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Electronic Patient Records

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Introduction

Prior to the development of the Electronic Patient Record (EPR), the technology used for recording information pertinent to patient's health was the Paper based Patient Record (PPR), and prior to PPR doctors maintained their own notes on patients in the form of logs or diaries. The PPR was a technology that emerged in Western medicine during the earlier decades of the 20th century and very quickly became standard practice.

The record tells the story of the patient's journey through the healthcare system and allows for a diverse group of health professionals to keep track of the trajectory of the patient's travels within the system (Berg, 2000). Specialization has led to the development of an even broader group of professionals who partake in the patient's journey and who require access to the patient's information. As a result, the patient's record has now become an even more vital component in the provision of care. To facilitate the sharing of information, various regulatory frameworks have been created and guidelines have been established, such as the standardization of medical terminology. This in turn further facilitates the use and development of the health record.

While the PPR has been the standard medical practice for decades, and has contributed to the creation of new professions, tasks and work routines, medical standards, forms, and has even impacted the design of healthcare settings (Berg, 2000). However, there is now a shift to the substitution of the paper based record with electronic forms. The need for EPR is fuelled by the

movement towards a multitude delivery method of care, where many professionals with specialized knowledge are involved in care delivery (Oates & Jensen, 1997). Healthcare professionals dispersed across a wide geographical area need structures in place for regular communication and exchange of patient information and EPR is viewed as facilitating the cooperation between these diverse groups.

Many benefits have been listed for the utilization of electronic records, the primary benefit being that of more access to patient information. The underlying premise is that more and higher quality information leads to better patient care. Information recorded and stored in an EPR system is used to "facilitate patient care, serve as a financial and legal record, aid in clinical research, support decision analysis, [and] guide professional and organizational performance improvements" (Kiger, 2003, 20).

Throughout the literature various terms are used to refer to automated health information systems: Electronic Patient Record (EPR), Electronic Medical Record (EMR), and Electronic Health Record (EHR). While these terms might be used interchangeably, there are slight differences between each system. The common characteristics among them are that they are all used to collect, store and manage patient information. EPRs and EMRs contain patient information gathered and accessed from a single site, or information transferred from another site.[1] EHRs contain longitudinal personal health data across the continuum of care. A network of EPRs and

EMRs and other data stored through other clinical technology forms the EHR, where a unique identifier is used for each patient, making the sharing of information possible.

Family practices are one of the most common settings for using EPRs. As one of the components of primary health care in BC, however, family practices, which provide the first point of contact for many patients, for the most part lie outside the jurisdiction of the Health Authority. While funding can be provided to practices for setting up EPR systems, in order to develop a nation wide EHR, these dispersed systems along with the many others implemented in other healthcare setting have to be integrated. Within Vancouver Coastal Health (VCH), PARIS system is being widely implemented in Community Health Centres, while PCIS has been implemented in some hospitals and the WOLF system in medical offices. Consistent implementation of systems within the authority is possible, however, once outside the authority of VCHA, this consistency can no longer be guaranteed. With the implementation of different software there is an additional layer of complexity, such as the development of interfaces between the different software to enable the exchange of information. As one of the key objectives of the Primary Health Care Network of VCH is pursuing the integration of the continuum of services, and information technology is viewed as one of the enablers for this integration, it is important to develop a better understanding of the issues surrounding the implementation of EPRs.

[1] Throughout this paper the term Electronic Patient Record (EPR) has been used to encompass both EMR and EPRs.

This paper is not a critical analysis of EPRs, nor one that lists all the potential benefits that can be derived from such systems. The paper is based on a review of various studies conducted on the implementation of EPRs and is an overview of the lessons learned during such implementations. It is important to note that a successful system in one organization would not necessarily be successful in another organization and as such best practices are always relative (Holland, King, & Sweeney, 2000). These lessons are by no means comprehensive, nor are they tailored to specific circumstances. They are some of the more general lessons that can be applied in implementations. The paper is broken down into two sections, one focusing on the lessons learned at the macro level, where top-down change occurs, and the other section focuses on local level of practice.

