

A Comparative study in the Diffusion of Information and Communication Technologies in Managing Medical Records in Kenya

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Abstract

Medical practice in hospitals depends on information, which is stored in medical records. Unfortunately, in many hospitals in Kenya, the effective management of records is hampered by several factors; the main one being inadequate application of information and communication technologies (ICTs) in the existing medical record systems. The aim of this study was, therefore, to investigate the extent of ICTs diffusion in managing medical records in hospitals in Kenya, with a view to identifying gaps that may be addressed in order to enhance the effectiveness of service provision in these institutions. The study focused on one hospital in the private sector – Aga Khan Hospital Nairobi (AKHN), and the other in the public sector – Moi Teaching and Referral Hospital (MTRH). The specific objectives of the study were to: establish the extent to which ICTs have been utilised in managing medical records; determine the organisational factors that influence the diffusion of ICTs in managing medical records; establish how the state of ICTs diffusion in managing medical records compares between the two hospitals, and make recommendations for enhancing diffusion of ICTs in order to improve the management of medical records in the two institutions. The study was based on the theory of diffusion of innovations, and a comparative case study research method was employed. Data was collected by means of structured and semi-structured face-to-face interviews, supplemented by analysis of documentary evidence. The Framework Analysis qualitative technique was used to analyse data and to make inferences. Data presentation is mainly descriptive, while interpretations are made by comparing the variables and their meanings and significance to the problem.

Among the findings are that the level of diffusion of ICTs is limited, occasioned largely by inadequate provision of requisite resources and infrastructure; inadequate involvement of stakeholders in the diffusion process; lack of physical access to ICTs, as well as lack of an overall ICTs culture among stakeholders. These findings help in indicating potential solutions to problems of ICTs diffusion in management of medical records.

Key terms: Communication, Diffusion, Information Technology, Kenya, Medical records.

Introduction

Medical records underpin the proper functioning of all information-related systems and services in a hospital environment. These services include curative, preventive, and rehabilitative health services, as well as provision of health information to patients and other users. Referral and teaching hospitals

have additional responsibilities, such as increasing accessibility and coverage of health services in the country, strengthening health management capabilities at the national level, and providing teaching and learning facilities for various learning institutions. This makes the maintenance of good medical record keeping systems of particular significance within the context of any health system. It is argued that the most promising way of effectively managing medical records generated and maintained in healthcare institutions, and especially in the two hospitals under study, is through the application of information and communication technologies (ICTs).

Background information on the study sites

The Moi Teaching and Referral Hospital (MTRH) is located in Eldoret town and is one of two national teaching and referral hospitals in Kenya (the other being Kenyatta National Hospital in Nairobi). The hospital was established by the colonial government in 1920 as a small cottage hospital with a 60-bed capacity to cater for the local population. It was upgraded to a National Referral and Teaching Hospital in 1998 in order to help in decongesting Kenyatta National Hospital. MTRH also provides teaching and research facilities for Moi University's Schools of Medicine, Public Health, and Dentistry, and other learning institutions.

MTRH relies heavily on the Health Records and Information Services (HRIS) department to provide the necessary medical record/information-related expertise as an essential input toward the successful accomplishment of its mandate. The department aims to develop a Health Management Information System that is geared towards provision of appropriate information services at various levels of the hospital's healthcare system.

The Aga Khan Hospital, Nairobi (AKHN), was established in the 1950s becoming one of the oldest and largest private multiracial medical institutions in Kenya. The hospital operates under the umbrella body of the Aga Khan Health Services of Kenya, a constituent part of the Aga Khan Development Network (AKDN, 2003). Through its state-of-the-art healthcare facilities, AKHN provides a wide range of quality clinical services, including teaching and research facilities for the Aga Khan University which was established in 2002.

The hospital's Medical Information and Records (MIR) department is responsible for gathering, classifying, composition and preservation of medical records and information, and for properly managing such records and information, as well as providing for their appropriate access and use. AKHN emphasises appropriate documentation in all activities, including medical records work, as an essential practice in its approach to institutional development.

Overview of medical records management

The management of medical records, while based on the general principles of records management, has unique characteristics, essentially because of the nature of medical records: each record contains information relating to only one patient. Medical records management is organised around the life cycle of a record, which begins with the creation (or acquisition) and use of the record, then moves to maintenance and storage, and ends with its permanent storage or destruction.

