Maternity patients' access to their electronic medical records: use and perspectives of a patient portal

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Abstract

Patients have been able to access clinical information from their paper-based health records for a number of years. With the advent of Electronic Medical Records (EMRs) access to this information can now be achieved online using a secure electronic patient portal. The purpose of this study was to investigate maternity patients' use and perceptions of a patient portal developed at the Mater Mothers' Hospital in Brisbane, Australia. A web-based patient portal, one of the first developed and deployed in Australia, was introduced on 26 June 2012. The portal was designed for maternity patients booked at Mater Mothers' Hospital, as an alternative to the paper-based Pregnancy Health Record. Through the portal, maternity patients are able to complete their hospital registration form online and obtain current health information about their pregnancy (via their EMR), as well as access a variety of support tools to use during their pregnancy such as tailored public health advice. A retrospective cross-sectional study design was employed. Usage statistics were extracted from the system for a one year period (1 July 2012 to 30 June 2013). Patients' perceptions of the portal were obtained using an online survey, accessible by maternity patients for two weeks in February 2013 (*n*=80). Descriptive statistics were employed to analyse the data. Between July 2012 and June 2013, 10,892 maternity patients were offered a patient portal account and access to their EMR. Of those 6,518 created one (60%; 6,518/10,892) and 3,104 went on to request access to their EMR (48%; 3,104/6,518). Of these, 1,751 had their access application granted by 30 June 2013. The majority of maternity patients submitted registration forms online via the patient portal (56.7%). Patients could view their EMR multiple times: there were 671 views of the EMR, 2,781 views of appointment schedules and 135 birth preferences submitted via the EMR. Eighty survey responses were received from EMR account holders, (response rate of 8.1%; 80/985). The majority of respondents indicated they would use the portal and access their EMR for future pregnancies (86.2%; 69/80). Approximately half looked at their EMR after a visit with their care provider (51.3%); 41/80) and 37.5% (30/80) viewed their EMR before, to prepare for their visit. The majority (65.8%) thought that the EMR improved their ability to understand and recall appointments and almost half (48.1%) thought that with the EMR they were less likely to repeat pregnancy information to caregivers. This study provides the first Australian evidence of a patient portal system, tied to an EMR, working effectively in a maternity care context. It provides new evidence that portals can deliver benefits to maternity patients in terms of providing quick and easy access to current personal and general health information and support patients in their ability to recall and prepare for appointments.

Keywords (MeSH): Electronic Medical Records; Patient Access to Records; Computer Communication Networks; Doctor-Patient Relations; Personal Electronic Health Records; Medical Records Systems, Computerised; Access to Information; Patient Data Privacy; Pregnant Women.

Introduction

The growth and spread of e-health, including electronic medical records (EMRs) and health knowledge sourced using the internet, has made online access to information by health professionals and patients, a key component of how healthcare is delivered today (Horton 2003; Gosling, Westbrook & Spencer 2004; Westbrook, Gosling & Coiera 2004; Westbrook, Gosling &Westbrook 2005; Hordern et al. 2011; Callen et al. 2013). Governments and healthcare facilities in Australia and overseas regularly highlight patient access to clinical information as an essential component for building a more effective, equitable and safer healthcare system (Al-Shorbaji 2013). Personally-controlled EMRs are seen as a way to promote greater patient access to their own medical information

(Committee on Quality of Health Care in America - Institute of Medicine 2001) and as a means to enhance care coordination across health services (Nettleton & Hanlon 2006).

Patients have been able to access clinical information recorded within their paper-based health records for a number of years (Freedom of Information Act 1982 (Cth)[1]; Davis Giardina et al. 2014). With the advent of EMRs, patients' access to this information can now be achieved online using a secure electronic patient portal; however currently this is not common practice (Delbanco et al. 2010). Electronic patient portals, tied to hospitals' electronic medical record systems, not only provide patients with secure electronic access to appointments and clinical information recorded in their EMR, but also enable them to review and add to their records and communicate with health professionals (Staroselsky et al. 2008; Ammenwerth, Schnell-Inderst & Hoerbst 2012; Schnipper et al. 2012; Goldzweig et al. 2013; Turvey et al. 2014).

