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A Socio-Technical Approach to Continuity of Care and Electronic Records in the South African Context

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Abstract

Paper-based techniques of record keeping are contributing greatly to the discontinuity of patient care among healthcare providers. To achieve continuity, access to the information contained in medical records collected by various healthcare providers is necessary. To improve the sharing of information contained in these medical records the use of electronic methods of record keeping as opposed to paper-based records becomes very important. Even though the benefits of using electronic methods of record keeping are widely documented, the majority of South African healthcare practitioners still use paper-based methods. This paper describes an explorative study to determine barriers to the adoption of electronic records in the private primary care sector of South Africa. An interpretive approach using a socio-technical systems theory perspective was used to conduct the study. Based on the analysis of the socio-technical subsystems in the South African context it was revealed that there is not sufficient information available on the barriers to adoption of electronic records and further research will be necessary to identify the barriers to the adoption of electronic records.

Keywords:

Computerized medical records systems, Medical records, Medical informatics

Introduction

Saltman, Rico, and Boerma define continuity as "the degree to which a series of discrete health care events is experienced as coherent and connected, and is consistent with the patients' medical needs and personal context" [1]. Continuity of care can further be defined based on various dimensions, including informational, longitudinal, and interpersonal continuity [2].

To achieve informational continuity it is necessary that relevant medical, social, and personal information about a patient be available to a healthcare provider at the point of care to ensure appropriate care for the patient. Longitudinal continuity refers to patient care delivered at a single point of care, involving a single medical record over a period of time, leading to growing knowledge of the patient by the healthcare provider(s) delivering the care. Longitudinal continuity should not be confused with interpersonal continuity. Longitudinal continuity simply implies a pattern of visits over time, while interpersonal, or relational continuity, refers to a particular type of longitudinal continuity. Interpersonal continuity involves an ongoing relationship based on personal trust between a patient and a healthcare provider. The patient normally trusts the healthcare provider to assume responsibility for the patients' overall health care [1-4]. According to Saultz these dimensions of continuity can be arranged in a hierarchy of increasing complexity starting with the need for informational continuity to ensure longitudinal continuity. It is also implied that longitudinal continuity is required to ensure interpersonal continuity [2, 5].

In the past the various dimensions of continuity was easily achieved since most patients received the majority of their care from the same healthcare provider from the cradle to the grave. In modern society it is highly unlikely that a patient will receive care from the same healthcare provider from cradle to grave. Even at a primary care level there is a trend towards the development of group practices where patients do not necessarily consult with the same General Practitioner every time that they visit the practice. Patients also move between different practices and healthcare providers freely. All of this makes it increasingly difficult to achieve longitudinal and interpersonal continuity of care. Informational continuity of care is thus becoming more and more important to ensure consistent, high-quality care for patients delivered by various healthcare providers [6-8]. When patients move between healthcare providers it often results in a loss of information leading to gaps or discontinuities of care [9]. To achieve informational continuity access to the information contained in medical records collected by the various healthcare providers are necessary. To improve the sharing of information contained in these various medical records the use of electronic methods of record keeping as opposed to paper-based records becomes very important [8, 10].

While various forms of Information and Communication Technologies (ICTs) are used in the South African healthcare industry to perform financial and administrative functions such as billing, the majority of South African healthcare practitioners still use paper-based methods of record keeping when it comes to patient's medical records. Paper-based

techniques of record keeping are contributing greatly to the discontinuity of care among healthcare providers and are widely considered to be inadequate in the face of an industry that is continually growing in both complexity and sophistication [11, 12]. Even though it is clear that paper-based patient medical records are becoming increasingly inadequate healthcare providers in South Africa have rarely made an effort to adopt the necessary technology, such as electronic medical records (EMRs), which will enable them to store patient medical records electronically. Many healthcare providers do not even have a computer in their consultation room. According to research by Cochrane and Ramokolo analysts estimate that only between 7% and 10% of general practitioners and specialists will be purchasing Electronic Health Records (EHRs) within the next three to five years [13].

A literature review indicated that research in the South African context is mostly focused on the implementation of hospital information systems [14] and telemedicine systems [15] in public healthcare. There is a lack of research focusing on the reasons behind South African healthcare providers' hesitance to move away from paper-based medical records.