Creation of a medical record occurs when a patient is attended to or admitted for treatment in a hospital (Maxwell-Stewart, et al., 1996). The content of the record becomes the intellectual property of the patient or his/her representatives and the health professionals treating him or her. It is, therefore, important for hospitals to ensure confidentiality of patient information.

Proper maintenance is designed to ensure that medical record keeping systems remain efficient and effective, and it is therefore crucial to get the critical success factors of records management right (Parker, 1999). These include maintenance of good filing systems, development of records

retention schedules, the development of appropriate finding aids, and developing and implementing classification systems so that records and information are easily retrievable.

Appropriate storage of records improves the speed and accuracy of retrieval, and also helps to avoid damage to the physical record. Finally, disposition – the decision to select a record either for permanent storage or for destruction – is aided by retention schedules developed during the appraisal stage. This is done with due regard to the legal, clinical and research criteria as set out by hospital authorities.

The ICTs revolution and its impact on records management

Computer technology has been applied to medical records management since the 1960s. For example, the 1969 automated experimental system in some medical practices in the UK that were supported by IBM, and which was the first use of real time computing in general practice, led to computerisation of all summary histories of male records (Price, 1990). However, even with these developments, some obstacles continued to be experienced in areas such as record construction, form and report completion and patient data communication. Effective solutions to these problems began to be realised from the 1980s due to enhanced microcomputer applications, and the emergence of IT.

Today, many dimensions of medical records management are supported by ICT applications leading to dramatic improvements in access to medical advice and care. These include capturing, storing and communicating the contents of medical records, such as transferring diagnostic information to, and between, specialised centres, as well as access to authoritative sources of reference during patient record construction. Nevertheless, healthcare institutions in Africa and Kenya in particular have yet to fully realise the potential for ICTs in managing medical records. Indeed, the United Nations Economic Commission for Africa (UNECA, 2001) estimates that in general, the health sector in Africa is fifteen years behind other sectors in application of ICTs. This problem is more glaring in medical records/information management in particular as exemplified by the fact that there are too many deaths which could have been avoided through access to information that is held in medical records.

Statement of the problem

Medical practices at the Moi Teaching and Referral Hospital (MTRH), and Aga Khan Hospital, Nairobi (AKHN) depend largely on information that is stored in medical records. Healthcare personnel depend on these records to provide appropriate medical care to patients. The respective medical records departments have strived to put in place sound systems to ensure effective management of these records. Unfortunately, most of the existing systems are manual-based, and are thus afflicted by many of the problems associated with manual systems.

First, they have inadequate capacity to deal with the enormous explosion in the volume of paper records generated, resulting in uncontrolled accumulation of paper. Second, there is shortage of storage and working space, leading to difficulties in locating and retrieving records and/or information. Third, the manual systems also occasion inadequate reporting, which often results in lack of timely information that is crucial in the management and evaluation of healthcare services. Last, procedures and security of records are compromised due to factors such as lack of proper record tracking mechanisms which may lead to loss of important medical data/records. These problems hinder the achievement of optimum patient care at the two hospitals.

It is argued that ICTs hold the promise of addressing more adequately the problems articulated above. This study was, therefore, undertaken to address this situation.

Aim and objectives of the study

The aim of this study was to investigate and compare the state of ICTs diffusion in managing medical records at the Moi Teaching and Referral Hospital, and the Aga Khan Hospital, Nairobi with a view to identifying gaps that may be addressed in order to enhance the effectiveness of service provision in these institutions.

The specific objectives of the study were to:

- Examine the nature of existing medical records management systems at Moi Teaching and Referral Hospital (MTRH) and Aga Khan Hospital, Nairobi (AKHN).
- Establish the extent to which ICTs have been utilised in managing medical records at the two hospitals;
- Determine the organisational factors that influence the adoption of ICTs in the management of medical records at MTRH and AKHN;
- Establish how the state of ICTs diffusion in managing medical records compares between the two hospitals, and
- Make recommendations for enhancing integration of ICTs in order to improve the management of medical records in the two institutions.

Assumptions

The study was based on the assumptions that:

- Application of ICTs in the management of medical records in the two institutions under study is inadequate, and this has contributed to the inability by those responsible for managing medical records to offer quality services; and
- The shortcomings of the existing manual systems may be overcome through the diffusion of ICTs, leading to improvements in the management of medical records and thus in enhancing delivery of healthcare services at MTRH and AKHN.