Despite the enthusiasm for patient portals, evidence of their use and impact has been limited and inconclusive (Ammenwerth, Schnell-Inderst & Hoerbst 2012; Davis Giardina et al. 2014; Goldzweig et al. 2013). A recent systematic review of literature examining the effect of patient portals on clinical care concluded that there was insufficient evidence to determine whether patient portals had a positive, negative or neutral impact (Goldzweig et al. 2013). The majority of positive examples related specifically to patients with chronic diseases, such as diabetes, hypertension and depression, where the portal was used as an accompaniment to case management (Goldzweig et al. 2013). The effect of patient portals on healthcare utilisation and efficiency is also unclear, with very few studies examining the impact of patient portals on inpatient hospitalisations, emergency department and outpatient visits, length of stay or telephone contacts (Goldzweig et al. 2013). One reason for the lack of research in this area is that patient portals are relatively new technology and the healthcare community has only just begun to understand how they can engage with this innovation to optimise care delivery, outcomes and patient engagement (Nettleton & Hanlon 2006). An area that has been highlighted is the lack of applicable evidence to replicate successes and avoid problems with implementation of patient portals (Goldzweig et al. 2013). Further studies are urgently needed to understand how patient portals are perceived in different health contexts and how they can be used as a means of enhancing the quality of healthcare delivery and outcomes (Prey et al. 2013).

Patient-held maternity health records are not new and studies have shown that they facilitate communication between patients and their healthcare providers and also provide patients with a sense of control and responsibility over their care (Elbourne et al. 1987; Lovell et al. 1987; Homer et al. 1999; Hawley et al. 2014). In spite of the apparent suitability of maternity patients to access information online there are very few evaluation studies in this environment (Shaw et al. 2008; Wackerle et al. 2010) and none undertaken in Australia. We aimed to fill this gap by investigating maternity patients' use and perceptions of a patient portal developed at the Mater Mothers' Hospital in Brisbane, Australia. The patient portal application at the Mater hospital allows maternity patients to perform a variety of tasks such as submit hospital registration forms online and access general health information. A further level of access linked the patient portal to the hospital's electronic medical record and enabled maternity patients' access to their Mater EMR via the portal.

Methods

Study site

The study was undertaken at the Mater Mothers' Hospital, which has 249 beds and annual statistics of 9,525 births, 15,246 inpatient discharges and 66,667 outpatient encounters (Mater Miseracordiae Health Services 2011). The Mater Mothers' Hospital caters for public and private patients and is part of Mater Health Services (Mater) located in Brisbane Australia. Mater incorporates an acute care service covering seven hospitals including adults, maternity and children.

Patient Portal and Mater EMR

A web-based patient portal, one of the first developed and deployed in Australia, known as the Mater Patient Portal (MPP) was introduced on 26 June 2012 (Figure 1).

The MPP was designed for maternity patients booked at Mater Mothers' Hospital, as an alternative to the paper-based Pregnancy Health Record (Noble 2013). The paper-based Pregnancy Health Record contains a clinician and mothers' section. The clinicians' section has documented the women's health history including medical history, previous pregnancies, laboratory and ultrasound results and physical examinations, visit notes and adverse drug reactions. The mother's section contains their appointment schedule, birth preferences, pregnancy and feeding information, which includes definitions of common

1 http://www.austlii.edu.au/au/legis/cth/consol_act/foia1982222/ (Act No. 3 of 1982 as amended, taking into account amendments up to Parliamentary Service Amendment (Parliamentary Budget Officer) Act 2011).

abbreviations used for maternity patients. It is through the MPP that maternity patients are able to complete their hospital registration form online, obtain current health information about their pregnancy (via their EMR) as well as access a variety of support tools to use during their pregnancy such as tailored public health advice relevant to the patient's particular health journey, Mater Mothers' Hospital brochures and approved external links. The MPP consists of two access levels. Level 1 is for users who have registered for an MPP account but are not able to access any clinical information from their Mater EMR. Users create an account using their email address as their username, and set a password. Level 1 allows patients to submit hospital registration forms online, access general health information and apply to have access to their Mater EMR. Level 1 also allows patients to provide feedback to the Mater, for example they may query the accuracy of their demographic or clinical data (if they have EMR access) or submit questions. These queries go the system administrator who responds or refers the request to an appropriate person for follow-up. Level 2 access is for users that have both registered for an MPP account and been verified for access to their Mater EMR. Level 2 provides patients with access to their own clinical information that is captured by Mater or shared by their general practitioner or private obstetrician. Level 2 access includes: demographic information, appointments details, pregnancy information from both Mater and external healthcare providers, prior pregnancy information, the ability to complete their birth preferences plan and pre-admission forms online, health information targeted to their number of weeks gestation and the ability to control who has access to their Mater EMR.

