Web based diabetes care planning

Sociotechnical barriers to implementation in general practice

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Background

This research explored the sociotechnical barriers in the implementation of web based diabetes care plans in general practice from the perspective of implementing stakeholders.

Methods

A qualitative case study design was use to explore the sociotechnical barriers. Twenty-one stakeholders were purposely recruited and interviewed.

Results

Technological barriers included rudimentary IT applications in general practice; standardisation and interoperability issues; and 'bugs' in the system. The role of practice managers as gatekeepers influenced the uptake of the technology. General practitioners were noted to be time poor, while practice nurses preferred to stick with paper based ways of doing care plans. The relationship between allied health professionals and GPs also influenced the adoption process.

Discussion

Implementers had significant insight into the sociotechnical barriers to diabetes web based care planning in general practice. Future research should examine the roles of the stakeholders involved in determining standards and the interoperability of systems.

Keywords: health services, delivery of health care; integrated delivery of health care

The use of care plans in the management of patients with chronic disease is a common practice within primary care. A care plan is 'a written, comprehensive, and longitudinal plan of action that sets out the healthcare needs of a patient and the types of services and supports needed to meet those needs'.[1] In Australia, the care planning process is initiated by the general practitioner in consultation with the patient, and sometimes with the assistance of the practice nurse. Two types of care plans (*Table 1*) are funded by Medicare: a General Practice Management Plan (GPMP) and a Team Care Arrangement (TCA).

The benefits of using these care plans have been shown to be minimal for both patients and the primary care team. Shortus et al[2] suggest that one reason for this is the lack of effective communication and collaboration between GPs, allied health professionals (AHPs) and specialists. Georgeff[3] proposes the use of information technology (IT) as a solution to optimising communication and collaboration between the members of the primary care team. Beilby[4] backs this approach as central to improving the care planning process in general practice.

In order to improve the care planning process, the Chronic Disease Management Network (CDM-Net) project (*Table 2*) was initiated to develop a web based care planning process for GPs, AHPs and specialists and diabetic patients in Geelong, Victoria. *Table 3* describes the web based planning process. It is well recognised that the identification of sociotechnical barriers is central to improving any IT initiative.[5–7] This article aims to explore the sociotechnical barriers associated with the implementation of the diabetes web based care planning tool in general practice from the perspectives of implementing stakeholders. The patients' perspectives will be reported separately. Specific objectives were to identify from the perspectives of the implementers:

* the technological barriers to implementing web based care planning
* the role of clinical users in the adoption of web based care planning.

Methods

We used a qualitative case study design[8] to explore the sociotechnical barriers associated with the implementation of the diabetes web based care planning tool. The sampling strategy was purposive and designed to capture the perspectives of the stakeholders actively involved in the implementation of the tool. These stakeholders were based in research institutions, software development companies, and in primary care.

The data collection method was in depth interviews, which lasted approximately 50 minutes. The interviews were voice recorded before being transcribed verbatim. The transcribed data was de-identified and each participant assigned a code number. Field notes obtained from participant observation and project documents provided additional evidence. The CDM-Net project documents collected for analysis included weekly project reports, minutes of meetings and the final evaluation report. The search and eventual selection of documents was informed by the emergent themes coming out of the interview process with stakeholders.

The data was analysed using theory (sociotechnical systems theory) driven thematic content analysis. This theory is a widely accepted

conceptual framework used in identifying barriers in e-health projects.[9] As a convention, sociotechnical systems research recognises the mutual influence between the social system (people, roles and tasks) and the technical subsystem (eg. technologies) in the adoption of IT systems.[10] Using a theoretical framework to guide the coding process facilitated the integration of concepts known in the literature into the current study, thus building on previous research by either supporting or contradicting similar work.

The data was organised based on the research questions, broken into meaningful patterns and themes, coded for repeated concepts and then sorted into categories. The findings were regularly presented to co-authors and their feedback was incorporated into the interpretations of the data.

Ethics approval was granted by Monash University Human Ethics Research Committee (CF09/0188: 2009000071).

Results

The development, implementation and evaluation phases of the CDM-Net project were intertwined and occurred between March 2008 and October 2010. A total of 21 implementing CDM-Net project stakeholders, including seven software developers, eight researchers, three GPs, one health executive, project manager and allied health staff, were interviewed during an 8 month period from July 2009 to February 2010. The barriers identified by interview participants were divided along the two dimensions of sociotechnical systems theory: the technological barriers and the role of stakeholders in general practice.