Significance of the study

The study creates an understanding and appreciation of the need for ICTs diffusion in managing medical records to enhance effective and efficient service delivery. The study findings also emphasise the important role ICTs can play in maximising access and use of scarce medical knowledge that is held in medical records. The study may also assist in identifying sources of difficulty and potential solutions to problems related to the diffusion of ICTs in the management of medical records.

Scope and limitations

The study focused on making a comparative analysis of only two institutions that have attained the status of referral hospitals, one from the private sector (AKHN) and the other in the public sector (MTRH). The organisational factors that influence the diffusion of innovations which were deemed most crucial to this study were: communication channels, resource allocation, ICTs infrastructure, top management support, and decision-making process in ICTs diffusion. In addition, the study confined itself to medical records only, that is, those that are directly related to patient's medical care and not other types of records.

Literature Review

Nature and value of medical records

More than three decades ago, Kerling (1975) divided medical records into three major categories: primary, secondary and transitory. Primary records have long-term value and are useful in medical research, for example, those containing history of illness; nursing records and prescriptions; discharge summaries, and post-mortem reports. Secondary records are those with relatively short-term value and can last up to five years before beginning to lose their value. These include pharmacy reports, temperature charts, and x-ray reports. Transitory records (such as appointment notes) are of little value and may be destroyed after a short time, for example when the patient is discharged.

However, this categorisation would appear to have more theoretical than practical significance. A number of authors have pointed out the need to ensure that records are available to satisfy the legal, clinical and research needs of the medical community on the one hand, and on the other, the need to ensure that storage space is not taken up by unimportant records which then compromise the speed and accuracy of retrieval (Roper, 1999; Maxwell-Stewart, et al., 1996). Nonetheless, each of these categories of records contains a diversity of information (or clinical data), which is fundamental to the medical process.

Medical records are a patient-centred archive from which healthcare personnel derive information for effective patient management, whether in-patient or an out-patient (Davidson, 2000; Maxwell-Stewart, et al., 1996). The value of medical records is demonstrated by their many uses, including: patient management; conducting medical research and clinical teaching; medical and clinical audits; providing information for management functions (PEMR, 2003); conducting disease and health surveillance (Agius, 2001); evaluation of healthcare services, and data checking and cleaning activities to ensure validity of data. Nevertheless, the perceived value of medical records is sometimes shaped by the format in which the record appears. Bleich (1993) is quoted by the US Institute of Medicine (1994, p. 45) commenting that:

"The medical record is an abomination ... it is a disgrace to the profession that created it. More often than not the chart is thick, tattered, disorganised and illegible; progress notes, consultant's notes, radiology reports and nurses' notes are all co-mingled in accession sequence...."

Such sentiments may reflect the frustrations that physicians experience with regard to the use of paper-based medical records rather than to the actual value of the records. This explains the move to computerised medical records and information management as the most cost-effective way of obtaining the value inherent in medical records.

ICTs Application in medical records management

Many dimensions of medical records management are now supported by ICT applications. According to Vincent (1993), as early as 1968, King's College Hospital, London specifically attempted to restructure the medical record so that all elements of the patient's record were entered by the junior staff (in addition to their completing the conventional medical notes). The project pointed to some important practical hurdles of computerising the medical records, several of which remained challenging over the succeeding twenty years. For example, many healthcare workers did not have good keyboarding skills meaning that they lacked a proper way of collecting information at the point of patient contact. Consequently, medical information and records management has lagged behind other areas in healthcare institutions in application of computerisation (Hess, 2003).

Another hurdle related to the need to access and review computerised medical records. These have had to be browsed from fixed points and yet they should be close to the doctor/patient when they are

required. There also lacked an integrated patient data system that could be accessible online from any healthcare transaction. Efforts to address these problems have included application of various ICT-based medical records, notably the electronic medical record and electronic health record (Darr, et al, 2003; Miller and Sim, 2004; Peake and Kantor, 2003; Taylor, 2002; Landro, 2004; PEMR, 2004; and Venkatesh, 2003), as well as the use of personal digital assistants (PDAs) that can be used to carry information around (Galblum, 2002).

ICTs are thus increasingly recognised as important tools for improving patient safety and quality of care, especially by promoting the practice of evidence-based medicine (Miller and Sim, 2004), which relies heavily on access and use of medical records.