The patient enrolment process for the MPP commences with the Mater providing a brochure and letter in the welcome pack for all registered maternity patients. This letter provides each patient with their unique reference number (UR). Once a history and booking appointment is made for the patient, a subsequent letter is sent to the patient, which contains their access security code. In order for the patient to apply for their Mater EMR (Level 2 access) they need to provide their UR, date of birth and access code. Once this has been submitted, the patient is then required to provide proof of identification. This can be undertaken in person at the hospital or by electronic means by uploading a certified copy of photo identification, such as their driver's licence.

Study design

A retrospective cross-sectional study design was employed to describe the usage and patients' perspectives of the MPP and Mater EMR. Usage statistics were extracted from the MPP system. Maternity patients' perceptions of the MPP and Mater EMR were collected using an online survey designed by two members of the research team (MF, KD). The survey consisted of 14 closed ended questions relating to: ease of registration, identity verification, what prompted access, ease of use, value in improving patients' abilities to understand appointments with care givers, and an overall rating of the value of the MPP and Mater EMR. Eight question responses were recorded on a 5-point Likert scale from strongly agree to strongly disagree (Appendix 1).

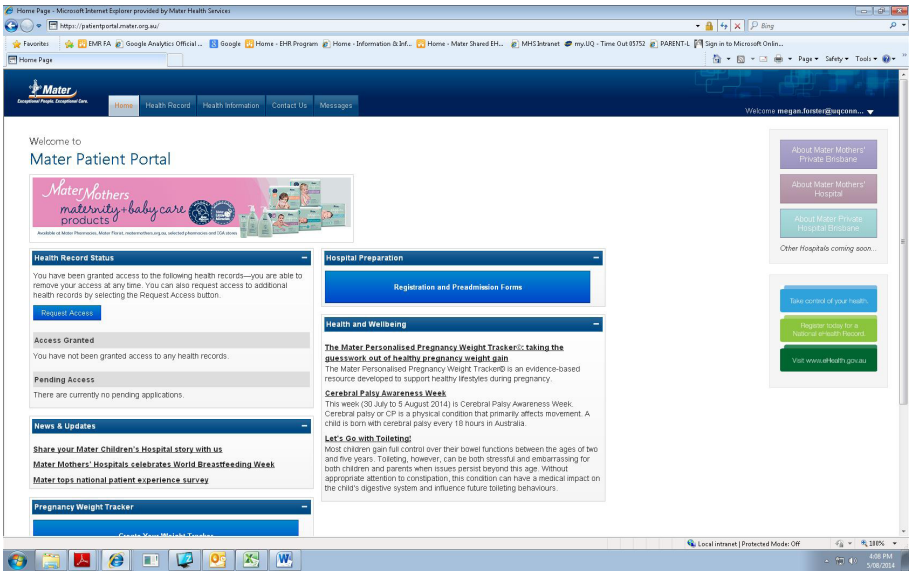

Figure 1: Screen shot of Mater Patient Portal's welcome page

Study population and data collection

Maternity patients' usage of the MPP was extracted from the system for a one year period (1 July 2012 to 30 June 2013). The survey data were collected by inviting all maternity patients with an MPP and Mater EMR accounts (n=985) to participate. The invitation to all maternity patients with accounts was made in the body of a secure email sent to the inbox of the MPP account, which then alerted their personal email account that they had a secure message in their MPP inbox. The invitation included a link to the electronic survey, which was created and analysed using Survey Monkey. No follow-up contacts were made with non-respondents. The online survey was accessible by maternity patients with MPP and Mater EMR accounts (access granted) for two weeks in February 2013.

