Australian Government
Australian Digital Health Agency

FINAL REPORT

Digital Health Test Beds Program

October 2022

Contents

Executive summary

Introduction

This report provides a summary of the Digital Health Test Beds research program (2018–2021) and its learnings. The first part of the report, 'Digital Health Test Beds', describes the 'what, where and how's of the Digital Health Test Beds. This is followed by two main sections: Section 1 focusing on the technical test beds and Section 2 focusing on the implementation test beds. These sections contain individual write-ups of each of the 15 Digital Health Test Bed projects that describe each test bed's context, methods, results and learnings. The 'Conclusion and next steps' section rounds out the report by summarising the achievements and learnings of the Digital Health Test Beds program and describing the Australian Digital Health Agency's next steps.

Digital Health Test Beds

The Digital Health Test Beds program was a research program funded by the Australian Digital Health Agency (the Agency) between June 2018 and June 2021. This program aimed to trial digital health innovations in frontline clinical settings and pilot solutions immediately usable by health workers.

The Digital Health Test Beds were divided into two streams of work: technical test beds and implementation test beds.

Technical test beds

Technical test beds related to the development and evaluation of digital health solutions. Project teams working on these test beds developed methods to integrate digital health tools into existing clinical workflows, for example by addressing key **software interoperability and usability challenges**. Technical test bed project teams also worked on developing mobile solutions that put **health in patients' hands** and developed infrastructure to enable the use of **data for research and public health purposes**.

Implementation test beds

On the other hand, implementation test beds explored the implementation of new, digital ways of working in healthcare settings. They focused on piloting ways to **improve the accessibility and adoption of digital health services** through digitising clinical workflows and explored barriers and enablers to **implementing Agency initiatives within less digitally mature settings**, such as the justice system, private specialist practice and residential aged care.

Conclusion and next steps

Program achievements

The technical test beds struck a balance between developing and piloting new and emerging technical solutions and enhancing digital health solutions used by healthcare professionals today. The initiatives that successfully designed and implemented solutions for the use of health information for research and public health purposes highlight how this data can contribute to a public health response. For example, the Western Sydney Diabetes dashboards have been used to support public health and research efforts to manage diabetes within Western Sydney, allowing clinicians to redirect resources in response to the latest data from the ground.

However, as bespoke technical solutions cannot be developed for every single health context, insights from implementation are required to supplement digital health research. The implementation test beds contributed many learnings for future practitioners intending to implement digital health solutions within clinical settings of varying digital maturity. Two of the implementation test beds that focused on medicine reconciliation during different parts of the patient journey also generated promising evidence about integrating digital health solutions into this process and the feasibility of integrating electronic medical records into clinical workflows.

Learnings

The Digital Health Test Beds program established that consumers and healthcare professionals are generally positive about the use of digital health solutions. However, privacy concerns remain salient for consumers, and professionals play an important role in encouraging their patients to try out new digital technologies.

The Digital Health Test Beds also identified barriers to digital health adoption for both patients and professionals, including lack of digital literacy and complexities in training processes. A key takeaway was learning that having someone 'champion' use of digital technologies within the test beds could help to overcome some barriers to adoption.

Learnings from the test beds highlighted the difficulties of and resistance towards digital health solutions in complex environments which lacked existing digital infrastructure, such as aged care facilities. Providing clear benefits of adoption, as well as efforts to understand and resolve existing barriers, is particularly important in these contexts.

At the same time, the program learnt a lot about the feasibility of integrating digital health solutions into existing workflows. This was most successful when embedded into the settings where the digital technology was implemented. Future initiatives should also promote widespread adoption across a variety of providers (e.g. allied health, specialists, hospitals) to improve clinical uptake of digital health.

Across the test bed projects, many interoperability issues, such as lack of standardisation of medication names, caused challenges. Further, a lack of clear guidance relating to digital health functionalities, such as the automated transfer of patient data, caused duty of care concerns for professionals. These challenges need to be explored further before digital health solutions can be rolled out at scale.

Next steps

The test bed program demonstrates that while digital technologies can enable new models of care across different healthcare settings, they are not the solution in and of themselves and are best viewed as parts of wider solutions to tackle barriers to adoption. Implementing these solutions will require broader changes across the healthcare system. It is vital that these solutions are continuously co-designed with users to ensure they are sustainable into the future.

Further, new models of research are required to evaluate the impact of digital interventions. There is a clear need for methods that go beyond the limitations of traditional randomised controlled trials, and that can overcome the challenges of conducting research in real-world settings through uncertain disruptions, such as COVID-19.

