Perspectives on Electronic Medical Record Implementation after Two Years of Use in Primary Health Care Practice

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Purpose: **This qualitative study explored the experiences of primary health care providers and staff who had moved beyond the stage of implementing electronic medical records (EMRs) in their practices to using this technology on an on-going basis.**

Methods: **A descriptive qualitative approach was used. Semistructured interviews were conducted with 19 participants. Data analysis was iterative and interpretive.**

Results: **Factors that hindered and motivated ongoing EMR use emerged. Factors that hindered use included (1) information technology challenges such as learning to use the EMR and the computer, electronic connectivity, and scanning; and (2) variability in on-going EMR use. Two factors motivated ongoing use: (1) improved efficiency in patient care, and (2) confidence with computers and EMR software.**

Conclusions: **Different issues in the use of EMRs surface as primary health care providers and staff mature in their use of this technology. Ongoing use of the EMR may be facilitated by confidence with the technology as well as providers' perceptions of efficiency in patient care. Optimal use of the EMR could be facilitated through assessing and enhancing computer skills, working toward consistent data entry and use of the EMR, and developing strategies to address issues such as scanning and electronic connectivity. (J Am Board Fam Med 2012;25:522–527.)**

Keywords: **Electronic Medical Records, Family Physicians, Primary Health Care, Qualitative Research**

Current levels of electronic medical record (EMR) use in primary health care in Canada and the United States have improved but are still relatively low (37% and 46% respectively), particularly compared with the United Kingdom (96%) and the Netherlands (99%).[1] Efforts directed toward EMR implementation on both sides of the border continue to grow.[2,3] Many barriers to and facilitators of EMR implementation have been identified.[4–13] However, there is a lack of evidence about what helps to facilitate information technology adoption among health care providers.[14] Little is known about how primary health care providers use the specific features of EMRs,[15] and few studies explore the longitudinal aspects of early EMR implementation and later adoption in primary health care.[16–18] Addressing these existing gaps in knowledge is essential because the evidence regarding the connection between levels of use of EMRs and quality of patient care is mixed.[19–21] Some re-

This article was externally peer reviewed.

Submitted 7 March 2011; revised 7 November 2011; accepted 21 November 2011.

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Funding: The DELPHI project was funded by the Ontario Ministry of Health and Long-Term Care. Dr. Amanda Terry was supported by a postdoctoral fellowship from 2008–2010, funded by the Canadian Health Services Research Foundation and the Canadian Institutes of Health Research. Dr. Moira Stewart is funded by the Dr. Brian W. Gilbert Canada Research Chair in Primary Health Care Research. Dr. Amardeep Thind is funded by a Canada Research Chair in Health Services Research.

Conflict of interest: none declared.

Disclaimer: The views expressed here are those of the authors and do not necessarily reflect the views of the Ontario Ministry of Health and Long-Term Care, who funded the DELPHI project.

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searchers have speculated that these results could be because of variation in how EMRs are used in practice.[19,20] Therefore, it is important to better understand the experiences of primary health care providers regarding their use of EMRs.

In this qualitative study, we explored the views of participants who had moved beyond the early EMR implementation stage and had adopted this technology in their primary health care practices. This follow-up study builds on prior research we conducted that explored the experiences of primary health care providers and staff at an early stage of EMR implementation.[12] We conducted this study with individuals who participated in our previous research and who had used EMRs for a period of ≥2 years. Specifically, we examined the views and experiences of participants regarding EMR adoption as well as issues with their current use of the EMR. This study was nested within a larger research project, Deliver Primary Healthcare Information (DELPHI); this project facilitated the implementation (in 2006) of EMRs in 6 primary health care group practices to create a researchable primary health care database.

Methods

We used a descriptive qualitative approach in this study[22] that allows the researcher to explore questions about an individual's concerns or responses regarding an event, with the purpose of providing a summary in "everyday terms" or to explore the "who, what, and where" of events.[22]

Participant Recruitment and Description

Participants were recruited from the sample of 30 primary health care providers and staff who took part in our original study.[12] From the original sample of 30, 19 participated (7 had moved, 3 decided not to participate, and 1 was on leave). Participants included 7 family physicians, 7 other health care professionals (nurses, nurse practitioners), and 5 administrative staff from 6 rural and urban practice sites across Southwestern Ontario, Canada. Fourteen participants were women and 5 were men. The size of the practices was, on average, 1300 patients. Participants had been employed at their practice sites from 3 to 34 years. The study was conducted between December 2008 and March 2009.