Data analysis

Descriptive statistics were employed to analyse the usage and survey data. The survey results were analysed using a combination of Survey Monkey functionality and Microsoft Excel. Survey Monkey provided the summative calculations and Excel calculated the percentage scores, displayed aggregate results and created the graphs and tables. For those eight survey questions that had 5-point Likert scale responses, the categories, 'strongly agree' and 'agree' were combined and 'strongly disagree' and 'disagree' were combined for analysis.

Results

Results on maternity patients' usage and perceptions of the MPP and Mater EMR are presented below.

Maternity patients' usage of the Mater Patient Portal (MPP) and Mater EMR

In order to provide the online tool for patients to create their MPP account and request subsequent access to the Mater EMR, a new website, http://patientportal.mater.org.au/ was created. 10,892 maternity patients were offered a MPP account and access to the Mater EMR during the one year study period (July 2012-June 2013). Sixty percent (6,518/10,892) of maternity patients who were offered access to the MPP created an account. Therefore 6,518 MPP accounts were created and 3,104 (48%; 3,104/6,518) of these patients went on to request access to their Mater EMR. Of these, 57% (1,751/3104) had their application verified by 30 June 2013. Most applications that were not verified by 30 June 2013 were pending applications awaiting submission of patient identification verification.

A time series of patients' participation is depicted in Figure 2 and demonstrates that uptake of access to the MPP and Mater EMR grew each month from go-live on 26 June 2012.

Table 1: Usage of Mater Patient Portal (MPP) and Mater EMR

Mater Patient Portal account holders *n*=6,518	
	n (%)
Patients who submitted registration forms online	3695 (56.7)
Patients who submitted feedback	127 (1.9)
Mater EMR account holders *n*=1,750*	
	n
Views made of appointment schedules	2,787
Views made of Mater EMRs	671
Number of birth preference plans submitted	135

* Percentages not calculated as patients can view their EMR and appointment schedules and submit birth preferences multiple times

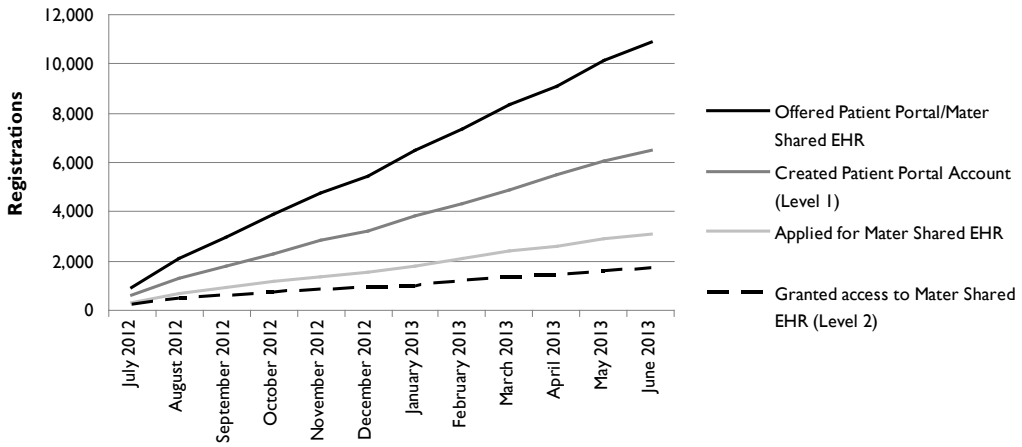

Figure 2: Mater Patient Portal and Mater EMR uptake

The majority of maternity patients who had Level 1 usage of the MPP submitted registration forms online via the MPP (56.7%) (Table 1). Patients with access could view their Mater EMR multiple times. For the one year study period there were 671 views made of Mater EMRs, 2,787 views of appointment schedules and 135 birth preferences submitted (Table 1).

Patients' access to, and perspectives of, the Mater Patient Portal (MPP) and Mater EMR

During the two week survey period in February 2013, 80 responses were received from Mater EMR (Level 2) account holders, giving a response rate of 8.1% (80/985). The majority of respondents stated they would use the MPP and access their Mater EMR for future pregnancies (86.2%; 69/80).

For 37.5% of respondents (30/80) an upcoming visit with their care provider prompted them to view their EMR while 51.3% (41/80) viewed their Mater EMR after a visit to their care provider (Table 2). The majority of patients (72.5%) verified their identity to gain access to the Mater EMR in person at the hospital (either at the clinic or privacy office) (Table 2).