Lessons learned

Various models have been proposed for technology implementation projects. Linear models suggest a staged process to implementation, where the project generally starts with the identification of business strategies, an assessment of needs, planning and development of design specifications and implementation plan, system design, which involves the technology specifications, and vendor selection, and implementation. Finally, the evaluation stage measures performance of the new system against the objectives set out prior to implementation. The downside of linear models is that they fail to take into account the complexity of organizations and the

variety of non-standard work practices undertaken in the completion of work procedures.

Contrary to linear models for change, the Socio-technical approach to technology implementation places the user at the centre of the model, and users' involvement is solicited throughout the change process. This model emphasizes the requirement for the development of further insight on the specific network of practices prior to undertaking development. An iterative approach to development is recommended, where changes to technology and work practice evolve together and no clear distinctions can be drawn between the different stages of analysis, design and implementation, and evaluation: they become concurring activities. (Berg, 1999). Stakeholder involvement at various levels within the organization is paramount for the success of such change initiatives.

The challenge in any change implementation project is the tension between change that is initiated and planned at the top (top-down approach) with that which is deemed as required and embraced at the bottom (bottom-up approach). Successful change occurs when the general directions are set from the top and people are engaged from below, thereby, structural change occurs concurrently with cultural change (Beer & Nohria, 2002). While this holds true within an organization, it can also be applied to individual organizations in relation to the larger structural bodies to which they are accountable. For the purposes of implementing EPRs within primary care settings, ideally, structural and systemic changes are set at the larger health

authority or province wide level, informed by the requirements of the individual organizations. As such, while the health authority or province will be in a position to set out the general direction for change and take the lead on implementing strategic and systemic change, primary care practices will have the autonomy to drive the change process based on their local needs. However, one of the challenges is providing for autonomy at the local practice while at the same time ensuring that this autonomy does not introduce additional challenges when integrating the individual local systems to develop a nationwide system. This is particularly difficult in the case of EPR implementations in family practices, since the health authority has no jurisdictional power and authority over private practices.

Maintaining a healthy tension and relationship between these two levels of change is vital for the success of the change initiative. The challenge is to work with the existing tensions rather than seeking a simple 'either-or' answer that might temporarily remove the tensions at one level (macro) while creating more problems at another level (micro) (Riis, Hildebrandt, Andreasen, & Johansen, 2001). Changes that are initiated at the grassroots and front line level are generally difficult to sustain over the long term if not supported by larger institutions, while institutional level changes are complete failures if not supported at the grassroots level. Change implementation projects will not happen without people who are willing and committed to making the change and living it. This becomes even more evident once we learn that lack of top management commitment to

technology implementation projects and failure to gain user commitment and involvement are two of the most cited reasons for the failure of technology implementation projects in the US (Dorsey, 2002).

Combining top-down and bottom-up change initiatives requires an acute sensitivity to situational factors, where different approaches are required based on the circumstances (Hayes, 2002). Certain situations require management to demonstrate determination and act upon it. On the other hand, as important as it is for employees to have managements' support, they also need to sense ownership over projects by being given the ability to actively participate in the problem definition and change process. For example, in the United Kingdom, despite the rapid growth of computers and the implementation of EPRs in general practice for over a decade, the absence of nation wide standards resulted in the incompatibility of the different systems and consequently the lack of integration of the different systems. To ensure nation wide data consistency among systems, the National Health Services has now set nationwide standards, imposed from the top-down. This is a good example of a top-down action that facilitates work processes at the local level.

MACRO – Health Authority level

In implementing structural changes, the health authority will have to make decisions and enact them, while at the same time create a space that provides practices the autonomy required to make decisions based on local requirements. As the health authority has no jurisdictional power over

individual family practices, the direction that is set out by the health authority cannot be enforced unless contracts are developed between individual family practices and the health authority or the provincial government takes the lead in mandating structural directions. A similar approach was employed when the Pharmanet system was implemented in all pharmacies across British Columbia.[2]

