Refereed paper

Many family physicians will not manually update PDA software: an observational study

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ABSTRACT

Background In a prospective study to explore connections between clinical information delivery and information retrieval, 41 Canadian family physicians searched an electronic knowledge resource (EKR) as needed for practice. Research software, called the Information Assessment Method (IAM), prompted family physicians to report on the situational relevance, perceived cognitive impact and application of their retrieved information hits. Both the IAM and the EKR needed periodic updating to properly address our research questions.

Objective To determine the frequency of software updating when manual or semi-automatic approaches are used by family physicians.

Methods Each family physician received a handheld computer (PDA) that ran the Windows Mobile 6 operating system. For technical reasons, both the IAM and the EKR were accessed offline on PDA. To update the EKR and the IAM, family physicians were asked to synchronise their PDA to their PC. Updating the IAM was a manual process, whereas updating the EKR was semi-automatic.

Results We found: (1) about 25% of family physicians never or rarely updated PDA software on their own, (2) a large number of software updates were never installed and (3) the semi-automatic method was associated with a small increase in the proportion of installed software updates (58.9% versus 48.6% for the manual method).

Conclusions When a wireless internet connection is not used to update PDA software, sociotechnical issues complicate mobile data collection and data transfer.

Keywords: family practice, handheld computers, software

'The only problem is software updating. I hate synchronising my PDA to my computer, even more I find updating a daunting process.' Quote from one participant, received on 29 July 2008

Introduction

Implicit in any move towards evidence-based practice is awareness of and access to current evidence. EKRs on mobile computers (PDAs) are increasingly used by health professionals, with much variability among the

types and methods of implementation and resulting effectiveness.[1] Given our changing knowledge base, EKRs are dynamic and periodically updated. Methods for updating EKRs on PDA can be classified as manual, semi-automatic or wireless. Manual updates are initiated by the user. Semi-automatic approaches prompt users to update their PDA software upon synchronising to a personal computer. Wireless installation allows end users to install new applications or update already installed PDA software without physically connecting to a computer.[2]

While numerous empirical studies describe the use of EKRs and PDAs in clinical practice, none scrutinises the frequency of PDA software updating. In this paper, we describe how often family physicians updated PDA software, and compare manual vs semi-automatic updating methods. Our findings are relevant to information providers and researchers considering mobile data collection, medical educators involved in e-learning projects and designers of health informatics projects.

Materials and methods

Design

In a prospective observational study, a cohort of 41 family physicians searched an EKR as needed for clinical information. They were asked to update two inter-related pieces of software on their PDAs.[3] Our research objectives were:

1 to examine to what extent family physicians retrieved clinical information they had formerly received on email
2 to compare ratings of clinical information received on email (push) versus that retrieved on PDA (pull)
3 to explore whether family physicians purposefully or by serendipity retrieved clinical information previously received on email.

The study was approved by the McGill University Faculty of Medicine Institutional Review Board.

Our study software, the IAM, hooked into a commercial EKR (Essential Evidence Plus, www.essential evidenceplus.com) to allow rating information such as synopses of clinical research retrieved to address practice-based questions. The IAM prompted participants to rate the situational relevance, perceived cognitive impact and any application to practice of these information hits. The IAM is the product of an eight-year research and development programme,[4] summarised at iam2009.pbworks.com.

Push

We emailed new synopses of published clinical research to family physicians, as they were released by the publisher.

Pull

At intervals of roughly two months, the publisher released EKR updates containing these new synopses, which family physicians could then retrieve as needed for practice. Since we wished to examine how *push* influenced *pull* through the retrieval of synopses that were previously read on email, family physicians were asked to use the most recently released versions of the EKR and the IAM. Failure to update the EKR left family physicians without PDA access to recently released synopses. Failure to update the IAM prevented evaluation of new synopses.

Participants

Forty-one family physicians from nine of the ten Canadian provinces consented to participate in the study. Thirty-six were certified by the College of Family Physicians of Canada. There were 24 men and 17 women, ranging in age from 28 to 70 years (median 44). All were in active practice. One family physician had no internet access in their main patient setting, 37 (90.2%) reported high-speed access and three did not know what type of connection they had. In terms of computer self-efficacy, eight (19.5%) rated their level of skill as advanced, 32 (78.1%) as intermediate and one as beginner. One participant dropped out early on before updating any software.

Data collection

All participants were offered an HTC Touch Smartphone. However, 17 chose a device with no phone (the hp iPAQ 110). Both devices were Wi-Fi enabled and used Windows Mobile 6. We performed the initial software installation. Family physicians were trained to synchronise their PDA to their PC for software updating and data transfer to our study server. Thus, no wireless connection was used and study software resided on the PDA. Upon synchronisation of PDA with the partner PC, an 'updater' application automatically reminded participants to install EKR updates.