Data Collection

Semistructured interviews with the participant at their practice site were conducted on an individual basis by one of 2 study investigators (ALT, LBD). Interview questions explored topics such as participants' experiences of EMR adoption, the ongoing barriers to and facilitators of the current use of the EMR in practice, and team use of the EMR. All interviews were audiotaped and transcribed verbatim.

Data Analysis

The analysis process was both iterative and interpretive. First, verbatim transcripts were independently coded by 3 study investigators (ALT, JBB, LBD) to identify key themes and concepts. Second, the investigators came together as a team to compare the results of this independent coding, ultimately creating a coding schema based on the agreement of the 3 investigators on the emergent themes and subthemes. Third, the schema was applied to all the interview transcripts and was adapted as the coding process unfolded. Finally, regular meetings of the investigator team were held to further synthesize and interpret the themes. The techniques of immersion and crystallization were used throughout the analysis.[23]

Credibility and Trustworthiness of the Data

Several steps were taken to ensure credibility and trustworthiness of the data. Interviews were audiotaped and transcribed verbatim; these transcripts subsequently were reviewed by the study investigators for accuracy. During the interview process, field notes were taken by the interviewers, and 3 study investigators (ALT, JBB, LBD) held debriefing discussions after the interviews. These discussions facilitated the adaptation of the interview guide and reflection on the concepts emerging from the interviews. This type of reflexivity is important for a qualitative study's credibility and trustworthiness.[24] Finally, study data also were analyzed both on an individual and team basis. This study was approved by The University of Western Ontario Review Board for Health Sciences Research Involving Human Subjects (no. 11151E).

Findings

The goal of the analysis was to identify themes regarding ongoing EMR use that were common among the practice sites. These practices had moved beyond the implementation stage and were focused on the use of the EMR. Factors that hindered and motivated

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ongoing use emerged. Factors that hindered use included (1) information technology challenges such as learning to use the EMR, electronic connectivity, and scanning; and (2) variability in EMR use. Two factors motivated ongoing use: (1) improved efficiency in providing patient care, and (2) confidence with computers and the EMR.

Factors That Hindered EMR Use

Learning to Use the EMR. A factor influencing ongoing use was the persistent challenge in using the EMR compared with the traditional paper chart. For some participants, letting go of paper was difficult.

"*He..always wants to go paperless, but if you look in his back office he's a paper nut. That's something that's hard to let go of…if that's what you've done for your whole life.*"

"*I'm not yet at the point where I feel like I want to ask my staff to not give me the paper charts.*"

Other influences on learning to use the EMR were the complexity of the system, and computer skills. Some participants continued to struggle over time with the complexity of the program and basic computer skills such as keyboarding.

"*It's a very complex program which [to]get familiar with, especially when you are like me who can't type.*"

Lack of Electronic Connectivity. A second factor impeding ongoing use was the lack of electronic connectivity among health care providers, for example, not having laboratory results coming into the EMR electronically. Participants expressed dissatisfaction with the lack of electronic connectivity as well as challenges that occurred with existing connectivity. This intensified participants' frustration with not being able to become fully electronic in their practices.

"*We are not paperless, unfortunately. That was our goal, how many years ago. It hasn't happened, unfortunately. It's difficult to be paperless because you can't get everything from every place right into your computer system. You just can't.*"

There also was concern about the reliability of the data even when there was connectivity.

"*…Faxing to a specialist for referrals, through the system, it still has to be paper. To the hospitals, it's still paper. The labs still aren't quite organized. There have been labs that we haven't received. So there's still a little bit of a fear of not receiving stuff, information….When you have the paper it's safe.*"

Scanning. A third factor within the information technology theme was scanning. Much of the information practices received was in hard copy form and had to be scanned in and attached to the patient's record. This scanning was a very labor-intensive process.

"*At the moment, all the consultant reports that come from the hospital, we receive by fax, we read on paper format and we scan in, which is a huge labor intensive financial thing, we're paying someone to do it….*"

Participants reported that there was often a backlog of documents that needed to be scanned, which could result in incomplete electronic patient records.