The majority of patients thought registering for the MPP was easy (82.5%), and the Mater EMR ensured that pregnancy information was readily available, accurate and up to date (70.5%) (Table 3). The majority of respondents (65.8%) agreed that the Mater EMR improves their ability to understand and recall appointments with care givers, and just under half thought that they were less likely to repeat pregnancy information to care givers with the Mater EMR (48.1%) (Table 3).

Discussion

Our study found that the majority of patients who were offered an MPP account went on to create one. Most maternity patients who successfully secured Level 2 access reported that they found the MPP easy to use and they thought the Mater EMR helped ensure pregnancy information was readily available, accurate and up-to-date. There were mixed responses regarding when and why they used the MPP/Mater EMR. Two fifths stated that they were prompted to look at their Mater EMR to prepare for their visit to the doctor or midwife, and one third stated that they viewed it just after they had visited their care giver. The majority thought that the Mater EMR improved their ability to understand and recall appointments with care givers, with almost half stating that it made them less likely to repeat information to their care givers. Overall, most patients were satisfied with the MPP and Mater EMR and the majority stated they would use it for future pregnancies.

Pregnancy is a period when maternity patients' information seeking behaviour is high and given the time constraints of antenatal visits patients are not always able to ask all their questions and care givers are not always able to provide adequate information (Shaw et al. 2008). Maternity patients' access to their clinical record would support their information needs at this time. A number of studies have shown that paper-based maternity held records can improve pregnancy-related behaviours (Wilkinson & Miller 2007). Patients with access to paper-based records report feeling in control of their antenatal care (Elbourne et al. 1987; Homer, Davis & Everitt 1999), that it is easier to talk to doctors and midwives (Elbourne et al. 1987) and they feel well informed and satisfied (Lovell et al. 1987). In a qualitative study that explored patients views of access to health records in a general practice setting, 16 of the 43 patients interviewed or included

Table 2: Patients' access to the Mater Patient Portal and Mater EMR

	n (%)
How did you hear about the MPP and Mater EMR? (*n*=80)*	
From a pamphlet in my information pack sent by the hospital	40 (50.0)
From the Mater midwife	20 (25.0)
From the Mater administrative staff	13 (16.3)
From my obstetrician	5 (6.3)
From my GP	5 (6.3)
How did you verify your identity to obtain a Mater EMR? (*n*=80)	
I presented my identification at the antenatal clinic or privacy office in the hospital	58 (72.5)
I uploaded certified copy of my identification documents online	10 (12.5)
I emailed a certified copy of my identification to the privacy office	4 (5)
Can't remember/unsure	3 (1.3)
Other (for example verified by private obstetrician)	5 (6.3)
What prompted you to look at your Mater EMR? (*n*=80)*	
Viewed after a visit with my care provider	41 (51.3)
Viewed to prepare for a visit to my care provider	30 (37.5)
Viewed after reaching a milestone in my pregnancy	11 (13.8)
To share information with family or friends	4 (5.0)
Unsure/don't know	10 (12.5)
Other	9 (11.3)
Were you able to view information that the care giver had sent to the Mater EMR? (n=79)∂	
yes	50 (63.3)
no	9 (11.4)
Unsure/don't know	20 (25.3)

* some participants ticked more than one response
∂ one missing response

in focus groups, were maternity patients (Fisher, Bhavnani & Winfield 2009). These maternity patients reported that access to their medical records increased their participation in healthcare, made them feel like partners in their care, more confident and more in control (Fisher, Bhavnani & Winfield 2009). Similar to findings in our study, these researchers reported that maternity patients accessed their paper-based records to prepare for appointments with their health care providers.