Determinants of effective ICTs diffusion in records systems

There are many factors which determine the effectiveness of ICTs diffusion in organisations. Although many of these factors are usually considered for specific ICTs applications, a good number of them can be generalised to all ICTs applications in any type of system or organisation (Lefebvre and Lefebvre, 1996). The most important of these factors revolve around two broad issues: organisational characteristics and decision-making process. Organisational characteristics have to do with size (the bigger the firm the more the resources and expertise, though smaller firms have less bureaucracy hence better reaction to innovations); communication (its importance remain consistent throughout the life of an innovation), and organisational innovativeness (which relies on a culture that both supports and rewards innovation (Wan, Ong and Lee, 2000; Brandyberry, 2003, and Lefebvre and Lefebvre, 1996).

The decision-making process in diffusion of ICTs is a strong determinant of the actual diffusion of these technologies. According to Rogers (1995), the innovation-adoption process can be divided into five stages: becoming aware of the innovation under consideration; forming a favourable or unfavourable attitude toward it; deciding to adopt the innovation; implementing the innovation; and deciding whether to keep the innovation after it has been implemented. These stages demonstrate the importance of employees' participating in technology-related changes such as adoption of ICTs in medical record keeping systems.

Challenges in ICTs diffusion in the management of medical records

Many health care systems boast state of the art diagnostic and treatment technologies. However, in some parts of the world and Kenya in particular, this has not extended to the management of medical records. There are many reasons for this.

First, diffusion of ICTs is expensive and balancing between costs and financial benefits is a major challenge (Miller and Sim, 2004). Some hospital administrators do not view medical record activities as "income generating" because the end product of using them is information, which is neither tangible nor quantifiable. However, where implementation of ICTs in management of medical records has been done, it has been demonstrated that this has led to substantial gains in areas such as enabling access to enormous wealth in the databases that are created about patients (Hess, 2003).

Second, there is the issue of interoperability between medical records management systems. Interoperability is the ability of one system to benefit from another. The proliferation of competing systems is unhelpful for medical records managers in making informed decisions as to the most appropriate system to acquire. It is apparent that the industry needs to reach agreement on a model system (Landro, 2004). However, since interoperability occurs at several levels there is need to determine whether the model system can be made to fit in all the levels.

The third challenge relate to ethical and medico-legal considerations. ICTs can make widely available from identifiable, linked and comprehensive health information databases but this poses risks to patient privacy (Mandl, Szolovits and Kohane, 2001; quoted by Darr, 2003). Access to patient data must therefore be restricted to only authorised persons. However, more economic data may be derived from the use of electronic records rather than over-emphasising their potential problems. After all, electronic records may not be more inherently unsafe than paper records. Fourth there is need to ensure that medical records personnel are well skilled to utilise ICTs in managing medical records in order to help them realise the potential benefits of new technologies.

Lack of appropriate infrastructure presents a significant threat to effective ICTs diffusion in managing medical records. The high costs involved in investing in ICTs, lack of resources to keep up with advances in the technology, national factors such as low tele-density and costly bandwidth, leads to little enthusiasm on the part of top-level management. Inappropriate managerial attitude for information management is also a major challenge. Healthcare institutions spend large amounts of resources to create and maintain medical records, but they are not effectively used. In some cases, top-level managers have not been sensitised to the opportunities and challenges of information resources and their management leading to inadequate allocation of resources to develop or acquire ICTs on a regular basis to help manage medical records better.

Theoretical framework

The study was based on the theory of diffusion of innovations, which helps to explain the complex social and technical processes that are involved in the diffusion of innovations. Rogers (1983: p.6) identifies four elements in the diffusion process, which also provide the basis for the definition of the term 'diffusion', as:

"the process by which (1) an innovation (2) is communicated through certain channels (3) over time (4) among members of a social system".

Three diffusion elements – communication channels, time, and social system, were considered crucial in this study in understanding the diffusion process of ICTs in the institutions studied. *Communication channels* – the conduit through which information about innovations is exchanged between people – was viewed as one of the factors that could determine the diffusion of ICTs in the two institutions. The *decision making process* is the component of *Time* (the third element) which was applied to help understand the types of innovation decisions made and how they affected the diffusion of ICTs in the two institutions under investigation. In applying the fourth element, *social system*, the study investigated how the social and communication structures of the two hospitals facilitated or impeded the diffusion of innovations. Moreover, the study took cognisance of the innovation process in organisations, by concentrating on the contextual environment of the two hospitals so as to link the two aspects (elements of diffusion, and innovation process in organisations) together.

