Barriers to EMR Adoption

Introduction

Electronic Medical Records (EMRs) have been touted as a tool that will enhance the coordination of patient care, reduce medical errors, improve patient safety, increase efficiency, and improve quality by incorporating decision support tools and encouraging best practices. Further, proponents have postulated that incorporating these capabilities into the healthcare system will produce dramatic cost savings. For example, Walker (2005) assessed the value of electronic health care information exchange and interoperability (HIEI) among multiple classes of providers (hospitals, medical group practices, independent laboratories, radiology centers, pharmacies, public health departments, etc.). The study calculates that that a fully standardized HIEI system fully implemented nationwide could yield a net value of $77.8 billion per year. Despite these high aspirations and great potential, according to the CDC in 2010 only 24.9% of office-based physicians had access to "basic" EMR system while only 10.1% had a "fully functional" system (Chun-Ju et al., 2010). The low EMR adoption rates imply that significant barriers exist.

This paper explores the hypothesis that although technical and financial considerations are the most widely discussed barriers to EMR adoption in the literature, user-specific social, psychological, and organizational factors may be almost as important. Such factors include poor usability/interfaces, negative impact on physician-patient relationships, incompatibility with clinical work flows, lack of training/poor change management, lack of interoperability, etc. A change management structure which emphasizes improvements in care over technology for its own sake and favors designs that properly accommodate user psychosocial, cognitive, and organizational factors can most effectively facilitate widespread adoption and use of EMR.

Widely Discussed Barriers

Boonstra and Broehhuis (2010) and Castillo et al. (2010) both conducted a systematic literature reviews to identify physician perceived barriers to EMR acceptance. The Boonstra study was based on twenty-two research papers (from a pool of 1,533 articles) from 1998 to 2009, and the Castillo study reviewed 68 research papers (from a pool of 2920) from 1985-2009. Boonstra found financial and technical barriers were the obstacles most commonly identified by the reviewed papers, and Castillo (who did not survey financial aspects) found technical factors mentioned most commonly.

Financial barriers were mentioned in all twenty-two papers in the Boonstra study with 33 total references. Physicians universally face the dilemma of weighing EMR cost versus EMR financial and patient care benefits. Boonstra further divided the financial barriers into four categories: high start-up costs, high ongoing costs, return on investment (ROI) uncertainty and lack of financial resources. Start-up costs were mentioned as the highest financial barrier to

adoption. Start-up costs were defined as all expenditures needed to go live with a functioning EMR in the physician's practice. Start-up costs include hardware/ software selection and purchasing, contracting costs, and installation expenses. They ranged from $16,000 to $36,000 per physician and were singled out as the most significant barrier. Meaningful Use incentives may offer some relief but, until recently, these have often been insufficient. High ongoing costs include system administration, control, maintenance and support to keep the system operating properly. These costs also include modifications, upgrades, and vendor after-sales service contracts which can be expensive. The ROI uncertainty barrier is the worry that EMR-specific financial gains to the practice may not be seen for years, if ever, and may not balance the investment risk. Lack of financial resources was also cited, especially as a factor in small to medium organizations, as was concern over obsolescence and the need to budget for system replacement costs.

Technical barriers were repeatedly mentioned in the systematic literature review, ranking high in both studies. EMR systems can be complex and a certain level of computer competency may be required for productive use. The Boonstra study suggests physicians generally lack the technical knowledge and skills to successfully use EMRs immediately at go-live, resulting in resistance. Without such skills, they are highly dependent on competent technical support, service and training. Boonstra suggests that 2/3 of physicians surveyed did not receive sufficient training and support from vendors. System complexity was also cited as technical barrier, although it can also be a user-specific human variable. For example, an EMR with a multitude of screens, options, menus, pop ups, and drop downs can create over stimulation and confusion. A related concern is that the systems lack customizability to meet specific physician needs. System reliability is of the utmost importance for patient information. Physicians fear that an unreliable system may cause loss of access to records and even inability to proceed with vital patient care activities. Lack of interconnectivity and standardization is a well recognized obstacle to wide EMR adoption. A new EMR may be incompatible with legacy electronic systems in the practice, and physicians may be reluctant to give up existing functional systems for EMR integration. Finally some researchers found that certain small practices lack even the basic facilities and hardware needed to support EMR implementation.