To optimize the benefits that can be obtained from EPRs and for patients to experience a seamless journey through the healthcare system, there is need for an integrated system. With this realization, within the NHS, a consistent approach has been employed for the procurement and implementation of systems. In the NHS, the Primary Care Information Modernization team helps primary care organizations in defining user requirements for systems and advises on best practices. One of the benefits of having different practices use similar systems and applications is that the health authority can help coordinate purchases, thereby, achieving economies of scale. Furthermore, a unified approach would decrease the complexity in delivering support, and would create for a far less complicated integration environment. For example, to ensure more consistency between systems, in Ontario, Canada, the e-physician project, a collaborative project between the Ontario Ministry of Health and Long-Term Care, the Ontario Medical Association and the Ontario Family Health Network, is responsible for

[2] Pharmanet is a network of computers that links all pharmacies in British Columbia, providing them access to real-time information on all prescriptions dispensed to individuals at any pharmacy in BC. Pharmanet was developed by B.C.'s Ministry of

developing cost effective information technology solutions for physicians in primary care.

Standards

The macro level changes that have contributed to the shift to electronic record keeping have also created an opportunity for vendors to develop software systems for record management solutions. These systems provide various functions and capabilities, ranging from scheduling and billing to clinical analysis and reporting. As more and more off-the-shelf software packages, which incorporate best practices, are becoming available in the market, the make or buy decision is becoming more straightforward. The health authority is not in the business of software development and with the strategic direction of focusing on core competencies and moving towards the outsourcing of non-core services, purchasing an EPR system rather than initiating the development of a custom build record system, is the most efficient route to take. The problem, however, is that suppliers in order to distinguish themselves and their products, and as a result of intellectual property rights, generally offer products that are based on different standards and are not compatible. This leads to additional complexity in the integration of the various local systems. To enable all parts of the healthcare network to communicate with each other efficiently, securely and cost effectively, it is important to have local systems in place that do not require complex interface technology to be able to communicate with each other.

Health Services, with the objective of preventing prescription drug abuse and fraud and adverse drug reactions (Ministry of Health Services, 2003).

One of the key barriers in the integration of the many systems is incompatibility in software and data standards (NHS Information Authority, 2003b). Standards are also required for the data model, which specifies the content of the system and the relationship between the data (Carpenter, 1994). The problem, however, is the creation of a system that strikes a balance between rigid data structures that allow for standardization and totally unstructured free-text structures that allow for unstructured elaborative narratives on patient's conditions (Hertzberg, 2000). In the United Kingdom, the National Health Services (NHS) has dealt with this problem by requiring suppliers to conform to specific standards and has developed an accreditation programme for this purpose (Oates et al., 1997). The e-physician project also requires vendors to meet the project's defined provincial standards and minimum clinical and practice management specifications, which are in part defined by Ontario physicians. Consequently, those suppliers who conform to the outlined standards and the minimum system requirements set out by a coordinating and governing body are given a competitive advantage over others (NHS Information Authority, 2003b).

Supplier Relations

To provide flexibility to practices for attainment of systems that meet local requirements, while at the same time ensure less complexity in the integration of the various systems, the development of closer working relationships with partners is of importance. One of the lessons learned in the implementation of EPRs in the NHS, has been the need for the NHS to work

closely with suppliers and to create an environment where different suppliers could work together based on a shared vision (NHS Information Authority, 2003b). This consortia of suppliers along with agreed upon standards and specifications, will aid the procurement process. Having shared values is key in the development and maintenance of systems that will help in the realization of the long-term strategic objectives of all parties involved. Good communication with suppliers enables parties to develop a better understanding of each other's requirements and constraints, thereby, contributing to a better working relationship and consequently the design and implementation of better systems.