Moving forward, a simulated version of real-world environments could be an ideal setting to test technologies, where any failures have no material impact.

INTRODUCTION

Digital Health Test Beds

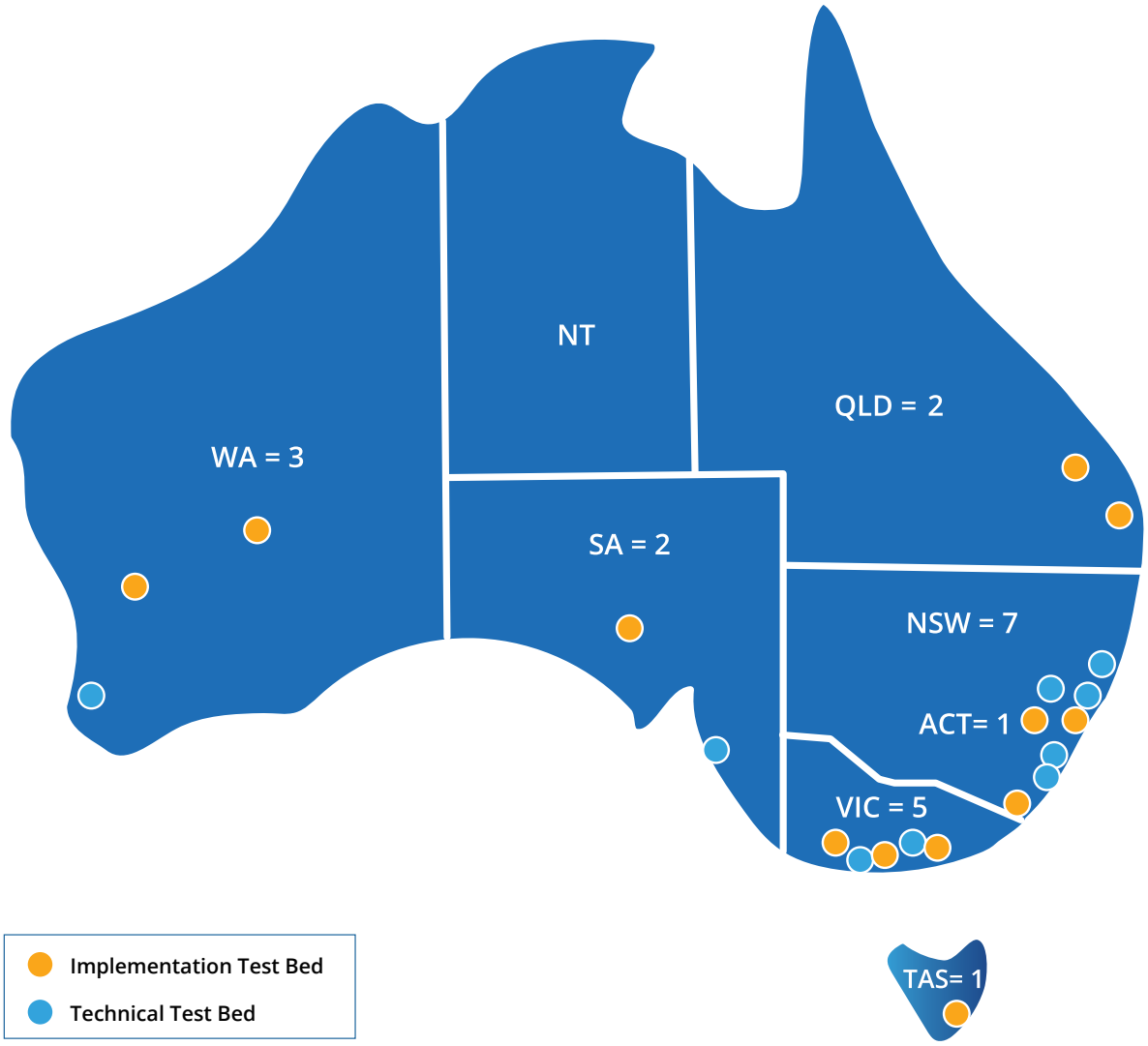
This section looks at:

- What were the Digital Health Test Beds?
- What did the Digital Health Test Beds do?

What were the Digital Health Test Beds?

From 2018 to 2021, the Australian Digital Health Agency (the Agency) funded a research program to pilot new digitally enabled models of care through partnerships between industry, government and healthcare provider organisations. This program, named the Digital Health Test Beds, funded 15 test beds — exploratory research projects in which new innovations and ideas are tested in real-world settings. Unlike traditional research methods that conduct evaluations in highly controlled environments, test beds are designed to work at the coalface — on the frontlines where healthcare is delivered — and pilot solutions that are immediately usable by health workers and administrators in the real world.