Table 1. Care planning in Australian general practice
GP Management Plan (Medicare Item 721)
• Patient has a chronic medical condition but does not require multidisciplinary care
• A comprehensive written plan that specifies the plan of action to meet the healthcare needs of a patient and the types of services and supports needed to meet those needs
• Should be undertaken by the patient's usual GP
• Offer a copy to the patient and add a copy to the patient's medical records
• Recommended once every 2 years
Team Care Arrangements (Medicare Item 723)
• A GPMP is required before a TCA can be created
• Patient must have a chronic medical condition that requires multidisciplinary care
• GP must consult with at least two collaborating providers, who will provide a different type of treatment/service
• Collaboration must be based on two-way communication
• The document should relate to specific needs and circumstances of the patient
• The document must include advice from providers on treatment and management of the patient
• Offer a copy to the patient and add a copy to the patient's medical records
• Recommended once every 2 years
Adapted from Medicare Australia 2011

Table 2. Summary details of the CDM-Net project
• The project was undertaken by a collaboration of 12 Australian and international organisations led by Precedence Health Care
• Collaborating partners: Barwon Health, Cisco Systems, CSIRO Australian e-Health Research Centre, Deakin University, Diabetes Australia (Vic), Global Health, the GP Association of Geelong, IBM, Intel, Monash University, and Victoria University Centre for Strategic Economic Studies
• Primary output of the project: CDM-Net, a network of computing services and infrastructure for supporting chronic disease web based care planning
• CDM-Net supports the entire care management process, from the creation of individualised care plans to review and follow up, continuously monitoring the care of the patient in real time across the care team
• CDM-Net also automates and manages the processes and documentation for meeting Medicare requirements and billing

Technological barriers

Rudimentary IT applications in general practice

'What we actually found was that the IT applications was really pretty poor, poorly designed, poor user interfaces, slow, and buggy...' (Software developer)

Although, it is widely recognised that general practice is the most computerised part of the health system, and that most GPs use sophisticated clinical software, the software developers felt that these technologies were still rudimentary given the current speed of innovation in IT development and when compared to other industries such as banking. The rudimentary nature of health IT in general practice slowed the integration of the web based care plan. The project team was less likely to be able to implement the web based care plan in practices that did not have the necessary or minimum IT systems requirements. The efficiency of the web based care plan depended on the internet connection of practices.

'The GPs... although they've got the internet, it's almost in a dial up speed, and the system just doesn't operate at that sort of speed level...' (Software developer)

Lack of standardisation and interoperability

'I think it has been difficult... it doesn't have standards, or the standards are too complicated...' (Researcher)

The lack of standards in the development of health IT applications affected the interoperability of the web based care plan with some of computer clinical software used by the GPs. This was reflected in the inability of the web based system to automatically upload some important diabetes clinical parameters such as glycosylated haemoblobin (HbA1c) and albumin/creatinine ratio.

'Bugs' in the system

'I was the only GP out of nine who used the system; the others had a brief look at it and decided that they would rather wait for the bugs to be ironed out before they'd launch into it.' (GP)

The early prototypes of the diabetes web based care plans had software 'bugs' in them. A software bug is the common term used to describe an error, flaw, or mistake in a computer

program that produces an incorrect or unexpected result, or causes it to behave in unintended ways. This slowed the adoption process, as GPs wanted a fully functional system before trialling it. One of the implementers explained why software bugs were present in earlier versions of the plan.

'One of the big challenges as far as the service goes is that we started with a pretty rudimentary service. The product was a little bit immature when it was first released, so that certainly created a barrier...' (Project manager)

Role of stakeholders

Gatekeeping practice manager

'The practice manager is trying to protect and gate-keep the practice in order to look after their GPs. So getting them into the project has been difficult...' (Researcher)

The role of the practice manager was central to recruiting GPs and encouraging them to adopt the web based care plan. The practice manager's perception of the ability of the web based care plan to reduce the GP's workload influenced their decision to encourage the GP to adopt the new system for care planning.

Time poor GP

'I think one of the biggest challenges is that it's difficult for them to find a decent amount of time to actually sit and listen to what you have to say.' (Researcher)

General practitioners are coordinators of care plans and are usually pressed for time. General practitioners who perceived that the web based care plan did not improve the time efficiency of the care planning process were more likely not to adopt the new system.