Important User-Specific Barriers

In contrast to widely discussed financial and technical EMR adoption barriers, user-specific social, psychological, and organizational factors are less often highlighted as key issues. Yet these factors can play a critical role in the user acceptance or rejection of an EMR implementation. Prior to the recent national focus on EMRs, development and implementation of computer-based patient-record systems, national patient databases, and medical knowledge bases were largely spearheaded and maintained by information technology professionals at technology vendors and medical organizations. However to attain success today and in the future, any project implementing a technical system that touches a front end clinical user should be driven by input from the user base. Without that consideration, the implementation team will

fail to understand and design for the intricate physician-patient relationships and current state workflows necessary to provide high quality patient care. "Workflow impact can modify the perceived characteristics of an innovation, which is critical in the persuasion stage of the innovation decision process" (Castillo et al., 2010). For example, designs that require clinicians to regularly access resources external to the EMR using separate login processes which disrupt clinical workflow will dramatically delay adoption. The goal is not necessarily to perfectly replicate every pre-EMR workflow in electronic form. However, a successful EMR must integrate with legacy electronic systems and leverage existing workflows so as to facilitate rather than impede the clinical activities of its users.

Perceived inefficiencies resulting in a negative physician-patient experience will immediately cause clinicians to associate a workflow barrier with a new system. In some cases, such perceived workflow barriers can undermine system credibility before user training can establish a needed comfort level. Therefore it is critical to understand the way EMR-imposed workflow impacts physician patient interaction. When a physician (especially one with poor keyboarding skills) stops to enter data or type a prescription, s/he perceives the cost of increased time per patient visit and increased workload (Boonstra, 2010). Additionally, the patient perceives a loss of physician attention and involvement during the encounter and may also experience concerns that the physician is in some way dependent on the computer. "Patients may surmise that a physician who uses a DSS is not as capable as a physician who makes the diagnosis with no assistance from a DSS." (Arkes et al., 2007). As a result, designers need to be exceedingly sensitive to the way systems are used during direct patient encounters, although it is reasonable to expect users to eventually develop the skills to mitigate this problem.

Studies identify poor change management as another significant problem, and this highlights additional user-specific barriers to EMR adoption. Change management includes the following components: achieving stakeholder buy-in and improved attitude towards EMRs, training, ongoing technical support, social and organizational structure(s) to effect the change, project management before and during go-live, and associated tools and resources (including trained personnel as change facilitators).

To support successful EMR implementation and adoption, change management needs to begin at the very start of the initiative. A lack of user buy-in and accountability at the outset can easily result in low adoption. There are two major organizational factors that can influence buy-in from clinicians. First is their initial attitude towards an EMR system. An organization needs to be able to convince its clinicians (physicians, nurses, pharmacists, etc.) that implementing/utilizing an EMR is good not only for the organization but also for them as individuals and for their patients. If this first step doesn't occur, an EMR project is likely to fail. Senior physician leaders and managers are needed to serve as EMR champions to "sell" the benefits of an EMR to the users. Post-implementation, these same EMR champions and specially trained super users need to model the use of the system and continue to influence the attitudes of the users. When issues arise (and they will), response to the problem(s) must be

rapid and effective. Otherwise negative feedback about the system can spread rapidly, since clinicians strongly influence other clinicians. "Whether or not they [physicians] support and use EMRs will have a great influence on other user-groups in a medical practice, such as nurses and administrative staff. As a result, physicians have a great impact on the overall adoption level of EMRs" (Boonstra, 2010). A single bad experience may be enough to spoil users' attitudes for a considerable period of time.