Figure 1: *The spread of Digital Health Test Beds across Australia*



Note: *Some test beds were implemented across multiple states and territories*

What did the Digital Health Test Beds do?

The Digital Health Test Beds aimed to solve Australia's highest priority health challenges. Each test bed was independently managed and executed in a diverse range of settings, including general practice, pharmacy, specialist care, aged care and in the community. They were divided into two streams of work: technical test beds and implementation test beds.

Technical test beds

Technical test beds related to the development and evaluation of digital health solutions. These can be divided into three sub-categories. The first category comprised three test beds which addressed key **software interoperability and usability challenges**. These test beds focused on:

- Supporting the integration of My Health Record with existing hospital and state systems used by Rapid Access Cardiology Clinic specialists in Western Sydney.
- Developing functionality to enable GPs to view differences between a patient's Shared Health Summary and their local record (in the GP's clinical information system), easily update a patient's Shared Health Summary and view a patient timeline of key events.
- Evaluating the clinical and financial feasibility of a digital platform that collates and displays a historical record of pathology test results.

The second category consisted of three test beds developing mobile solutions that put **health in patients' hands**. These test beds focused on:

- Further prototyping a mobile app and portal designed to simplify a patient's experience during treatment for pancreatic cancer.
- Piloting a solution for collecting actionable patience experience insights in a clinical (hospital) setting.
- Digitising the advance care planning process and linking Advance Care Directives with My Health Record.

The final category consisted of two test beds developing infrastructure to enable the use of **data for research and public health purposes**. These test beds focused on:

- Developing two diabetes monitoring dashboards to inform the provision of diabetes care, public health campaigns and research in Western Sydney.
- Developing a decision support tool to predict the risk of hospital presentation based on patient data within a GP's clinical information system and Shared Health Summary.

You can find a report summarising each of the technical test beds in Section 1.

Implementation test beds

Implementation test beds explored the implementation of new, digital ways of working in healthcare settings. These can also be divided into two sub-categories. The first category was made up of four test beds which piloted ways to **improve the accessibility and adoption of digital health services**. These test beds focused on:

- Evaluating whether a digital platform could help hospital pharmacists perform quicker and more accurate medicine reconciliations during admission.
- Piloting a community pharmacy medicine reconciliation service which integrated with the Discharge Summary on My Health Record.
- Piloting a digital platform that allowed healthcare professionals in a hospital to email/SMS tailored health resources to their patients.
- Rolling out an app and portal which enabled patients with chronic illness to connect their health data with their digital health ecosystem and care team.

The second category contained three test beds which explored barriers and enablers to **implementing Agency initiatives within less digitally mature settings**. These test beds focused on:

- Identifying barriers and enablers to implementing My Health Record in Queensland correctional centres.
- Piloting training, education and support approaches to increase uptake and use of My Health Record and Secure Message Delivery in the aged care sector.
- Piloting training, education and support approaches to increase uptake and use of My Health Record and Secure Message Delivery among private specialists.

You can find a report summarising each of the implementation test beds in Section 2.

Location and timeframe

Collectively, the Digital Health Test Beds were deployed in seven Australian states and territories. Contracting with project teams was finalised in mid-2018 and test bed work commenced shortly thereafter. As each test bed was different in complexity, they met their objectives and closed out at different times between October 2019 and June 2021.

SECTION 1

Technical test beds

This section looks at:

Software interoperability and usability

- Integrating My Health Record in outpatient cardiology clinics to improve quality of care
- Enhanced view of the Shared Health Summary on My Health Record
- Aggregating historical pathology results into one digital platform to reduce inefficiencies

Health in patients' hands

- Prototyping a mobile app for people with pancreatic cancer
- Piloting clinical administration of a digital patient experience measure in cancer care
- Digitising and linking Advance Care Directives with My Health Record

Data for research and public health purposes

- Developing the Western Sydney Diabetes Data Hub
- Developing an algorithm predicting risk of unplanned hospitalisation

SOFTWARE INTEROPERABILITY AND USABILITY

Integrating My Health Record in outpatient cardiology clinics to improve quality of care

Introduction

Background

Cardiovascular disease is the leading cause of death in Australia[1]. However, while chest pain is one of the most common symptoms of acute coronary syndrome (ACS) and one of the most common reasons for presenting to emergency departments, only a small percentage of these cases are due to ACS[2]. In response to this issue, a new model of care, the Rapid Access Cardiology Clinic (RACC), has been established in Australia.