Software to implement the IAM on PDA was developed and piloted with guidance from a private firm. By email and telephone, we reminded participants to install the IAM updates released alongside each EKR update. No updater application was available for the IAM on the partner PC. Thus, updating

the IAM was a manual process requiring synchronisation with a partner PC to reinstall six components (e.g. Microsoft SQL Mobile 2005).

Entry into the study began in December 2007 and continued until May 2008. Data collection ended on 8 September 2008.

Data analysis

From December 2007 to September 2008, six EKR and five IAM updates were released. We counted the number of updates installed by each participant in a time window spanning their start date until the end of data collection. We classified updates as either unassisted or assisted. Unassisted updates were defined as updates done by the participant without our help. For each participant, we compared the number of unassisted updates with the number of available updates for both the EKR and the IAM. We also counted assisted updates, defined as updates requiring the assistance of our research team. In the assisted situation, for each participant we calculated proportions for the number of updates done divided by the number of updates available.

Results

Between 10 December 2007 and 8 September 2008 we received 1374 rated searches containing 2634 rated hits. Most family physicians ($n = 28$, 70%) reported at least one sociotechnical problem, such as:

1 problems with synchronisation software
2 trouble synchronising at work due to lack of administrative rights
3 changes in PC operating system.

On 19 occasions, these problems led us to recall PDAs to the research centre to update study software.

Unassisted updating

The variable start date created different numbers of updates available for each family physician. Figures 1 and 2 reveal the number of EKR and IAM updates made without help from the research team by each family physician. In both figures, the number of installed updates is represented by the black bars, and ranked from least to most. We observed that:

1 about 25% of participants never or rarely updated on their own
2 a large number of updates were never installed (light grey bars)
3 the semi-automatic method was associated with a 10% increase in the proportion of installed software updates ($n = 123/209$, (58.9%) vs $n = 83/171$ (48.6%)).
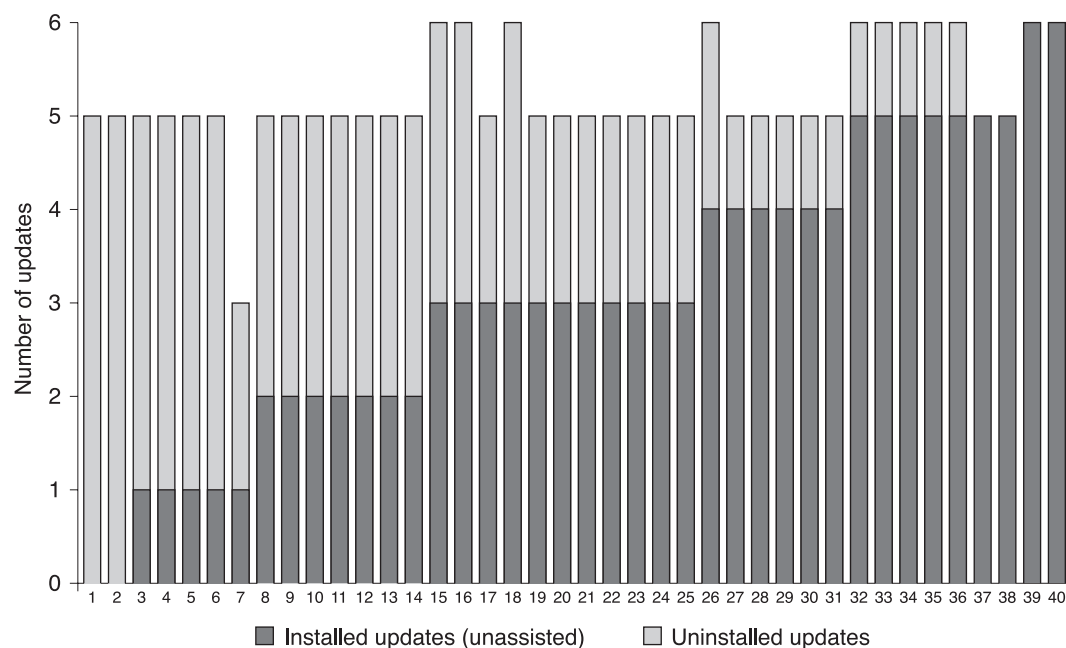

