A shared electronic health record: lessons from the coalface

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ABSTRACT

- A shared electronic health record system has been successfully implemented in Australia by a Division of General Practice in northern Brisbane.
- The system grew out of coordinated care trials that showed the critical need to share summary patient information, particularly for patients with complex conditions who require the services of a wide range of multisector, multidisciplinary health care professionals.
- As at 30 April 2008, connected users of the system included 239 GPs from 66 general practices, two major public hospitals, three large private hospitals, 11 allied health and community-based provider organisations and 1108 registered patients.
- Access data showed a patient's shared record was accessed an average of 15 times over a 12-month period.
- The success of the Brisbane implementation relied on seven key factors: connectivity, interoperability, change management, clinical leadership, targeted patient involvement, information at the point of care, and governance.
- The Australian Commission on Safety and Quality in Health Care is currently evaluating the system for its potential to reduce errors relating to inadequate information transfer during clinical handover.

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A shared electronic health record (SEHR) system known as Health Record eXchange (HRX) has been used in North Brisbane since its commissioning in April 2005 and underpins the sharing of critical summary patient information between multidisciplinary health care professionals at the point of care.

Development of the HRX program was based on findings from the second round of coordinated care trials,[1] run from 2003 to 2005 by GPpartners Ltd, the Division of General Practice covering northern Brisbane. This trial demonstrated that patients with chronic and complex conditions can benefit from a multidisciplinary, multisector, team-based approach to the planning and provision of their care. The trial resulted in an average reduction of 26% in inpatient costs for intervention patients.[2] Another key outcome from the trial was the understanding that an electronic health record system was required to facilitate the flow of information between care team members, as existing paper-based systems did not work.

Methods

The HRX has three main technical components: a registration system, a clinical database and a communications system. The clinical database includes critical structured data such as demographics, medications, diagnosis, allergies, medical history, diagnostic results, care team members, and unstructured data (including documents). The system uses software components developed by others, including Health*Connect*. The HRX follows national guidelines on interoperability and uses web services and HL7 (Health Level 7) messaging, allowing for extraction of data straight from a general practitioner's clinical software package. The system interfaces seamlessly with GP clinical software and uses Medicare Australia's public key infrastructure security certificates to authenticate registered users. Patients are required to give consent via an "opt-in" model to be registered on the HRX.

GPpartners has initially used the HRX system to support Team Care Coordination services funded by the Australian Government Department of Veterans' Affairs, Queensland Health and Medibank Private. Patients enrolled by their GPs into the Team Care Coordination program have the maximum ability to benefit from having a shared health record, as their complex care needs necessitate involvement of a number of health care professionals. Due to demand from GPs, the use of the HRX is now being extended to other patients, including women in maternity shared care and aged-care residents.

In a project funded by the Australian Commission on Safety and Quality in Health Care, the system is now also being evaluated to assess its impact on reducing errors relating to inadequate information transfer during handovers between hospitals and residential aged-care facilities.

The original development and implementation of the HRX involved significant change management processes, such as training GPs, practice staff and hospital staff to use the system. Change management efforts accounted for about 80% of the implementation budget. These included integrating new e-health procedures into clinical practice, supporting providers, deploying dedicated hospital and general practice liaison officers, informing and managing patient and provider expectations, and focused marketing.

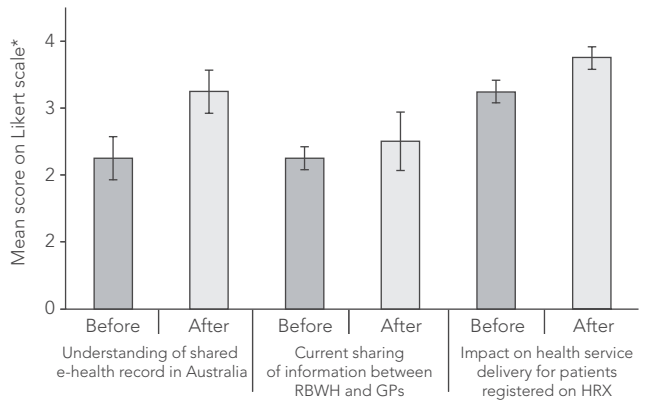
The focus of the HRX implementation to date has been to connect the provider community and to integrate new e-health procedures into everyday clinical practice while limiting the number of registered patients to those who would gain the most benefit. The objective has been to keep the number of registered patients at a manageable level and to maintain good quality, accurate information on the system. It is believed that, once providers are connected and sharing information via the HRX as part of standard clinical practice, the numbers of registered patients will be able to be increased readily.