RACCs are cardiologist-led outpatient clinics located in hospitals that provide cardiovascular risk assessment and management of patients presenting with low- to intermediate-risk chest pain[3]. The RACC model of care manages the immediate needs of referred patients but refers patients back to their GP for long-term management. While there are many newly established RACCs in Australia, they operate independently.

Currently, clinicians at the RACC in Westmead Hospital access patients' electronic medical records through a Cerner Millennium Powerchart portal, which is also able to link with NSW's HealtheNet and the My Health Record (MHR) platform. Using this data to triage patients at referral could help to identify higher risk patients for more effective short- and long-term care.

In this test bed, the Agency partnered with The University of Sydney and Westmead Hospital to investigate how MHR can support the RACC model of cardiovascular care. This test bed ran from June 2018 to December 2020.

Aims

This test bed initially aimed to identify gaps in cardiovascular risk assessment and leverage electronic data from the MHR platform to optimise cardiovascular disease patient management in Western Sydney. However, due to technical challenges and the impact of COVID-19, the project scope was revised to:

1. Understand barriers to the seamless flow of information across the patient journey and between healthcare professionals.
2. Identify barriers to integrating the RACC with MHR.
3. Integrate the MHR platform into the routine care received by patients visiting the RACC at Westmead Hospital, by enabling RACC clinicians to upload RACC Specialist Letters to MHR.

Methods

Design and participants

Phase 1 (Data availability audit)

To address the first aim, the project team conducted a data availability audit at the RACC at Westmead Hospital. This audit manually compared 200 patient records from the local, Cerner-based electronic medical record with each patient's MHR. The audits also recorded whether it would be possible to use the information from both these sources to calculate two commonly used cardiovascular disease risk scores: the Australian Absolute Cardiovascular Disease Risk (ACVDR) and the History, ECG, Age, Risk factors, and Troponin (HEART) Score.

Further details on audit methodology have been reported elsewhere[4] by the project team.

Phase 2 (Identifying barriers)

To address the second aim, a technical review was conducted in the RACC at Westmead Hospital to determine the interoperability of RACC systems with MHR.

Qualitative interviews were also conducted to understand perceptions of and engagement with MHR, and to identify barriers to integrating MHR with the RACC. Eight consumers (aged between 38 and 74 years) who had visited RACC were interviewed by phone about their perceptions of and experiences with digital health tools and MHR specifically. Four RACC clinicians were also interviewed by phone to understand their engagement with MHR and how it could be used in cardiology care in western Sydney.

Finally, key stakeholders, including RACC clinicians, eHealth NSW, Western Sydney Local Health District Digital Health Solutions (WSLHD DHS) and the Agency, were regularly consulted to further understand workflow, interoperability and conformance barriers, and identify potential solutions.

Phase 3 (Developing the RACC Specialist Letter)

To address the third and final aim, the project team worked with eHealth NSW and WSLHD DHS to develop a new document type for the MHR platform compatible with the RACC model of care. This phase incorporated learnings from the previous phases in terms of including the key variables identified in Phase 1 for enabling effective communication between RACC and other healthcare providers and overcoming barriers identified in Phase 2. The resulting document type, the RACC Specialist Letter, was designed to support patient care across cardiology settings and integrate MHR with the RACC model of care.

Research ethics approval

Received from the WSLHD Human Research Ethics Committee for work conducted in Phases 1 and 2.

Results

Phase 1: Data availability audit

The data availability audit found that patients' MHR did not contain enough and the correct types of data to calculate either ACVDR or HEART risk scores. More information has been published by the project team[4].

Phase 2: Identifying barriers and enablers

The technical review found that the RACC at Westmead Hospital was not interoperable with MHR and was unable to upload any data to the platform.

Findings from the qualitative interviews with consumers showed that although none were currently actively engaging with MHR, they were receptive to using it and were aware of its potential utility in being able to access previously collected information. Consumers regarded MHR as particularly useful for tracking medicines. However, a majority also expressed concerns about the privacy of their health information. The consumers interviewed also demonstrated a general lack of digital health technology adoption, but they had also experienced telehealth appointments because of COVID-19 and were generally positive about them, particularly for routine appointments.

All clinicians interviewed had used the MHR platform at least once, and three out of four reported using it to look at all patients coming from hospital settings outside of WSLHD. These clinicians noted that MHR was useful to build a patient history, but also that it was not the only source they drew upon. As with consumers, there was consensus amongst clinicians that there is future utility in MHR and that it could be useful for pathology and diagnostic imaging. However, they also perceived that MHR did not contain information relevant to specialist needs and that specialists had not been engaged with about MHR.