"*…Very little scanning has been done here so I feel that we have 2 incomplete charts. We have a paper chart that is not complete and we have an electronic chart which is also not complete.*"

Variability in Ongoing EMR Use. Finally, variable use of the EMR among participants created difficulties. Because the participants used the EMR in different ways and to different degrees, the same information was not always available in the EMRs of all patients. Participants expressed frustration when other team members were not using the EMR fully.

"*So there's a few that are not up to par and… there's not that enthusiasm or not that push to learn it, which I find frustrating. Because then if I have to fill in for somebody then I can't pull up the immunizations because they're not in the computer, they haven't been put in. Just learn it and do it!*"

Factors That Motivated EMR Use

Efficiency in Providing Patient Care. Participants identified improved efficiency in providing patient care as a benefit of EMR use, which in turn was a key motivator for ongoing EMR use.

"*…once it's there if you keep it up it is simpler for us which means it's better for the patient. It's even more efficient, and [I] have more time to spend on maybe some other things.*"

Another participant stated:

"*Well, I think life is easier with this program. I feel like I'm more efficient, I can do things like consult letters, chart summaries much faster and easier than before.*"

This facilitated a positive view of the EMR as a useful tool in the provision of primary health care. However, for efficiency to be realized, information had to be up to date and included in the patient record, as a participant stated:

"*…I have to be more organized in how I put things in there.*"

Confidence. The second facilitator to ongoing use was confidence with using computers and the EMR software. For some participants, continuing to learn to use the computer and the EMR posed a

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challenge, whereas for other participants, confidence with computers and the EMR motivated use.

"I like computers, so I have some previous experience that's transferable, and that was invaluable."

For some participants, the use of the computer and the EMR became simply a part of their day-to-day routine.

"…now it's just part of coming to work."

Finally, participants in our earlier study described the challenging nature of EMR implementation. In this study, as participants moved into the postimplementation phase, they had a practical view of EMRs, as this participant indicated:

"Not every EMR is ever going to be perfect."

This likely reflects a more balanced view of both the benefits and drawbacks of EMRs.

Discussion

This study explored the views of participants who had moved beyond the initial EMR implementation stage and had been using the EMR in their practices for ≥2 years. Factors that hindered ongoing EMR use were information technology challenges such as learning to use the computer and the EMR, electronic connectivity, and scanning as well as variability in the use of the EMR. There were 2 factors that motivated ongoing EMR use: improved efficiency in providing patient care and confidence in using computers and the EMR.

In our previous study, training, time, and computer skills were themes that emerged as barriers to EMR implementation. In the current study, though these central themes emerged again, they had evolved over time. Training was still a concern but was focused on enhancement of skills and capability. Time remained an issue, but was related more specifically to the labor-intensive need to scan documents into the patient chart. The influence of learning to use the computer and the EMR was a consistent theme throughout both studies. In contrast with our previous study, new issues related to increased levels of EMR use, such as electronic connectivity, came to the fore. As participants advanced their use of the EMR, the desire to become fully electronic and to have all team members use the EMR consistently also emerged. Participants in our previous study discussed the benefits of having an in-house problem solver and using the EMR messaging system. Although these were novel aspects of EMR use in our previous study, they had become integrated into the routine use of the EMR 2 years after implementation. A recent systematic review of physician perspectives on adopting EMRs identified 8 main barriers to implementation, including technical concerns (such as lack of computer skills, training, and system complexity); time (including learning to use the EMR and data entry processes); change process; and leadership.[13] Similarly, in this study, computer skills and system complexity, time, and change processes emerged as influencers of EMR use.

Participants in this study acknowledged the learning curve associated with using the EMR and how gaining knowledge about computer use continued to be a challenge even 2 years after implementation. These findings reinforce our understanding that a focus on learning to use the computer enhances adoption of the EMR. A lack of computer skills has been noted as a barrier to EMR implementation in previous research.[5,7,13,25] The importance of learning to use a computer suggests the need to plan for assessing and improving computer skills (including keyboarding/typing) as not only a part of early EMR implementation, but as a part of later adoption and use processes. This is an important and potentially easily overlooked part of ongoing EMR use. Recognizing the ongoing nature of the learning process when adopting new software, practices implementing EMRs should aim to maintain protected time for EMR training as part of continuing professional development.