Research Objectives

This paper describes an explorative study to determine barriers to the adoption of the necessary technology to replace paper-based patient records with EMRs in the private primary care sector of South Africa in order to improve informational continuity of care. The authors will focus on a primary care level as a starting point since primary care is the main entry point into the healthcare system for the majority of patients and it is at this level that the bulk of a patient's medical record is generated. The focus will also be on primary care in the private healthcare sector of South Africa since very little or no research in health informatics in South Africa focuses on the private care sector. Another motivating factor for focusing on the private primary care level is the South African government's plans to implement a National Health Insurance (NHI) in the future. Once the NHI is implemented more and more patients that were previously served by primary care facilities in the public care sector will now be served by primary care facilities in the private sector. This will also make EMRs even more necessary to improve informational continuity of care as patient will move back and forth between public- and private healthcare facilities.

Materials and Methods

An interpretive approach was used to conduct the study and a socio-technical systems (STS) perspective was used to investigate barriers to the adoption of EMRs in terms of the social, technological, and environmental subsystems. Since this paper forms part of the exploratory stage of a more comprehensive research project, the primary technique of a literature survey was employed as a suitable research method. A literature study of books, journals, the Internet and electronic databases was conducted to determine the barriers to the adoption of EMRs in South Africa. The findings of the literature study are subsequently described. The conclusions drawn from the observations made in this paper will contribute towards the design of further instruments to gather data (for example, surveys and structured interviews).

When significant changes are introduced in an organization that involves work redesign, it has been suggested that a socio-technical systems approach should be followed to ensure successful adoption of the changes [16, 17]. Originally developed over 30 year ago at the Tavistock Institute of Human Relations in London by Emery and Trist, with significant contributions also made by Cherns, the concept of STS was originally associated with organizational development and the re-design of work systems in offices, manufacturing environments, and the mining industry to improve the performance and effectiveness of organizations.

STS theory is based on the argument that an organization is open to influences from its environment, and that the organization is a combination of both social and technical components that must work together to accomplish tasks. The organization is thus divided into three interdependent subsystems, namely the social, technological, and environmental subsystems. The social subsystem represents the people inside the organization using technology and knowledge, the technical subsystem, to produce a product or service valued by the environmental subsystem, which includes customers, suppliers, government bodies, and other stakeholders that interact with the organization [16-19]. The concept of joint optimization also features very strongly in STS theory to ensure that the organization is designed in such a way that both the social and technical subsystems are optimized, instead of simply designing the technical subsystem without any regard for the social subsystem and then simply fitting the people to the technical subsystem afterwards. The manner in which the social and the technical subsystems interact with each other to meet the demands of the environmental subsystem plays an important role in the overall success of the organization.

Results

The introduction of an EMR (technical subsystem) will involve a significant change in the way that the healthcare provider performs his daily tasks, as well as in the tasks performed by the employees of the practice (social subsystem). Various stakeholders such as patients, medical aids and other healthcare providers will also be affected, and various policies and regulations as specified by the South African Government and Department of Health (DoH) will also have to be considered (environmental subsystem). The technical, environmental, and social subsystems in the South African context will be discussed in this section.

The technical subsystem

As previously mentioned, publicly available research focused on the South African context is mostly directed towards the implementation of hospital information systems and telemedicine systems in public healthcare. In the public sector there is literature available on a few cases of Electronic Health Records (EHRs) being installed in some hospitals [13]. An EHR is defined as [20]: *"A comprehensive, historical file of personal health information stored electronically that is*

compiled from the multiple healthcare providers treating a patient or evaluating their conditions over the course of that patient's health history." The literature is not clear on the context that the term EHR is being used in, and it could also be that they are actually referring to an Electronic Medical Record (EMR). An EMR contains patient information kept electronically by a single provider, such as a clinic, hospital, general practitioner, or other provider [21]. Pathology, radiology, or other laboratory test results can be uploaded into the EMR where the functionality is available. An EHR is a superset of various episodes of care provided by various healthcare providers [22].