Methodology

The study utilised a comparative case study approach, which Bryman (2001) says enables a researcher to better understand phenomena among two or more meaningfully contrasting situations. In this approach, similar variables were investigated at MTRH and AKHN respectively. Although this approach was time-consuming, expensive, and generates much data, it had benefits. Among the benefits was that it allows intensive and extensive data to be collected, which in turn lead to strong findings (Hancock, 1998; and Bryman, 2001).

The membership of the two units of analysis (MTRH and AKHN) from whom data was obtained comprised the following:

- Health/medical records and information departments staff – mainly responsible for managing medical records – totalling to 72 and 22 at MTRH and AKHN respectively, and
- Other staff who influenced diffusion of ICTs medical records systems, including clinical services staff (49 and 64 at MTRH and AKHN respectively), and top hospital administrators numbering 8 at MTRH and 6 at AKHN.

The study population was sampled as shown in table 1.

Table 1: Distribution of Sample Size between Moi Teaching and Referral Hospital (n₁) and Aga Khan Hospital, Nairobi (n₂)

Strata	Sampling Method Used	Moi Teaching and Referral Hospital (n ₁) Sample Size	Aga Khan Hospital (n ₂) Sample Size
Medical Records Departments Heads	Census	6	4
Clinical Services Staff	Purposive	2	2
Top Hospital Administrators	Census	3	3
Other Medical Records personnel	Systematic	19	11
Total		30	20

In the first stratum, a census allowed inclusion of all its members in the sample, because as heads of their respective departments and sections, they were deemed to be key informants. The second stratum comprised respondents who, by virtue of being both creators and users of medical records, as well as being involved in ICTs diffusion at clinical departmental level, had influence in the diffusion of ICTs in medical records work. The use of purposive sampling in this stratum was justified on the basis that it assisted in choosing information-rich respondents (key informants) that were felt to be extremely useful to this study.

The third stratum comprised top administrators who were directly responsible for evolving the institutional policies within which all ICTs projects operate, as well as providing the resources to acquire, implement and sustain such projects. These were the hospital CEOs, the ranking officers under whose docket medical records fell, and the heads of IT/ICTs. A census was applied to include all six members in the sample. Systematic sampling was chosen for the fourth strata because of its strength in providing an unbiased way of selecting the sample from a population that is fairly homogeneous (Patton, 1990; Hancock, 1998; and Bryman, 2001).

Data were collected through face-to-face interviewing supplemented by analysis of documentary evidence. The interviews consisted mostly of semi-structured questions, and a few structured questions. Despite high costs associated with personal interviewing, it has important advantages, including providing the highest response rate and high quality data which are both valid and reliable

(Oka and Shaw, 2000). It is therefore recommended in collecting qualitative data (Hancock, 1998; Montealegre, 1999). On the other hand, examining the numerous documentation generated during diffusion of ICTs provided useful insight into the institutional "thinking" on the opportunities and challenges provided by ICTs as well as the process of integrating ICTs into the medical records work routines. Data collection tools were interview schedules as well as reviewing documents such as departmental guides, job descriptions, memoranda and other correspondence, and reports.

Data analysis and interpretation

The Framework Analysis, which is a recommended qualitative method in applied research (Lacey and Luff, 2001) was used to analyse responses. The method involved the following stages:

- Familiarisation: whole or partial transcription of data;
- Identifying a thematic framework developed both from *a priori* issues and from emerging issues from the familiarisation stage;
- Indexing (or coding) – apply framework to data using codes;
- Charting – use framework to create charts of data, and
- Mapping and interpretation – search for patterns and explanations in the data to enable one to present ideas from the data to aid in interpretation.

Summary of major findings

The major findings discussed below have implications for those responsible for managing medical records and for policy and decision-makers in the two institutions studied, regarding factors that must be carefully considered in the diffusion of ICTs in managing medical records.

Nature of existing medical records management systems

The Moi Teaching and Referral Hospital (MTRH) had a decentralised system which was meant to ease records access and use. However, it occasioned scattering and duplication of patient data because at each consultation area, a patient record would be created. Consequently, there was little ICTs application since such decentralisation would imply huge capital outlay. The Aga Khan Hospital, Nairobi (AKHN) had a centralised system which consolidated patient data and saved on costs. This correlates findings by Zmud (1995) who found out that centralisation is positively associated with initiation of compatible administrative innovations. Nevertheless, this often leads to a lengthy process of access and use of medical records because the records are not available at the point of use. Obviously, both systems needed enhanced ICTs diffusion to make them more efficient.

