Adoption of Electronic Medical Records in Family Practice: The Providers' Perspective

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Background and Objectives: *The study's objectives were to explore Deliver Primary Healthcare Information (DELPHI) project participants' experiences, ideas, and perspectives regarding the adoption of electronic medical records (EMRs) into their primary health care practices and to examine perceived barriers and facilitators to EMR adoption.* Methods: *This study explored the experiences of the 30 participants in the project. Semi-structured interviews were conducted. The analysis was both iterative and interpretive.* Results: *Two key themes emerged: (1) barriers (ie, level of computer literacy, training required, and time) and facilitators (ie, having an in-house problem solver and the EMR's integrated messaging system), and (2) a continuum of EMR adoption (ie, levels of knowledge ranging from novice to advanced and responses to the EMR that included participants' reflections on their personal journey across the adoption continuum and that of their practice sites).* Conclusions: *It is important to be aware of and responsive to factors that can influence EMR implementation and adoption. They include paying attention to computer literacy; setting aside dedicated time for EMR implementation and adoption, as well as engaging in training activities; and supporting problem-solvers in the practice. Mechanisms should be put into place to promote the movement of practices across the continuum of EMR adoption.*

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Electronic medical record (EMR) use in primary health care is becoming increasingly important. However, the rate of EMR use among primary health care providers in Canada remains low.[1,2] Barriers to EMR adoption include time commitments,[3,4] financial costs,[3,5-8] availability of technical support,[3,5] insufficient training in medical informatics,[6] slowdown in work or productivity downturn,[5,7,8] difficulty with entering data and computer skills,[5,8] and security and confidentiality issues.[5,9] However, facilitators of EMR use include commitment by management,[10] "physician champions,"[3,10,11] and funding for implementation and operation.[3,10] Recent literature reviews confirm the role of physician commitment and funding and identify two additional facilitators: availability of training and addressing expectations and concerns prior to implementation.[12,13] These facilitators can expedite EMR implementation and adoption. Many studies examining EMR implementation are either individual accounts,[11] or they are based on survey data collected in primary health care settings in the United States.[5,7-9,14-16]

A scarcity of research exploring the unique information technology implementation experiences of health care providers has been noted.[12] Few qualitative studies explore the views of providers regarding EMR implementation.[4,10] Therefore, we set out to conduct a qualitative study exploring the specific experiences of individuals within primary health care practices who were in the midst of implementing and adopting EMRs. In the present study, we define implementation as the process of installing the hardware and software, as well as providing training, whereas we define adoption as the actual uptake and use of the EMR.

Methods

Overview

We conducted a qualitative study in Southwestern Ontario between January and July 2006. The study was nested within a larger study, the Deliver Primary Healthcare Information (DELPHI) project. The

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DELPHI project facilitated the implementation of EMRs in community-based practices in Southwestern Ontario to create a researchable database. The practices were first recruited by the principal investigator; subsequently, computer equipment was installed. Software purchase and installation was the responsibility of the practices. Participants then received training on the use of the EMR, which included, for example, problem lists, laboratory results, immunizations, medications, referrals, exam results, and procedures/investigations.

Following implementation, a qualitative study was conducted to explore participants' experiences with the adoption of EMRs into their practices, as well as perceived barriers to and facilitators of adoption. At the time of the study, participants were in the midst of this process and were therefore in a position to reflect on their EMR implementation experiences and to anticipate future steps in this process.

The goal of our analysis was to seek common themes or shared experiences across all sites that implemented the EMR. The descriptive qualitative approach used in this study answered questions such as, "What are people's responses (eg, thoughts, feeling, attitudes) toward an event?" with the intent of providing a synopsis in "everyday terms."[17]

Participants

Study participants were recruited from the DELPHI participant pool of 39 new EMR users across six family practice sites. The final sample comprised 30 participants from six practice sites (three urban, two rural, and one small-town practice). Participants included 13 family physicians, 11 other health professionals (including nurses, medical assistants) and six administrative staff (receptionists, secretaries). The length of time participants had worked at the practice sites ranged from less than 1 year to 32 years. On average, each family physician's practice had approximately 1,300 patients. The family physician participants had practiced for approximately 27 years on average; 62% were men, and 38% were women.

Data Collectioon

A semi-structured interview was conducted with all participants at their practice site by one of the investigators. The interview questions explored the implementation process and barriers and facilitators to EMR implementation, beginning with questions such as, "How do you discuss problems associated with the EMR?" "What challenges have you faced with regard to implementing and using the EMR?" These broad topic areas were derived from existing literature. The interviews lasted half an hour on average.

A brief description of each practice was developed to capture the context, and field notes were generated after the interviews. All the interviews were audiotaped, transcribed verbatim, and subsequently checked by the original interviewer for accuracy.

Data Analysis

The team conducting the analysis included a social worker, an epidemiologist, and an EMR implementation facilitator. In the first phase of the analysis, each transcript was independently reviewed and coded by a minimum of two researchers to determine the key concepts and themes emerging from the data. Next, the researchers met to compare and contrast their independent coding, culminating in a consensus that informed the development of the coding template. Consensus was achieved by reaching agreement about the main themes and their concomitant subcategories.