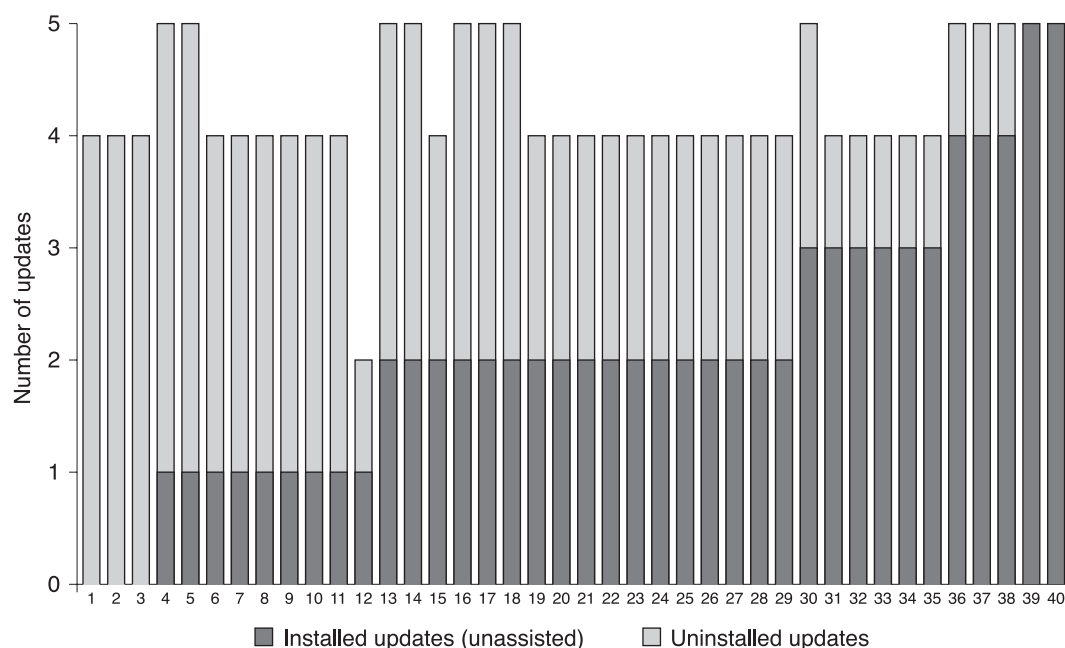**Figure 1** EKR: number of installed and uninstalled updates (unassisted)

Figure 2 The IAM: number of installed and uninstalled updates (unassisted)

Assisted updating

On at least one occasion, eight of the 40 participants needed assistance to update their EKR (Table 1). Eleven of the 40 needed help to update the IAM. With assistance, all participants updated at least once. After multiple email reminders and our ongoing support, 26 participants (65%) succeeded in downloading 60% or more of all EKR updates. Only nine of the 40 participants (22.5%) installed the final IAM update in the last 30 days of data collection.

Discussion

Principal findings

Some experts believe few physicians will manually update PDA software.[5] Our results support this belief.

Table 1 Number of participants needing assistance to update PDA software

Number of assisted updates	EKR	IAM
0	32	29
1	5	7
2	2	3
3	1	1

In this observational study, many participants did not update their PDA software, even though they had consented and were trained to do so. The semi-automatic updating method was not much better than the manual method, perhaps because any potential advantage of semi-automatic updating can be realised only when personal and organisational factors are aligned. For example, a motivated family physician may not be permitted to install software in the workplace.

Implications of the findings

Sociotechnical approaches to IT implementation in health care consider the importance of learning how people, technologies and the process of care interact.[6] From an organisational perspective, IT problems can be controlled at the source by restricting administrative rights to members of a technical support team. This approach to network security was one obstacle to mobile data transfer in our study.

From an individual perspective, the task of updating software for research is outside the normal workflow. To optimise mobile data collection and data transfer for research, a wireless connection[7] should be used. While some PDA software vendors now provide wireless mobile access to frequently updated content, this was not an option for us, as the EKR we used was only available offline.

Limitations of the method

One limitation concerns generalisability, as our study sample was chosen by convenience. A sub-group of family physicians with high-level computer skills might have higher rates of software updating on PDA. Secondly, the use of PDAs for research data collection cannot be understood in isolation from the organisational context. Our method of software updating was workable in our hands, but not in the hands of many participants within different organisations.

Comparison with the literature

In searching bibliographic databases for studies reporting on the frequency of PDA software updating (search strategy available on request), we found no empirical primary care studies on this topic. However, a growing body of literature describes the use of EKRs in health care, or the use of PDAs in clinical practice.[8–13] Many articles examine sociotechnical issues and how theoretical models are relevant to technology acceptance.[14–16]

Call for further development

Our results suggest better methods are needed for PDA data collection in evaluation and research. The capacity for wireless updating of medical software on PDA seems essential.

Conclusion

In this paper, we observed how often family physicians updated two types of PDA software when a wireless connection was not used. In this context, sociotechnical issues complicated mobile data collection and data transfer, requiring frequent assistance. Our findings will hopefully prompt researchers and developers to seek better solutions to software updating given the work context of health professionals.[17]

> **What this paper adds**
> Manual or semi-automatic methods of updating medical software on PDA were barriers for many family physicians, supporting a need for wireless updating technology

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CONFLICTS OF INTEREST

The authors declare no conflict of interest with respect to any of the commercial products listed in this paper.

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