Extent of icts diffusion in the medical records management systems

Diffusion of ICTs was mostly directed towards common administrative functions such as word processing and routine production of reports. This was particularly pronounced at MTRH where none of the records management areas had benefited from the diffusion of "live" ICTs. All the systems were essentially manual, tempered only by the introduction of retrospective conversion of manual patient registers at some registration areas. At AKHN, on the other hand, one of major medical records management stages – creation and use – had full ICTs utilisation which ensured that all requests for patients' records were automatically raised. However, as with MTRH, other areas of medical records management systems were essentially manual.

Among the reasons attributed to this poor state of ICTs diffusion were: lack of an overall ICTs culture within the two organisations; inertia by medical records managers to properly articulate the ICTs needs of the departments among the decision-makers, and lack of administrative will among policy and decision makers to give full attention to the possibility of ICTs diffusion in this area. Though AKHN was doing marginally better than MTRH in utilising ICTs in medical records functions, there was need for accelerated ICTs diffusion in both institutions to enhance the quality of medical records management functions.

Communication of information on ICTs

There were significant relationships between the communication channels available and ICTs diffusion practices at the two organisations, especially at different employee levels. For example, informal channels such as personal networks, mass media, and discussions were the most heavily used in obtaining and disseminating ICTs-related information among non-managerial medical records staff because they perceived them as being convenient and un-bureaucratic.

On the other hand, administrative and clinical staff used both informal and formal channels because they were able to access such channels due to their positions of responsibility or functions of their offices. The use of a channel, therefore, was determined by the level of employee's access to it and the channel's suitability for use at that employees' social (organisational) status.

Nevertheless, communication channels for obtaining and sharing information were not well developed or designed to suit all the employees in both hospitals. For example, only 17 per cent and 25 per cent of all departmental/section heads at MTRH and AKHN respectively, and none of the other medical records personnel had Internet connection (which arguably holds the most promise for obtaining the most appropriate ICTs-related information). This put some staff at an advantage in terms of obtaining ICTs information, thus making them more likely to be important players in the diffusion process. This finding agrees with the thinking by some diffusion researchers who point out that the level of inequality in a given society plays an important role in the diffusion of ICTs (Conceição, et al., 2004).

Resource allocation for ICTs diffusion in managing medical records

In general ICTs diffusion in both hospitals was hindered by inadequate resource allocation (human, financial and physical). For example, funding for ICTs accounted for only 3 per cent of total budget for the medical records department at MTRH, while at AKHN the allocation was only 4 per cent of the same. This demonstrated a less-than-clear relationship between ICTs diffusion and the strategic goals of the two hospitals. Additionally, at MTRH, there was perception by some middle level management staff that medical records services were a 'drain' on hospital resources arguably because they brought no tangible and direct financial benefits.

There was also inadequate technical support for ICTs-related activities, mostly due to high key ICTs staff turnover. This was compounded by lack of a critical mass of medical records personnel with the ability to support effectively the diffusion of ICTs in the workplace in both hospitals. These inadequacies were replicated with regard to provision of physical resources, notably ICTs equipment, accommodation and supplies. Generally, however, inadequacy in resource allocation for ICTs diffusion was experienced more severely at MTRH due to its largely decentralised records system.

Availability of infrastructure to support ICT diffusion

The two organisations had similar infrastructure which could be used to support ICTs diffusion in managing medical records including computers, networks, as well as hardware and software used for connectivity. Unfortunately, these components were not being utilised to support medical records

functions *per se* but rather in administrative work. Moreover, there was limited physical access and use of computing facilities by non-managerial staff, which hindered effective diffusion of ICTs. Even though this situation was being gradually improved – with computer-to-staff ratio standing at 1 to 4 at MTRH and 1 to 2 at AKHN – this was yet to impact greatly on ICTs diffusion in medical records work. Nonetheless, AKHN had relatively more up-to-date infrastructure compared to MTRH.