The split practice nurse

'They cannot use this system for one GP and then use another system for another. They would rather stick with the old one as most of the GPs in this practice are still using it...' (GP)

In most practices, especially group practices, the practice nurse was primarily responsible for creating care plans and communicating with AHPs.
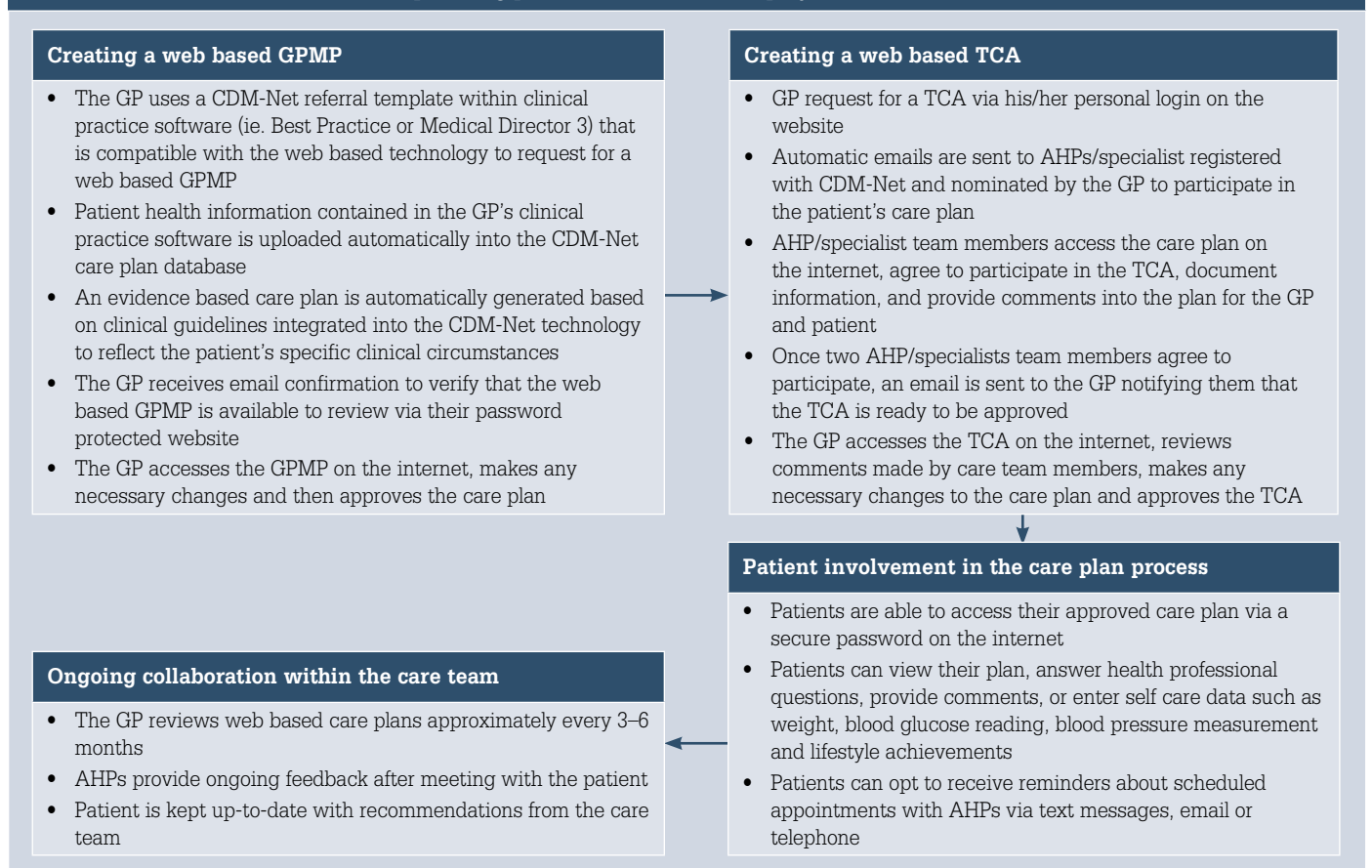
Even if some of the GPs were interested in adopting the web based care plan, the role of the practice nurse determined to a great extent if the new system would be adopted. If the practice nurse perceives that they have to implement two systems at the same time they would rather stick with the old one, which largely involved a paper based approach to collaborating and communicating with members of the care team.