The coding template was applied to subsequent interviews and adapted by the team as new themes emerged. The research team regularly met for further synthesis and interpretation of the themes. The techniques of immersion and crystallization were used throughout the analysis process, in that the researchers immersed themselves in the verbatim transcripts to acquire an experiential understanding of the data, followed by continuous reflection as their understanding and interpretation of the data crystallized.[18]

Theme saturation was achieved by approximately the 27th interview. However, the researchers were committed to ensuring all the practice sites had an equal voice in the research process and thus completed the data collection and analysis on all interviews.

Credibility and Trustworthiness of Data

Trustworthiness and credibility of the data analysis was enhanced by checking of the verbatim transcription of the interviews, taking detailed field notes, and debriefing sessions after each interview. The debriefing sessions, conducted by the interviewer and one of the investigators, promoted the iterative nature of the data collection and analysis through additions and alterations to the semi-structured interview guide as appropriate. Reflexivity is important to a study's credibility and trustworthiness. It characterizes the researchers' ability to reflect back on their own role and participation in the study to better understand the implications to the study findings and interpretation.[19]

Ethics approval for this study was received from The University of Western Ontario's Review Board for Health Sciences Research Involving Human Subjects (number 11151E).

Results

All the participants in this study were new to using the EMR software. Within each of the practice sites, participants varied in their experience with computers, the amount they used the EMR, and their EMR knowledge level.

Analysis of the data illuminated two key themes: (1) barriers (ie, level of computer literacy, amount of training required and time) and facilitators (ie, having an in-house problem solver and the EMR's integrated messaging system) and (2) a continuum of EMR adoption (ie, levels of knowledge ranging from novice to advanced and responses to the EMR that included participants' reflections on their personal journey across the EMR adoption continuum and that of their practice sites).

Barriers and Facilitators to EMR Adoption

Based on interviews with participants, three key barriers were identified. Barriers included level of computer literacy, training, and time. In-house problem solvers and a functional messaging system were also important.

Computer Literacy. For many participants, the use of a computer in the work environment was a completely new experience. One participant summarized her experience in becoming computer literate:

> I've always had a computer at home, but I was one of those people that dusted it and knew how to turn it on. Then all of [a] sudden it's like, okay! But actually it's a lot easier than I ever thought it would be.

Training. The training required to effectively and efficiently use the EMR emerged as a barrier. As one participant stated:

> I would certainly like some more training myself. Some of the things that I am doing I may not be doing the most efficient way.

In some practices, training, and opportunities to apply the training, proceeded in small bursts of dedicated time. One participant provided the following suggestion:

> If you learn one day, then you've got to start using it either that day or the following few days or else you forget. So you've got to put it right into practice.

Time. Time emerged as an underlying barrier. Participants indicated there was not enough time available to reflect on and apply the knowledge gained through the training sessions or to learn how to use the EMR in real time. As one participant explained:

> They need some down time. They need to know the program and how it works and what it does for them, a fair bit ahead [and] how they're going to handle this in their practice.

The amount of time required to record information in the EMR was not appreciated initially.

> It's been overwhelming how much work it's been. I spend an extra hour and a half to 2 hours every night inputting stuff.

The task of entering information proved to be quite difficult as practices often maintained their regular patient load throughout the adoption process. For example:

> We didn't cut down on the number of patients we were seeing. We were still going full-bore. I had had some training, but it's different when you're in there [the clinical encounter] by yourself.

In-house Problem Solvers. A primary facilitator of implementing the EMR technology was having an in-house problem solver who was available to support fellow colleagues on an ongoing basis. This facilitator was often a leader by way of accumulating more knowledge of the EMR system than colleagues and then when problems arose, provided assistance and education regarding possible solutions. For example, a participant reflected on their experience in the following way:

> Some of the other ones have a little trouble learning so it's just, little bits at a time. Like [colleague], she didn't know how to bill when she was doing flu shots, or B12s, so we had go over it with her and write it down. Then we moved on to something else and then something else after that.

Message System. Another important facilitator that emerged was the EMR's integrated messaging system. Participants' use of the messaging system varied between infrequent and consistent use; it was often used to relay messages regarding tasks, patient information, and questions about the EMR. Those who did use it consistently appeared to find it useful:

> I do like it. I thought it was going to be silly initially. Because we work in such close proximity to everybody that I didn't think it would be…important but it is. It's been useful.

EMR Adoption Continuum

Participants self-described their level of EMR knowledge as ranging from novice to advanced. In turn, it appeared the barriers and facilitators they experienced influenced their level of EMR adoption. Novice EMR users faced great challenges in simply being able to use the software on a daily basis, as the following comment reveals:

> … you can train on one but until you're on the job doing it, and you've got patients coming in, and you have to learn fast. And what happened with me is that I was off on holidays [when the practice went live]. I came back, and it was all computerized. So I had to start that morning, and it was hard. It was hard for the first month, I barely hung in.