Outcomes

As at 30 April 2008, the number of provider organisations connected to the HRX was as follows: 239 GPs from 66 general practices; two major public hospitals (Royal Brisbane and Women's Hospital [RBWH], Prince Charles Hospital); three large private hospitals (St Andrews War Memorial Private Hospital, the Wesley Hospital, Greenslopes Private Hospital); and 11 allied health and community-based providers. There were 1108 registered patients.

There are plans to enable patients to access at least parts of their shared health record, but access to the HRX system is currently limited to health care providers. Access data over a 12-month period to 30 April 2008 showed an average of 9.7 "events" uploaded for each patient record, with each record accessed, on

1 Mean scores from surveys of hospital staff before and after implementation of the HRX system at RBWH



GP = general practitioner. HRX = Health Record eXchange. RBWH = Royal Brisbane and Women's Hospital. * Likert score: 1 = poor; 5 = excellent (small bars represent 95% CIs). ◆

average, 15 times over the 12-month period. An event normally contains details of a patient interaction, such as a consultation or admission.

In July 2008, the RBWH conducted an evaluation that included a quantitative analysis of the HRX user access logs, patient registration growth rates and connection figures (Fenn M, Kumar R. HRX evaluation report, phase 1 [unpublished data]). In addition, qualitative data were collected from user surveys and patient case studies. Some of the outcomes highlighted by this evaluation were as follows:

- Increase in HRX usage by nurses in the Discharge Facilitation Unit and Community Assessment and Referral Services as their understanding of the benefits of shared health summaries increased;
- Increase in registered patient numbers, from 474 in July 2007 to 1320 in June 2008;
- Increased commitment by RBWH to promote recruitment of patients and GPs to the HRX through specific recruitment strategies — for example, uploading discharge documents, distributing HRX patient brochures, and identifying patients with complex conditions who would be likely to benefit;
- Use of HRX to facilitate positive patient communication and help prevent unplanned readmission (demonstrated by case studies);
- Significant and pressing interest expressed by other RBWH clinical units in accessing the shared patient information from primary care; and
- Improvements in staff perception and acceptance of an SEHR, and benefits for patients and health care providers (demonstrated by user surveys).

Results from a survey of RBWH staff involved in the HRX implementation before connection to the HRX and again 4 months after commencement of the trial are shown in Box 1. Staff were asked to grade their responses to the following questions based on a five-point Likert scale (from 1 "poor" to 5 "excellent"):

- How would you describe your understanding of a shared electronic health record in Australia today?
- How would you describe the current sharing of information and communication between your organisation and GPs?
- What impact do you think the HRX will have on the delivery of health services for registered patients?

2 Case study 1

A 77-year-old man has been living alone since his wife's death 2 years ago. He has a history of coronary artery bypass grafts and ongoing chest and leg pain, with multiple presentations to the emergency department, usually not requiring admission.

Chronic conditions:

- Chronic renal failure
- Chronic obstructive pulmonary disease
- Ischaemic heart disease
- Hyperlipidaemia
- Non-insulin-dependent diabetes mellitus

Information recorded on the HRX and shared between members of the patient's care team included:

- Current medications
- Allergies
- Current conditions
- Care team members (10 in total)
- Case management coordination events
- Initial health summary
- Initial health assessment
- General practitioner management plan
- Allied health referrals
- Allied health report
- Hospital events
- GP consultation events
- Patient consent form

Outcomes regarding this case study:

- The HRX enabled staff in the emergency department to access important and otherwise unknown patient information
- The HRX enabled the patient's community service coordinator to work with hospital clinicians and assist with strategies to prevent further hospital presentations, resulting in a reduction in unplanned visits to the emergency department
- The patient reported increased satisfaction with his care and said he felt more confident since this episode of care and was more willing to follow up on other referrals
- Ongoing updates are continually available via the HRX to the GP and the patient's care team regarding his episodes of care.