Perceived technical barriers to the implementation of EHRs in South Africa include the relatively poor standard of Internet connectivity, as well as the high probability of hardware theft. For an EHR to be feasible it is imperative that all users are able to access the EHR online, but in South Africa Internet connectivity is expensive, relatively unreliable and slow [13].

The environmental subsystem

Patients form part of the environmental subsystem and during 2006 a study into the attitudes of South African patients towards using paper-based and electronic medical records was developed by Accenture and executed by AC Nielsen. The findings of the study will be discussed below [23].

The problem of discontinuity of care was highlighted by the study wherein 51% of respondents indicated that they repeatedly had to recount their medical histories when visiting different healthcare providers. Apart from the time wasted, the fact that most patients do not have the knowledge to recount their full medical histories accurately, and in sufficient detail, is a major problem. According to the study, South African patients see electronic health records as a solution to many of the problems associated with paper-based health records. In fact, 50% of respondents on medical aid are willing to pay between R20 and R100 extra per month to have their health records maintained electronically. One would assume that it would be respondents in the highest income groups that are willing to pay for electronic medical records. This is not the case. It is, in fact, the mid-income groups that are most willing to pay for this service.

Concerns relating to the use of paper-based health records range from those of privacy and confidentiality, to that of a healthcare provider not having vital medical information available at the point of care. The overall perception amongst South African patients is that electronic medical records will improve the quality of healthcare that they receive. This perception is not isolated to a single racial group, but is common to all the major racial groups in South Africa. Patients are also of the opinion that electronic records can ensure better privacy, confidentiality and integrity of health data than paper-based records.

The results of the survey demonstrate the importance of finding a solution to the problems associated with paper-based techniques of record keeping in the South African healthcare industry. With 54% of respondents being very to extremely concerned about the fact that their various healthcare providers do not have their full medical records, the problem of discontinuity of care is certainly an issue that should be addressed.

Another stakeholder that forms part of a primary care practice's environmental subsystem includes the South African DoH. According to Dr Shaheen Khotu, chief information officer for the DoH, some of the problems with the current paper-based system (in the public sector) include the time spent by healthcare personnel to locate patient records, instead of spending the time looking after patients, as well as the negative impact on the quality of care that patients receive due to a lack of vital information and misinformation [24]. There are also various initiatives in the South African public healthcare sector to replace inefficient paper-based patient records with electronic patient records. So, while there are efforts made in the public sector to improve continuity of care, the same cannot be said for the private sector.

The social subsystem

As very little publicly available information on the barriers to implementation of EMRs in the private sector in South Africa could be found, it was decided to draw a preliminary analogy from literature covering the international scene. The major concern from healthcare providers in the private sector centres around the costs involved in implementing EMRs. Perceptions are that these systems require considerable investment, without significant evidence of value, cost effectiveness, or Return On Investment (ROI) [3, 10, 11]. Adopters of these systems are not reimbursed for the cost and time spent to implement and use the systems, which also cause reservations towards adopting EMRs. There are also concerns about the usability of these systems and the impact that the use of an EMR will have on the consultation with a patient [25]. Literature on the South African perspective that the authors were able to locate echoed the international concerns. High start-up costs and concerns about the usability of these systems all indicate that it will be necessary to find an incentive to convince private practices to adopt EHRs and EMRs [13].

Discussion

Paper-based techniques of record keeping are contributing greatly to the discontinuity of care among healthcare providers and are widely considered to be inadequate in the face of an industry that is continually growing in both complexity and sophistication [11, 12].

It has been widely cited that the use of EHRs can improve the quality, safety and efficiency of healthcare delivery [21, 26]. An EHR is expected to enable continuity of care by consolidating all of a patient's health information in a single place. This will ensure that a provider has all the relevant information on which to base decisions when treating a patient. While this is the ideal, the reality is that this level of inter-provider interoperability is not likely to be achieved in the foreseeable future [27]. One of the barriers that must be overcome before the potential of an EHR can be realized is the lack of EMR implementation [27, 28].

While an EMR contains patient information kept electronically by a single provider, an EHR is a superset of

various episodes of care provided by various healthcare providers [22]. The American Society for Testing and Materials' (ASTM) Continuity of Care (CCR) and Health Level Seven's (HL7) Clinical Document Architecture (CDA) standards may be used to incorporate information representing various episodes of care contained in various EMR's in a single EHR [29].