Funding

The absence of sufficient funding has been one of the impediments in the implementation and successful utilization of EPRs (Holbrook et al., 2003; Keshavjee et al., 2001). Funding plans should take into account the costs for involving multiple stakeholders, evaluating the various systems, communication among stakeholders and the dissemination of information to the public, consultation, training, prototyping etc. (NHS Information Authority, 2002). There is a gap in the literature on studies providing a cost-benefit analysis on EPRs, providing a justification for the funding of these systems. One study estimates a net benefit of $US 86,400 for a 5 year period, per provider (Wang et al., 2003). These benefits are realized from savings in drug expenditures, better capture of charges, decreased billing errors and improved utilization of radiology tests (Wang et al., 2003). The

study also concludes that more benefits are realized as more features of the system are utilized and more time elapses from implementation. The savings were realized under both capitated and fee-for-service models; however, among the fee-for-service patients the payers rather than the providers realized larger portions of the savings. Accordingly, the authors recommend risk-sharing arrangements between providers and payers in the implementation of EPRs in primary care (Wang et al., 2003). In the States, where insurance companies are gaining from the implementation of ERs, by having faster access to more patient information, they should shoulder some of the risks and costs of implementation.

In a case study of a solo family physician, the authors learn that despite the high initial cost of setting up an ER, the increase in quality of care made the investment a financially smart decision (Litvin, Ornstein, Anthony Jr., & Tanner, 2001). Some of the other benefits realized from EPR implementations are added revenues, increased patient satisfaction and increased managed care contracting (by having access to better patient data), and liability savings (Townes, Jr., Benson, Johnston, & Vaughn, 2000). In another study examining the societal repercussions (such as impacts on staff in terms of additional stress, and decreased productivity) resulting from EPR implementations, it was found that during the first year after implementation the societal costs exceeded the benefits (Arias-Vimarlund, Ljunggren, & Timpka, 1996). When conducting a cost benefit analysis of the implementation of EPR, the costs of integrating the system should be

included in the total costs. The area that might be overlooked in these cost benefit analyses is the shift in costs, where while savings might be realized from the elimination of certain clerical duties, additional and new costs are likely to be created for the compensation of higher paid health care professionals and computer support staff (Frisse, 1998). Furthermore, results obtained from cost/benefit analyses are dependant on the time elapsed from the implementation date. Certain costs and benefits are not immediately realized. During the transition period, there is the likelihood that there will be a dip in performance (Hodgkins, 1995), while further into the implementation there could be an increase in maintenance and upgrade costs.

In the Dutch healthcare system, which is more similar to the Canadian system, the government has been promoting the use of EPRs and has been co-funding physicians (Hertzberg, 2000). Physicians can be reimbursed for 60% of the costs they incur to implement EPRs, as long as the system they select is one that is approved, and they provide data to the government to help in health policy planning (Hertzberg, 2000). An approach taken in the UK, at the Croydon South Primary Care Group was the creation of eight levels of IT implementation, where the eight level was full implementation (paperless practice). Funding was provided to each primary care group as they moved through each IT competency level (Department of Health, 2002). Alternatively staged implementations can be used to secure funding. With the

implementation of each module (i.e. billing, clinical, etc.), the practice would qualify for additional funding.

MICRO - Individual practices

The best designed technology will be futile if not successfully implemented within the local setting. The reason behind such assertion is partially because the "successful implementation of information systems depends heavily upon integrating these systems into complex, organizational settings" (Anderson, 1997, 89). The success of any EPR implementation is dependant on the users (Litvin et al., 2001). Users need to be brought together to discuss the care process and to map it out. This will enable them to gain a better understanding of the whole process of care, and how the EPR will help in the process as an information-sharing tool. Clear objectives have to be set out by the practice for what the EPR is supposed to accomplish and how it will help in the delivery of care (Smith, 2003). User involvement will also provide further insight on existing workflows and work practices, helping in defining the system requirements and in revising work practices to better integrate the new system (NHS Information Authority, 2002). With the change in work practices and the development of new work processes, there could be a need to revise protocols and guidelines that are based on assumptions related to old practices. However, it is important to ensure that the tool's capabilities are not taken as the ideals to which the practice is moulded. The technology is there to serve the practice, rather than the practice serving the requirements of the technology (Berg, 1999).