Allied health professionals in the care team

'It really depends on your GP and the relationship you've got. If you were to send one GP off on the wrong foot from day one, I don't think they're going to listen to you after that...' (AHP)

Although some AHPs work in general practices, a large proportion work within the broader primary care community. So, as a collaborating and communicating tool, the successful adoption of the web based care plan depended on the relationship between GPs and AHPs who worked outside of the practice. A strong and positive relationship

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Table 3. The web based diabetes care planning process in the CDM-Net project (2008–2010)

Creating a web based GPMP
- The GP uses a CDM-Net referral template within clinical practice software (ie. Best Practice or Medical Director 3) that is compatible with the web based technology to request for a web based GPMP
- Patient health information contained in the GP's clinical practice software is uploaded automatically into the CDM-Net care plan database
- An evidence based care plan is automatically generated based on clinical guidelines integrated into the CDM-Net technology to reflect the patient's specific clinical circumstances
- The GP receives email confirmation to verify that the web based GPMP is available to review via their password protected website
- The GP accesses the GPMP on the internet, makes any necessary changes and then approves the care plan

Creating a web based TCA
- GP request for a TCA via his/her personal login on the website
- Automatic emails are sent to AHPs/specialist registered with CDM-Net and nominated by the GP to participate in the patient's care plan
- AHP/specialist team members access the care plan on the internet, agree to participate in the TCA, document information, and provide comments into the plan for the GP and patient
- Once two AHP/specialists team members agree to participate, an email is sent to the GP notifying them that the TCA is ready to be approved
- The GP accesses the TCA on the internet, reviews comments made by care team members, makes any necessary changes to the care plan and approves the TCA

Patient involvement in the care plan process
- Patients are able to access their approved care plan via a secure password on the internet
- Patients can view their plan, answer health professional questions, provide comments, or enter self care data such as weight, blood glucose reading, blood pressure measurement and lifestyle achievements
- Patients can opt to receive reminders about scheduled appointments with AHPs via text messages, email or telephone

Ongoing collaboration within the care team
- The GP reviews web based care plans approximately every 3–6 months
- AHPs provide ongoing feedback after meeting with the patient
- Patient is kept up-to-date with recommendations from the care team

enhanced the adoption of the web based care plan across the primary care team within the community.

The elderly patient

'I suspect it's probably an age thing, because a lot of these diabetes patients are older... not used to the internet or something...' (Researcher)

The patient cohort that was being treated by the GP for diabetes was more likely to be in the older age group. This factor may have influenced their decision to partake in the web based care planning process.

Discussion

The adoption of the web based care planning process was limited by the rudimentary nature of health IT, the slow internet connectivity and the lack of standards and interoperability between systems. The latter is one of the major issues currently affecting the adoption of e-health technologies generally.[11] In addition, the immature nature of the early prototypes of the web based care plan prevented some GPs from taking up the system. This is to be expected when a new technology is being developed.[12]

A time efficient system will almost certainly be more attractive to GPs, assuming that the practice manager and practice nurse see benefits in using the system. The likelihood that older patients (apart from IT enthusiasts) would adopt the web based system is minimal. However, as chronic disease such as diabetes is increasing in younger patients who are keener on using these types of technology, the potential target audience would probably broaden in the future.

The examination of the role of key stakeholders, as probed in this study, has provided some insight into some of the sociotechnical issues associated with implementing a web based care plan. However, the use of case study design limited the generalisation of our findings to other settings. Nevertheless, the case study method allowed for the in depth examination required for complex social interventions such as IT systems.[12,13]

This research may assist in the adoption process of other innovative technologies in Australian general practice. *Table 4* provides some recommendation to stakeholders interested in implementing web based diabetes care planning. Future research should examine the roles of

Table 4. Recommendations for implementers of web based care planning
• Examine the organisational context of general practice to ascertain whether enabling circumstances exist to encourage the adoption of web based care planning. In particular, more resources should be targeted at assisting the practice nurse in the utilisation of web based care planning
• Examine the relationship between general practices and AHPs to determine the suitability of web based care planning. For AHPs not colocated with GPs, a strong relationship seems to be a positive factor
• Expect and prepare for problems with interoperability due to current lack of uniform standards across the health IT

stakeholders involved in determining standards and the interoperability of IT systems. This may help in improving the development of innovative technologies such as the web based care plan. Policy makers should consider increasing funding to improve the internet connectivity in general practice in order to be on par with other industries. This will be essential to achieving the wider e-health initiative in primary care.

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