ICT policy was considered an essential component of ICT infrastructure. AKHN had in place a functional hospital-wide ICTs policy (which MTRH did not have) even though it was specific to medical records. Absence of ICT policy led to many negative effects, including duplication of efforts and unjustifiable expenditures. Conclusively, therefore, the technological architecture which could be expected to support the two hospitals' medical records and information systems in a future ICTs-based operation was generally weak and in need of enhancement.

Nature of Decision-making process in ICTs diffusion

Only the medical records managers and some section heads who were members of the task forces, as well as clinical departmental heads and top hospital administrators were involved in making vital decisions regarding ICTs diffusion. Non-inclusion of employees in the lower levels in the decision-making process was occasioned by the belief that due to their lack of technical expertise or knowledge on ICTs, their contribution to such a process would be minimal. This top-down, non-participative approach to decision-making impacted negatively on ICTs diffusion and is contrary to empirical findings that stress the importance of all employees' participation in entering into a process of change like the one technology generates (Lefebvre and Lefebvre, 1996).

Nature and level of top management support in ICTs diffusion

Top management support strongly influences the diffusion pattern of innovations and where that support is wanting, the diffusion process is compromised. Findings indicated that top management support for diffusion of ICTs was inadequate in both cases, as evidenced by the fact that very few ICTs tools and services were available. Among the reasons advanced for this situation were lethargy and lack of understanding of the role of ICTs in managing medical records among some members of management who were responsible for policy implementation; inadequate profiling of medical records functions by medical records staff leading to ignorance by some members of management on the need to provide ICTs tools, and perceived high cost of ICTs. Other reasons were inadequate support from IT departments and inadequate articulation of the medical records department's ICT needs to hospital management. It is clear that what King and Anderson (2002) refer to as 'support for innovation' – the degree of practical support from management for innovations – was inadequate at both MTRH and AKHN.

Conclusion

The thesis of this study was that the inefficiencies being experienced in the management of medical records at MTRH and AKHN may have been occasioned by inadequate diffusion of ICTs. In order to test the validity of this thesis, the study examined a number of factors that affect the diffusion process, and also investigated the state of diffusion of ICTs in the major records management functions. The thesis has been borne out by the research findings.

In particular, it has been demonstrated that diffusion of innovations requires what O'Brien (1996) refers to as an understanding of people, hardware, software, communication networks and resources that collects, transforms, and disseminates information. These were not the only factors investigated, but the statement helps to show the complex nature of the diffusion process in the medical records keeping systems in the two organisations.

Findings have demonstrated the fact that paying much greater attention to the ICTs needs of the medical records departments in respective hospitals is vital for more effective management of medical records, and also for enhancing service delivery, recognising that medical records are the mainstay of effective and efficient healthcare system. Specific actions are urged through suggested recommendations.

Recommendations

Arising from the findings of this study, the following recommendations are suggested, with due regard to their practicality and achievement.

Design and use of appropriate communication channels

There is need to develop and encourage the use of appropriate communication channels to guide the optimised acquisition and dissemination of both internal and external ICTs-related information available through a variety of sources. The following channels, derived in part from the work of Timm (1996), are among those recommended for adoption/adaptation by both institutions:

- Downward channels such as job descriptions; procedure and policy manuals; seminars, meetings and training activities;
- Upward channels such as ICTs task forces; meetings, and suggestion programmes;
- Interpersonal channels such as presentations, and training programs;
- Mediums for disseminating ICT applications such as intranet, the Internet, and other information storage and delivery technologies; and
- General communication media, such as newsletters and in-house magazines.

Where specific channels already exist, they need to be improved to add quality to the communication of innovative information.

Provision of adequate resources for innovation and technological modernization

ICTs diffusion can not be successfully achieved unless adequate resources are allocated. The following strategies could help the records managers at MTRH and AKHN to ensure sustained resource allocation:

- Raise the medical records departmental profile throughout the hospital, and especially among the top managers, so that the relevancy and importance of these departments can be realised;
- Prepare budget items to cater for ICTs; and
- Provide medical records staff with basic technical ICTs expertise as insurance against collapse or interruption of ICTs-related systems when technical manpower is unavailable.

Additionally, respective hospital managements need to:

- Ensure recruitment and maintenance of professionally trained and motivated ICTs personnel who can provide uninterrupted expert support
- Ensure that provision of physical resources become a regular part of the two institutions' planning process; and

- Have purpose-designed and built medical records centres to ensure proper coordination of workflow processes, especially with regard to access and use; maintenance and storage of electronic medical records.