Hardware and Software requirements

Hardware requirements will vary depending on the requirements of the practice. Generally workstations are provided where staff interact with patients, and need to have access to patient information (The Joint Computing Group of the General Practioners' Committee and the Royal College of General Practioners, 2000). To accommodate physician work patterns and allow for their movement, workstations must be readily available to account for different locations where physicians may work on their notes or consult charts. This will help physicians in entering their notes in the system immediately following patient encounters. Depending on the size of the practice, the number of patients and the complexity of the software being used, the capacity and storage requirements will vary. In addition to the storage capacity required for daily usage, practices should also ensure back-up media and devices for short and long-term requirements. Along with hardware, other peripheral devices will be needed, such as printers and equipment for remote network access or local area network support, which will require sufficient space (The Joint Computing Group of the General Practitioners' Committee and the Royal College of General Practitioners, 2000).

One of the neglected areas in the implementation of new systems is often times the design of workstations to provide for an ergonomic workspace, with sufficient desk space and accessibility (NHS Information Authority, 2003a). Accessibility refers both to physical access, where a

sufficient number of workstations should be available for authorized staff to access the system when required; it also refers to quicker access to data. One of the main incentives for using the electronic system is quicker access to greater amounts of information. If the network does not provide for quick access, users might be deterred from utilizing the system to its fullest capacity (NHS Information Authority, 2003a). Therefore, ensuring an adequate response time, and guaranteed information availability is of critical importance (Moen, 2003).

Training

The substitution of the paper-based record with new electronic systems not only requires the learning of the new technology but also necessities the re-learning of many common work practices. As staff has different competency levels in relation to the technology, the education process should start with an assessment of users' readiness in terms of technological and organizational insight. This will allow for the preparation of training material that is better suited to users' needs. Training should be provided close to time of go-live at the usual place of work, so material remains more current to users and should be an ongoing endeavour (Keshavjee et al., 2001). Preferably training should be available on-site during and immediately following go-live. Furthermore, as system glitches usually appear with real data, it is best to use real data for training purposes rather than dummy data (NHS Information Authority, 2002).

Training material should include three different knowledge types: object knowledge (factual knowledge of the device including the functionality of the system), tool knowledge (skills in using the system), praxis knowledge (the values and norms underlying the system) (Bygholm, 2001). Object knowledge can be communicated through manuals and teaching courses and is not context dependant. Tool knowledge, on the other hand, is best communicated by educators who are familiar with clinical applications and are able to integrate the new ways of performing tasks within the day-to-day working praxis (Bygholm, 2001). This training will range from learning how to use keyboards to the usage of clinical system and conforming with local practices (The Joint Computing Group of the General Practitioners' Committee and the Royal College of General Practitioners, 2003). The introduction of EPR will impact existing work practices and users will need to learn how to integrate electronic and interpersonal communication of information. Users will need to become aware of how computer use will impact the consultation process, and they will need to acquire the communication skills which will help them relate to patients while using computers (The Joint Computing Group of the General Practitioners' Committee and the Royal College of General Practitioners, 2000). Praxis knowledge should include reasons behind using the system. Educational efforts should show the benefits of EPR to staff to help improve their perception of the capabilities of the system and how these capabilities will facilitate staffs' efforts in delivering patient care. Users need to feel that the

values gained from the change outweigh the costs and challenges of the change (Keshavjee et al., 2001). The support required at this stage will involve the reorganization of work, renegotiation of rules and norms, and learning and reflection with respect to the whole system. Users will need to learn more about the nature of data, information and meaning (The Joint Computing Group of the General Practitioners' Committee and the Royal College of General Practitioners, 2003).

Data Quality

Physician data entry is one of the biggest changes in work patterns in a clinical setting and one of the barriers in the implementation of electronic records (Kaplan, 1994). Physicians, who formerly wrote their patient encounter notes by hand, are now required to enter them into a computer system, which is usually the primary bottleneck and results in documentation backlog. Some argue that it does not make sense to have a highly compensated physician to spend time typing data (Hertzberg, 2000). However, to extract reliable information from the system it is important to have complete patient records, where records play an “active” role in the delivery of health care; therefore, it is critical to facilitate data entry at the point of care (Darroch & Ellis, 2003). Data should be complete, accurate, relevant, accessible and timely (The Joint Computing Group of the General Practitioners' Committee and the Royal College of General Practitioners, 2000). For this purpose, guidelines and templates could be created (format, codes). Furthermore, the system should be periodically reviewed to obtain