The second facet of change management that most powerfully affects EMR adoption is training, training, and more training (Adler, 2007). Skillful training allows users to see how the new system integrates with and may even improve their current workflow caring for patients. Growing proficiency removes the temptation to revert back to their old familiar processes and procedures. No system is ever implemented perfectly the first time around and there will always be "bugs" to fix. When users encounter system issues, internal IT staff, super users, or the vendor need to be readily available to respond and address the issues. Long waits for response to a problem will negatively impact both user learning and user satisfaction.

Lastly, effective change management processes, tools and resources need to be in place both pre and post implementation. Effective self-teaching tools should be available on site or on the Internet to add a second dimension to the training. A feedback mechanism for the users to communicate not only system issues but also workflow concerns is vital. The newly implemented EMR system needs to be continuously monitored and evaluated to see how well it meets specifications and serves user needs. Specially trained and qualified change managers and/or clinical informatics professionals can be very helpful managing the project. Their work can synergize with the activities of clinically trained physician champions in achieving full acceptance and utilization of the new system.

Conclusions

Meta-analysis of the literature has often identified financial and technical factors as the most frequently cited barriers to adoption of EMR by clinicians (Boonstra and Broekhuis, 2010 and Castillo et al., 2010). However, studies of IT implementation in the British and Canadian National Healthcare Systems (Hendy et al., 2005 and Rozenblum et al., 2011) have shown that even when a technically robust IT system is provided by the taxpayers, daunting psychosocial, cognitive and organizational challenges to HIT implementation remain. Now that the HITECH Act of 2009 is providing more adequate financial incentives for HIT adoption in the US, such user-specific human factors are becoming ever more significant for our own HIT implementation process.

Change management is the discipline designed to deal directly and intentionally with this human side of facilitating EMR adoption. As McCarthy and Eastman (2010) have pointed out, the purpose of change management is to move people more rapidly through the change process so the anticipated benefits of EMR are achieved earlier. In addition to the benefits intrinsic to an

EMR (error reduction, cost efficiency, etc.), properly executed change management can generate improved performance and outcomes (from effective use of the system), improve clinician morale (from learning new skills and meeting expectations), and improved levels of trust and teamwork (from helping each other through a difficult transition process). In contrast, IT systems and transitions which ignore such human factors can actually cause increased stress, more errors, and decreased productivity (Stead et al., 2009).

Psychological barriers to EMR adoption include physician skepticism that EMR can increase the quality of care enough to justify the enforced change in work style and fear that EMR will bring a loss of professional autonomy. Social barriers include negative perceptions, lack of support from colleagues and work processes that divert attention away from the patient during clinic visits. Organizational barriers include lack of leadership, lack of management commitment to EMR, and lack of supportive organizational culture (Boonstra, 2010). Adler (2007) lists a wide variety of change management techniques to deal with these issues. It's vital for senior management to fully and consistently support the change, including recruitment and support of a qualified change manager. Senior physician leaders with IT skills are recruited to advocate for the system and convince colleagues to share the vision and goals. Work flows may need some adjustment to properly synchronize with the new system. Multiple training systems are set up well in advance with a variety of methods for users to become comfortable and proficient with the new system (one on one, group training, Internet training sites with video demonstrations of common tasks and model systems to practice with, etc.). Super user physicians are trained early to help other physicians. Adequate IT personnel are available to confirm and support the reliability of the infrastructure. Goals are clear, measurable and realistic, including reduction in patient volumes at go-live to allow the learning time necessary to adapt to the system.

Overcoming the hurdles to IT adoption requires a combination of astute change management and IT system design that properly that properly incorporates human concerns into technical form and function. People make mistakes, get distracted by subsidiary tasks, get bored with complex training routines, and resent work flow disruptions that increase their overall workload. Successful systems will be intuitive, usable with minimal learning curve, error correcting (or at least notifying), easily integrated into clinical workflow, incorporate clinical decision support, and capable of some visible improvement (even if modest) early on, so as to reinforce the change process (Stead et al., 2009). In short, the easy thing will be the right thing, at least most of the time. If this vision from the IOM report on computational technology for effective health care could become reality, the federal government would not have to force the transition to EMR, the change would catalyze itself.

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