In contrast, advanced EMR users were able to realize the benefits of the EMR to their practices. A participant from a practice approaching the end of the adoption process explained:

> … the flow of it is just so much better and being able to have the chart right there and not running around searching for charts. I've always kept patient profiles, but you know when you're writing them in and you put short forms and things like that you don't always have it up to date. This way it's right there, it's legible, doing consultations, I mean click click click and you've got all the drug lists and all the allergies and everything. That is awesome and I really like that.

Participants described their own personal journey across the EMR adoption continuum and comfort level with the EMR:

> I didn't know a heck of a lot about computers. I didn't even have one at home. I couldn't type worth a darn… It's been a struggle, but we made it. It's like climbing a mountain, we're not at the top yet, but I think we've come a long way. I enjoy the computer and taught myself a lot. When you can get everything imbedded in there I think it's great.

In addition, participants described the overall response of their practice site to the EMR. Initially, most practices had a negative reaction to the introduction of the EMR. Feelings of frustration were described by many participants due to little knowledge of the EMR program combined with issues related to the hardware setup. One participant described the reaction to the EMR as:

> … kind of frustrating at first to get everything sorted out.

The workload of the practices and insufficient time to learn on the job also frustrated many participants. Reluctance and resistance to change also played a role in the transition process. As a participant reflected:

> Initially, a couple of the doctors were eager to try new things out, but the rest of us were a little reluctant initially. I don't even know if reluctant is it but maybe just a little bit intimidated thinking how are we going to integrate this into our lives.

Even though some time had passed since the initial implementation, adoption within practices remained, as one participant put it, "lopsided."

> Physicians overall are quite happy with it, and the receptionist is fairly happy with it, and the nurse is still slightly skeptical.

Positive reactions emerged from participants whose practices were approaching the "advanced-user" end of the adoption continuum. Upon reflecting on her practice's transition, a participant stated:

> I think they've been very apprehensive about it. But the more they've used it, the more they've learned about it, the easier it is for them to use it. Some of them have got to the point now where they actually enjoy using it and want to keep going because it does make some parts of their job a lot easier… Like results that they can get that they don't have to wait for. It's wonderful.

The participants and their practices were clearly at different stages along the continuum of adoption and illustrated the evolution of their own experiences in the EMR implementation and adoption process.

Discussion

This study examined the views of primary health care providers regarding EMR implementation and adoption. Two key themes emerged: (1) barriers and facilitators to EMR implementation and adoption and (2) a continuum of EMR adoption.

Major barriers to implementation and adoption included computer literacy, training, and time. Although there is variability regarding the influence of prior computer knowledge on perceptions of EMR implementation,[14,15,20] participants in our study expressed how a lack of exposure to computers in the workplace was a major barrier. Therefore, when considering EMR implementation, it could be advantageous to assess not only levels of computer skills, which are known to be a barrier to implementation,[5,8,16] but basic familiarity with computers. Adequate training and sufficient time for implementation were highlighted as additional barriers experienced by participants. While these issues have been identified in prior studies,[3,4,8] they remain an ongoing challenge for primary health care providers. Implementation and adoption of EMRs will be most successful when protected time is available for training all EMR users.

In this study, in-house problem-solvers emerged during the EMR implementation and adoption process; these individuals played an important role in addressing day-to-day issues related to the EMR. Their function appeared to be more hands-on, in contrast to physician "champions," who assume more of a leadership role in EMR implementation.[12] Both roles are seen as

important and need to be encouraged. Electronic messaging was viewed as facilitating the communication abilities among participants; this has been identified in previous research.[4] These barriers and facilitators appeared to influence the participants' varying levels of EMR adoption.

This study also revealed a continuum of EMR adoption. Levels of EMR knowledge were self-described by participants and ranged from novice to advanced. It was not until one reached the advanced user end of the continuum that the full benefits of the EMR could be realized. Both the in-house problem-solver and the champion may serve a key role in helping novice users move forward to achieve this stage of EMR adoption. Participants also described both their individual journey as well as the experiences of the practice. Reactions to the EMR were varied; some reflected a strong resistance, while others were more positive. Negative reactions were expressed by participants who had little knowledge of the software program. In contrast, positive reactions were expressed by participants who had achieved a high level of EMR use. These findings suggest how the uniqueness of each primary health care practice should be considered in relation to EMR adoption. Specifically, if negative individual reactions are pervasive across the practice, this could pose a threat to implementation and the movement of the whole practice toward full EMR adoption.

A key limitation of this study is the limited geographic area of participants, Southwestern Ontario. The location of the practices in the study was more rural compared to practices across the Province of Ontario.[2] However, the gender distribution of the physicians in this study closely approximates that of family physicians in Ontario.[2]

Conclusions

This study highlights the importance of being both aware of and responsive to factors that can influence EMR implementation and adoption. They include paying attention to computer literacy; setting aside dedicated time for EMR implementation and adoption, as well as engaging in training activities; and supporting problem-solvers in the practice. It is also worth acknowledging that there will likely be different levels of EMR knowledge and adoption among members of primary health care practices. To encourage success, mechanisms should be put into place to promote the movement of practices across the continuum of EMR adoption.

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