information on missing data and data that is not recorded consistently by users. This could be as a result of software problems, technical glitches within the system, lack of data, or etc. Once the problem is identified, the necessary steps can be taken to resolve it. Furthermore, the many sources of data should be identified and workflows should be created to ensure that transmitted data is captured within the system, logging the source and not overwriting existing data (The Joint Computing Group of the General Practitioners' Committee and the Royal College of General Practitioners, 2000). Work practices also have to be developed for retrospective data recording, recording reading codes, direct data entry, indirect data entry, non-routine data capture, linking data items, use of templates and protocols, referrals, clinical letters and investigations, and contacts with outside practice (The Joint Computing Group of the General Practitioners' Committee and the Royal College of General Practitioners, 2000).

User Acceptance

One of the organizational barriers in the implementation of EPRs is the lack of clear objectives for the development of the EPR, along with the lack of clear definitions of the functionality of the system. Users are more accepting of a new system when they are able to understand its purpose (Townes, Jr. et al., 2000). It is thus imperative that an organizational wide understanding is developed of why change is necessary, which in turn will lead to higher acceptance of the change. By identifying and assessing the gaps between the organizations' present state and desired state and widely communicating the

findings to stakeholders, everyone will develop a better understanding of why change is necessary. When staff is able to see the advantages that can be reaped from the utilization of EPRs in delivering patient care, they will be more willing to deal with the frustrations of using the new technology (Darroch et al., 2003). For example, if the EPR system is linked to clinical prevention goals, staff will be more enthusiastic about making change. For example by enhancing the benefits of the EPR and communicating those benefits to physicians, they will be more likely to overcome their reluctance in using the system (Kaplan, 1994). Users need to know whether the challenges of the change process are worthwhile, and that the change will result in sufficient added value to justify the cost and challenges involved. This also applies to patients, who will be impacted by the new system implementation; as long as patients are aware that with the new system the services they receive will be improved, they will be more accepting of the system. It is thus important for users and all those impacted by the implementation of electronic records to understand the benefits and advantages that will result from the change. Therefore, prior to making a decision to implement an EPR system, objectives and system requirements have to be clarified. This helps in gaining user acceptance of the system and provides criteria for assessing the success of the implementation and the system. However, inherent to any system change is resistance. By using attentive listening, observations and midcourse correction to gain users' acceptance of the system, resistances could be potentially overcome.

Continuous presence on site will help in obtaining feedback from users and making changes accordingly. Information should be collected from users at different levels and from different levels within the organization (individual level, unit level, divisional level).

All stakeholders need to feel involved in the process, in order to assume a sense of ownership and commitment towards the change (Faber, 2003). The existing information relationships and networks between people within the organization can be used for this purpose. To keep staff informed and involved in the change process and to provide them with the tools in helping them overcome problems encountered with the new technology super-users or project champions should be selected from different levels within the organization. The presence of strong leadership in the form of champion physicians or nurses is critical (Townes, Jr. et al., 2000). These individuals help with the introduction of the new system and with the day-to-day system troubleshooting. Super users could also help in reminding all those impacted by the implementation of an EPR system that change is a process and not an event. A steep learning curve is involved and users will be more prepared for change if they know they are part of a group that is committed to having a learning organization (Townes, Jr. et al., 2000).

One of the lessons learned in the NHS, with the implementation of electronic records in primary care settings, is the need for Information Support Workers (ISW), who possess a mixture of clinical and information support skills (NHS Information Authority, 2002). Part of the responsibilities

of ISW is to provide support to patients in understanding their health record and to also help with clinical administration. While the vendor contract generally includes software and technical support in the form of a help-line, having access to on-site support is significantly important to users (Townes, Jr. et al., 2000). Support provided by the vendor help-line, project champions and ISW are all required and should not be viewed as substitutes. During and after implementation, support facilities, such as a centralized help desk should also be provided. These support systems should be over and above the general services available to users on a regular basis. Encountering problems during and after implementation are inevitable making it critical for additional staff to help users resolve their problems with the new system while performing their daily tasks (Keshavjee et al., 2001). Incentive programs could also be developed to help keep staff motivated, especially with the additional workload and working hours following the implementation (Litvin et al., 2001). Commitment should be obtained from all physicians to use the new system, which will involve time commitment and the understanding that changes will have to be made to existing workflows and processes as a result of the implementation of the EPR.