Other components that can aid in improving continuity of care include personal health records (PHR) and electronic prescribing (e-prescribing).

A PHR is an electronic application, normally Web-based, that allows an individual to capture, access, and manage his own health information [28]. A PHR is owned and controlled by the individual and represents a repository of the individual's health information and allows the individual to have a lifelong summary of all of his health information in one convenient place. An individual can allow his healthcare provider access to his PHR, which can be a valuable source of information for improving care [27, 28].

While e-prescribing does not directly contribute to the continuity of care, it is still considered an important contributor to the vision of an EHR. E-prescribing is a valuable step towards medical practice automation, and even healthcare providers that are skeptical about implementing EMRs appreciate the benefits of e-prescribing, which can aid in recognizing the benefits of interoperability between healthcare providers. While continuity of care plays an important role in the quality of care that a patient receives, the importance of e-prescribing should not be overlooked as it reduces errors caused by handwritten prescriptions, and it is possible to build a history of all medications that have been dispensed to a particular patient. This enables the automated checking of interactions between medications and also ensures that an accurate medication list can be available at the point of care [20].

Figure 1 depicts a model of how the technological components that have been discussed above could work together to improve informational continuity of care while a national EHR is not available yet. If healthcare practitioners can be convinced of the benefits of adopting EMRs, standards such as CCR and CDA could be used to share information between healthcare practitioners to improve informational continuity of care.

While it is clear that the necessary technology and standards are available to make up the technical subsystem, further research will be necessary to determine whether private primary care practices in South Africa are aware of the benefits associated with EMRs and willing to spend the necessary funds on the hardware, software, and training necessary to make use of EMRs. In terms of the environmental subsystem there seems to be support from patients and the DoH for the use of EMRs, but the authors will use landscaping techniques to identify and investigate additional environmental stakeholders in the South African context that may have an impact on the implementation of EMRs, for example medical aids and other healthcare providers involved when patients are referred from primary care level. Very little research has been done to investigate the social subsystem. Observations made from international literature will contribute towards the design of further instruments to gather data on the social subsystem and barriers to the adoption of EMRs in South Africa.

Conclusion

Based on the explorative analysis of the social, technical, and environmental subsystems in the South African context it was revealed that there is not sufficient information available on the barriers to adoption of EMRs in private primary care in South Africa. Further research efforts will focus on gathering further data on the barriers to the adoption of EMRs in order to develop a socio-technical framework to encourage adoption of EMRs to improve informational continuity of care.

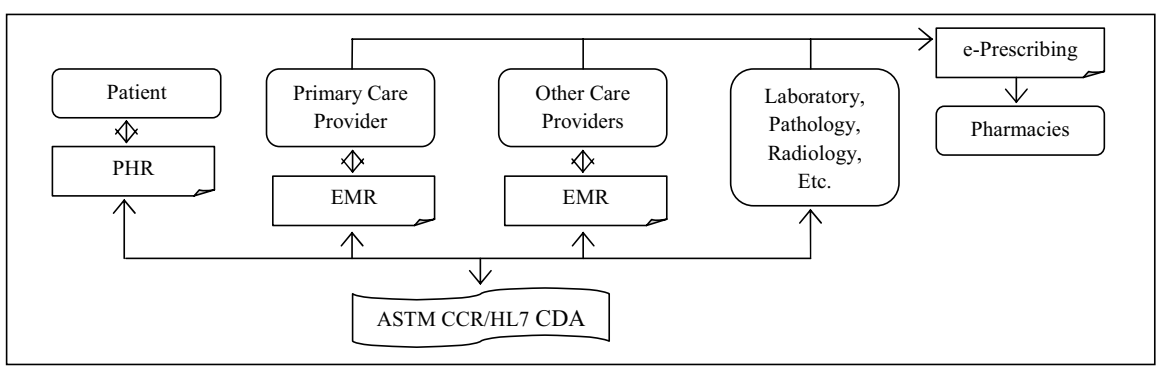

Figure 1 - A technological model to improve continuity of car

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