Only two studies have evaluated maternity patients' usage and perceptions of electronic access to health information (Shaw et al. 2008; Wackerle et al. 2010). One study (Shaw et al. 2008) randomly allocated women to two groups: in the control group women could access a secure website with links to general pregnancy health information alone, whereas in the study group, women had access to the same website but also were able to access a copy of their antenatal health record. Women in the study group could also access personalised information through an antenatal care planner, which could generate reminders if risk factors were present, such as smoking status and history of premature labour. Results showed that women were six times more likely to access personal pregnancy information than simply accessing general pregnancy information available to both groups (Shaw et al. 2008). These results demonstrated participants' preferences for access to individual personal health information rather than general health information. Women in both control and study groups reported a high level of satisfaction with no significant differences between both groups in terms of the ease of use and value in providing pregnancy information online. An important limitation of this study (Shaw et al. 2008) was that in the personalised information group, women were only given access to specific aspects of their record as physicians were reluctant to provide access to clinical notes as they thought this would cause unnecessary worry to the patients. Despite concerns being expressed about access to health records leading to patient anxiety and confusion, a recent systematic review concluded that there was no current evidence to support this claim (Davis Giardina et al. 2014). Results from this study (Shaw et al. 2008) align with our findings in terms of providing evidence that patients are interested in online access to their health information. Our study provides further information in relation to patients' satisfaction with access to more comprehensive personal health information via their EMR and details on what prompted patients to access this information.

The second study evaluated maternity patients who were given a USB flash drive containing their entire ante-natal to post-natal notes including ultrasound images in PDF format (Wackerle et al. 2010). Expectant mothers who were given a USB flash drive containing their maternity notes were compared with a control group (no USB) of expectant mothers. The majority of the USB group wanted to repeat the experience and the majority of the controls wished they had been given the USB (Wackerle et al. 2010). A number from the control group thought the USB would have been helpful during vacation and emergencies and the majority of the USB group felt safer having the flash drive available. Some of the USB group reported that their husband/partner also accessed information via the flash drive during the pregnancy and in some cases this was perceived as an indication that their partners were more involved (Wackerle et al. 2010). The key

Table 3: Patients' perspectives and ease of use of the Mater Patient Portal (MPP) and Mater EMR (n=80)

To what extent do you agree with the following statements?			
	Agree *n* (%)	Neutral *n* (%)	Disagree *n* (%)
Registering for an MPP account was easy	66 (82.5)	9 (11.3)	5 (6.3)
The anti-spam method was easy to use	55 (68.8)	17 (21.3)	4 (5.0)
The identity verification process was easy to complete	58 (72.5)	16 (20.0)	5 (6.3)
When I view the Mater EMR information is easy to find	63 (78.8)	11 (13.8)	6 (7.5)
The Mater EMR helps to ensure that my pregnancy information is readily available, accurate and up to date*	55 (70.5)	14 (18.0)	9 (11.5)
The Mater EMR improves my ability to understand and recall appointments with my care givers!	52 (65.8)	20 (25.3)	7 (8.9)
With the Mater EMR I am less likely to repeat pregnancy information to my care givers!	38 (48.1)	24 (30.4)	17 (21.5)

* 2 missing responses

! 1 missing response

differences between this study (Wackerle et al. 2010) and ours is the nature of the information storage medium (USB versus patient portal access tied to the hospital's EMR) and the nature of communications with our study allowing maternity patients more functionalities and interaction with their electronic health record and care givers. However, our study supported their findings with the majority of patients in our study (86.2%) stating they would use the MPP and Mater EMR for future pregnancies.

Limitations

Care should be taken when generalising results from our study as the response rate for the survey was low and responses were from one hospital only. A further consideration is that the survey reports perceptions and only reflects the views of patients who had access to their EMR via a patient portal. We did not seek information from those patients who did not choose to create a patient portal account.

Further research

Further research evaluating patient portal use by maternity patients should explore what information is accessed, why and how often, and whether socioeconomic and health literacy barriers compromise online access. Qualitative methods with interviews, observations and focus groups could elicit in-depth data to illuminate barriers and facilitators to information access using patient portals. Future research should also examine whether use of patient portals linked to EMRs leads to differences in health services utilisation and improved health outcomes for maternity patients.

Conclusion

This study of use and perceptions of a patient portal linked to an EMR in a large maternity hospital found that patients are responsive to accessing and sharing health information relevant to their pregnancy. The significance of this study is that it provides the first evidence of a patient portal system, linked to an EMR, working effectively in a maternity context. The study also provides evidence that portals can deliver benefits to maternity patients in terms of providing quick and easy access to current personal and general health information and support patients in term of their abilities to recall appointments and prepare for future appointments. Results from this study provide new evidence to inform policy makers, hospital administrators and clinicians about the potential viability of implementing patient portal access for maternity patients.

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