While often times overlooked, one of the ways for attaining user acceptance of the system is by having a phased approach to implementation, where users are gradually introduced to the different functionalities of the system and have to utilize these functions in their regular work practice (Aydin & Forsythe, 1997). On the other hand, with a phased approach many

of the benefits of a system are not readily realizable upon implementation (Townes, Jr. et al., 2000). Considering that access to information is one of the most sought after benefits of EPRs for physicians, it would be worthwhile to maximise the electronic data exchange capabilities of the system and make these benefits more visible, as they will create more of an incentive to use the system.

The tangible benefits that can be realized from the system should be made more visible to clinicians (Briscoe, 1996). Patients' needs are at the centre of physicians' and clinicians' work; as such the success of implementing an EPR system in primary care is largely dependant on the extent that the system is associated with patient care. Systems that complicate the process of delivering care to patients, are those that risk non-utilization (Haley & Kohn, 1999).

Physicians are also concerned that with the implementation of EPRs in their practice, they will lose eye contact with patients (Aydin et al., 1997). However, the findings of Blair et al. suggest that computers have not acted as barriers between physicians and patients (Blair & Schutte, 2003). It is important that the patient is located in the focal point of the room, rather than having the system positioned in the centre of the workspace. The system should not be placed in a location that would interfere with the ability of the provider to attend to the patient (Carpenter, 1994). Physicians need to be able to gain access to required information, without having to divert their attention to the system rather than the patient and while information should

be screened from patient's view, it should also be displayed on a monitor that is easily adjusted to enable patients to view the information (Carpenter, 1994). In another study to mitigate the problem of less contact with patients resulting from the implementation of EPR, more information regarding the new system was provided to patients. Patients who understand the function of the computer in the examination room, react more positively to it (Gonzalez-Heydrich et al., 2000). Furthermore, if users take longer to enter data into the system in comparison to writing, they should consider taking some time after each patient for data entry purposes rather than entering the information during the consultation process.

Recommendations

In the hype towards the implementation of EPR and EMR in primary care, and the integration of systems to develop the Canada Health Infoway[3] it is of great importance that a technically deterministic perspective does not surface, where technology is viewed as the end all to problems within the healthcare system. Technology alone is not sufficient in the development of primary care. Other structural changes have to be made to ensure that IT implementation is not a piecemeal change and that programmes for delivery of patient care are all integrated. To ensure this integration, stakeholders

[3] Canada Health Infoway is a term used to refer to the information and communication technologies and their usage, the policies governing their use, and the people and organizations who create and use this infrastructure (Advisory Council on Health Infostructure, 2000). The mandate of Canada Health Infoway as an organization, is to "accelerate the development and adoption of electronic health information systems in Canada" (Canada Health Infoway, 2004).

have to be identified at the onset and a set of common values and visions need to be developed.

If the information sharing capabilities of EPR is to be realized, the development and implementation of standards and system requirements is of paramount importance. These standards should be set and mandated at the Ministry level. Standards and minimum requirements will help ensure data quality and assist in data exchange between systems. The development of accreditation programs for suppliers will also ensure a certain level of coordination between practices, helping in data integration. The Health Authority should also work with local practices to identify changes to work practices as a result of the implementation of EPR, and capture knowledge of best practices to share with other primary care centres. Rewards could be handed out to early adopters of systems, who can then act as user champions in helping in the introduction and adoption of EPRs at other sites. Phased funding can help ensure that the inadequacy of funds does not impede implementation. Further studies are required on the costs of system implementations and the benefits that are gained from utilizing EPRs. By identifying the organizations that are gaining most from the implementation of EPRs, risk sharing strategies can be designed for the funding of EPRs. At the practice level, users should be involved in the decision making process and in determining changes to work practice. When users are clear on the objectives that the practice aims to realize with the implementation of EPRs,

they will be more willing to accept the challenges resulting from the change process.

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