HRX = Health Record eXchange. ◆

For all three questions, there was an increase in the mean score in the post-implementation survey compared with the pre-implementation survey, demonstrating an improvement in users' perceptions across all three questions.

Case studies from the RBWH evaluation of two patients enrolled in the Team Care Coordination Program (Box 2, Box 3) illustrate the type of patient for whom the HRX is an ideal tool to facilitate improved care between GPs and other service providers.

Discussion

Implementation of SEHR projects in Brisbane and the Northern Territory[3] has shown that health communities and state/territory jurisdictions can implement such systems, and both need to be included in any health system's transformation. These projects also demonstrate that components such as unique patient and

3 Case study 2

An 80-year-old man who lives alone in a housing commission unit receives community services (including physiotherapy, home help services for hygiene, shopping and cleaning) to support independent living. He uses walking aids and says he often has falls. He is planning to move into supported accommodation.

Chronic conditions:

- Impaired mobility
- Lumbar back pain
- Osteoporosis
- Crush fracture at L2

The patient presented to the Royal Brisbane and Women's Hospital (RBWH) after a fall at home and was treated by staff of Community Assessment and Referral Services (CARS).

Information recorded on the HRX and shared between members of the CARS team included:

- Current medications
- Allergies
- Current conditions
- Initial health summary
- Initial health assessment
- Service coordinator review

Outcomes regarding this case study:

- Staff from CARS were able to contact the patient's service coordinator to inform her that the patient was in hospital
- The service coordinator was then able to contact the patient's general practitioner to advise him of the patient's admission
- The GP could then liaise with the RBWH Discharge Facilitation Unit while the man was an inpatient
- RBWH staff treating the patient found the HRX to be extremely helpful, as they were able to access important information
- The HRX enabled coordination with other service providers for ongoing management and care.

HRX = Health Record eXchange. ◆

provider identifiers, clinical coding standards and legislation and privacy standards need to be applied at a national level.

The success of the early implementation of an SEHR system by GPpartners can be distilled into seven key areas:

Connectivity: The focus was to connect as many providers as possible, including public and private hospitals, general practices, allied health providers and community services, to make the system useful for the participants.

Interoperability: The system linked with GP clinical desktop applications, provided automated event notification and allowed all care team members to access and input events.

Change management: About 80% of resources were allocated to change management. This included integrating new e-health procedures into clinical practice, supporting providers, deploying dedicated hospital and general practice liaison officers, informing and managing patient and provider expectations, and focused marketing.

Clinical leadership: Clinicians supported the HRX, as it addressed an identified clinical need. They acted as "champions" both in general practice and hospital settings.

Targeted patient involvement: The HRX targeted patients with complex health care needs and used an opt-in informed consent model. A consumer advisory group provided input into all stages of the project.

Information at the point of care: The project focused on sharing high-value elements within a patient health summary and on the capacity to share structured clinical data as well as unstructured documents.

Governance: The project and system were managed by a trusted entity that leveraged existing relationships using a grassroots, bottom-up approach.

Professor Keith McNeil, Clinical Chief Executive Officer at the RBWH, noted:

> For coordinated care to work, all parties must have access to a patient's records at all times. We see the benefits of an SEHR when a patient is rushed to hospital at 3:00 am and hospital staff can access their up-to-date records.

Often countries have quoted time frames of 10 years or more to deliver SEHR systems.[4] These estimates are quite realistic, given the significant change management required. Any SEHR program should anticipate and plan for several generations of software during the course of a widespread implementation.

Summary

Implementing an electronic health record system is incredibly difficult. It involves deploying an information system, managing patients and providers, dealing with the "cultural" issues of exchanging information across specialties, and introducing changes to long-established processes across the health sector.

However, these difficulties do not outweigh the significant benefits derived from electronic tools, which provide essential infrastructure to support the delivery of high-quality health care and, in particular, multidisciplinary care team management of complex patients.

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Competing interests

Brett Silvester is the Deputy Chief Executive Officer and Simon Carr is the Manager of Information Systems at GPpartners. GPpartners receives significant funds from the Australian Government Department of Health and Ageing. Funding is also sourced through project and research funding pools, the Queensland Government, community organisations and private industry. GPs contribute with an annual membership fee.

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