Provision and improvement of appropriate icts infrastructure

ICTs infrastructure must be provided, maintained and upgraded continuously as part of the diffusion process. The following is a priority list. First, since diffusion of ICTs depend on well-developed infrastructure (Accenture, Markie and UNDP, 2001), there is need to upgrade or replace the technological infrastructure on which diffusion can take place. Second, there should be better utilisation of internally available hardware tools and services. For example, connectivity that already exists in the medical records departments can be used to network to other key areas such as consultation rooms and specialised clinics as a first step in creating links between the creators and users of medical records and information. There is also need to improve physical access to computing facilities and other ICTs tools and services by employees at all levels. This will help staff acquire ICTs skills on the job and sustain their interest in the use and potential applications of ICTs at the workplace and thus encourage a more innovative culture among staff. Third, adoption and adaptation of non-proprietary software is encouraged as a cost-cutting measure and progress towards an innovation-based service.

Formulation of ICTs policy

Absence of an ICT policy was shown to lead to the diffusion of ICTs in a rather pedestrian manner, devoid of strategic purpose. Even where such a policy exists such as at AKHN, it has not addressed itself specifically to the management of medical records. The two hospitals need to develop flexible ICT policies to help in the following:

- Strengthening the basis for decision-making by both healthcare professionals and administrators as a result of information provided;
- Promoting ICT information exchange among all stakeholders, and
- Enhancing the effectiveness of the two healthcare institutions;

Where such policies exist, they must be constantly reviewed in keeping with technological trends such as advances in hardware platforms and new or upgraded software. The medical records departments at the two hospitals can also provide leadership by having their own standards and guidelines which could form a basis for the development or updating of institutional-wide ICTs policy framework.

Implementing ICTs education and training programme for staff

Technological change is skill-biased in the sense that new technologies create the demand for new skills which may be in low supply at the moment when the new technologies begin to diffuse (Conceição, et al., 2004). Bearing this in mind, it is imperative that MTRH and AKHN implement a strategy concerning acquisition of ICTs education and training. Such a strategy is vital for promoting an innovative culture, reducing the 'digital divide' existing between employees at different social (institutional) levels, and working with 'new' technologies or coping with changes. Possession of ICTs-literacy should also become a job-related requirement for all prospective employees. Even other staff need to have basic computer literacy as this is necessary in the use of ICTs tools and services once they are implemented.

Involvement of all stakeholders in decision-making

Diffusion of ICTs in managing medical records must be intentional rather than accidental and so it makes sense to ensure that everybody whose work will be affected by the diffusion of these technologies are consulted before initiation, during actual diffusion, and after adoption of the ICTs. Employees support decisions that they have taken part in formulating and such involvement minimizes interference during implementation. It is especially important to engage the lower cadre as much as the gate-keepers (namely middle-level administrators and/or supervisors) since those are the ones who handle the day-to-day diffusion activities. They can also play a vital role in providing evidence of areas that need greater attention with regard to ICTs diffusion.

Strengthening the medical records and information management committees

In order to ensure sustained corporate support for ICTs diffusion, the committees responsible for policy formulation and decision-making in the management of medical records and information services at the two hospitals should be strengthened in a number of ways. Their mandate need to be expanded so that they are not just responsible for prioritising the development and/or acquisition of ICTs, but also be more involved in helping the two institutions become effective in using ICTs, in designing ICTs policies and strategies, in diffusing ICTs throughout the two organisations, in promoting partnership between the creators and users of the records and in ensuring an-all inclusive employee involvement in planning and implementing ICTs projects.

The role of medical records managers in such committees should be enhanced in order to enable the status of the respective medical records departments to be raised, recognise their functions as integral to the organisations' mission, and give them a voice at the highest administrative level, in matters pertaining to ICTs diffusion. There should also be ICTs liaison staff in all medical records sections to help articulate the departmental-wide ICTs.

Encouraging innovativeness among all employees

There is an urgent need for the two hospitals to enhance innovative behaviour among its members as a way of encouraging positive attitude towards ICTs diffusion. Techniques for this include: encouraging team spirit through participative management and decision-making; identifying and developing change agents – those responsible for overseeing the introduction of changes in an organisation (King and Anderson, 2002) and idea champions – individuals responsible for introduction of innovations (King and Anderson, 2002). Finally, fostering and championing ideas of all employees should become a core management function as a catalyst to wider and more intensive ICTs diffusion in managing medical records.

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