Participants in our previous study were struggling to implement the EMR.[12] In this follow-up study, the challenge shifted to the issue of entering information in the EMR through electronic connectivity with other providers and scanning. Issues with scanning have been identified in the literature: hospital-based physicians and nurses found they were less satisfied over the long term with using patient data stored as scanned images compared with the use of electronic data.[26] Primary health care practices may want to consider implementing a consistent strategy to deal with paper coming in to the practice during the start-up EMR period and to continue advocating for health system change to resolve electronic connectivity issues. In this study, as providers became more adept at the use of the EMR, they were increasingly frustrated by not being able to have a fully paperless practice.

Differences in EMR use among participants also emerged. This resulted in variability in the informa-

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tion available for each patient within the practice. Consistent with these findings, differences in the use of EMRs have been found among individuals in a particular provider group as well as between nurse practitioners and physicians.[27] The frustration expressed by participants about the lack of consistent patient information may reflect that they were seeking to maximize their use of the EMR in practice. Developing strategies, such as team meetings to agree on data entry conventions in the practice and the identification of the important uses of these data to all team members, could encourage consistent use of the EMR among team members and facilitate the entry of this information.

Despite continued challenges, participants also experienced facilitators of ongoing EMR use, in particular, perceived benefits regarding efficiency in providing patient care. These perceived benefits of the EMR to health care provision perhaps reflect some participants' advanced stage of EMR use. Perceptions of increased quality of care also were found in 2 previous longitudinal studies of EMR implementation.[16,17] The benefits to efficiency when providing patient care that were expressed by some participants in this study were clearly a motivating force in their continued EMR use. Similarly, over time, some participants became more comfortable with and confident in their use of computers and the EMR. It became part of their day-to-day practice rather than an insurmountable hurdle in their everyday work life.

Finally, the overall perspective of the participants shifted from mixed reactions in our previous study (both positive and negative, depending on stage of EMR use) to a more practical view overall. Similarly, negative opinions about EMRs have been found among participants at an early stage of EMR use (6 months).[18] It may be that a certain period of time needs to elapse before providers are able to overcome the initial challenges of EMR implementation and realize some of the potential benefits of this technology. Alternatively, those who learn the software more rapidly may perceive benefits relatively quickly compared with others. Ultimately, after ≥2 years of EMR use, participants in this study expressed a more balanced perspective on the realities of EMRs in primary health care practice.

To expand further on this interpretation of the study findings, we identify below the linkages between our findings and the concepts described in Davis' Technology Acceptance Model (TAM).[28]The TAM has been utilized to explore and interpret physicians' acceptance of information technology[29,30] and has been shown to explain much of the use/acceptance of information technology in the health care context.[31] In general, the TAM posits that acceptance (and subsequent use) of information technology is determined by behavioral intention, which reflects an individual's willingness to change. This intention is then influenced by attitude, that is, an individual's view about a "target behavior." Attitude is determined by 2 constructs: perceived usefulness (ie, "the information technology system will enhance job performance") and perceived ease of use of the technology (ie, "the information technology system will be free of effort").[31]

Several of the concepts identified in the TAM support the findings of this study. We did not ask participants in our study questions specifically designed to elicit their beliefs about the ease of use of the EMR or about the EMR's perceived usefulness. Despite this, one may consider the themes that emerged from our study (confidence with computers and EMR software; challenges in learning to use the EMR and the computer; challenges with electronic connectivity and scanning) as influences on beliefs about ease of use of the EMR. Similarly, the theme of perceptions of improved efficiency in patient care that emerged from this study could be considered as contributing to views about perceived usefulness of EMRs among primary health care providers.

The central limitation of this study is the small number of participants (n = 19) from a specific geographic area (Southwestern Ontario, Canada). However, we were able to explore the views and experiences of a variety of EMR users (men and women, health care providers and administrative staff) from both rural and urban practices. Most significantly, we were able to compare participants' experiences of EMR implementation and use in their practices over a 2-year time period, thereby affording us an opportunity to observe changes in perceptions, ideas, and experiences.

Conclusions

Issues different from those that were identified during earlier stages of EMR use surfaced as primary health care providers and staff matured in their use of this technology. Ongoing use may be facilitated by confidence with using computers and the EMR and providers' perceptions of benefits to patient care. Optimal use of the EMR could be facilitated through assessing and enhancing users' EMR and computer

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skills, working toward consistent data entry and use of the EMR, and developing strategies to address issues such as scanning and electronic connectivity.

We thank the participants in this study.

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