Figure 2: The RACC Specialist Letter

NSW GOVERNMENT Health

Patient Health Record

Name: **CAGE, LUKE**
DOB: 01/03/1980 Sex: Male
ADDRESS: 23 Marvel Lane
Parramatta, NSW 2150
AUID: 1004028926
MRN: **4718275**

Encounter Type: **Outpatient**
Facility: Westmead Hospital
Admission: 26/04/2021 10:31 AEST
Discharge: 26/04/2021 23:59 AEST

RACC Specialist Letter

DOCUMENT NAME: RACC Specialist Letter
SERVICE DATE/TIME: 08/06/2021 09:43 AEST
RESULT STATUS: Auth (Verified)
PERFORM INFORMATION: Cruz,Rommel (08/06/2021 09:44 AEST)
SIGN INFORMATION: Cruz,Rommel (08/06/2021 09:44 AEST)

Dear MICHAEL FOSTER

LUKE CAGE was seen in the WE C.Cardiology (Westmead Hosp). Please see management plan, recommendations and risk factors below.
RACC Specialist Letter
Sent 08/06/2021 09:44

Please contact me if you have any questions about the management recommended for this patient.

Yours Sincerely,

Name: Rommel Cruz
Contact#:
Provider#:

The interviews and consultation process also identified the following barriers to integrating MHR with the RACC:

- While quick technical solutions that adapt existing interfaces and architecture would be cost-effective, they would not overwhelmingly improve patient safety and hence low clinician uptake was anticipated.
- Existing document types on MHR (e.g. the Discharge Summary) could not be used for the RACC model of care as they contain mandatory fields not used by RACC clinicians. Having to manually "delete" these fields would negatively impact clinician workflow.

Phase 3: Developing the RACC Specialist Letter

During consultations, eHealth NSW proposed that the RACC model of care could be a case study and Proof of Concept site for piloting digitisation of specialist letter templates. The project team collaborated with WSLHD DHS and eHealth NSW to map out communications pathways for RACC and requirements for a digital solution within these pathways. These were designed to involve MHR, leverage the existing work of eHealth NSW, and adhere to the principles of quality, safety and efficiency of cardiology services.

With this as context, the RACC Specialist Letter document type for MHR was successfully developed and soft launched (technical go-live) in December 2020. The RACC Specialist Letter (Figure 2) is interoperable with the local hospital EMR, state-wide HealtheNet and national MHR. Final responsibility for the RACC Specialist Letter implementation process was handed over to WSLHD DHS.

Following the close of the test bed, the RACC Specialist Letter was launched into production on 5 July 2021. In the month following 94 letters arrived in HealtheNet. 54 of these are in MHR, including being sent to GP brokers via the secure messaging system.

Discussion

Learnings

Overall, this test bed achieved its rescoped aims. It successfully generated an improved understanding of the current use of MHR in cardiovascular disease management, as well as the feasibility of using MHR data for public health (in this case, to support continuity of cardiovascular care). The value of prioritising user experience when designing digital health technologies – including that of both consumers and healthcare professionals – was also identified. Finally, a technical solution to support the integration of MHR with the RACC model of care was developed and successfully launched. As of July 2021, the RACC Specialist Letter has been integrated into RACC workflow. The Letter template will be rolled out by the WSLHD DHS to all outpatient services in WSLHD and Nepean Blue Mountains.

Recommendations

Recommendations for future related work were identified by the project team and include:

- Explore how electronic health records may support telehealth in and beyond the RACC model of care.
- Use of MHR data for research and public health purposes remains promising and further investigations of cardiovascular risk assessment with MHR data should be conducted once this is possible.

The project team also separately identified recommendations for the Agency related to MHR improvements.

Conclusion

This test bed provided nuanced understanding of the role MHR could have in improving the quality, safety and efficiency of cardiology services. Mixed research methods identified barriers and enablers to using MHR and digital health technologies to triage patients and improve communication pathways between healthcare professionals in a cardiovascular care setting.

A new document type in MHR that is interoperable with state and hospital systems was then developed to support the delivery of critical patient data from hospital RACC clinicians to community healthcare providers, enabling a more seamless continuity of care.

SOFTWARE INTEROPERABILITY AND USABILITY

Enhanced view of the Shared Health Summary on My Health Record

Introduction

Background

The Shared Health Summary (SHS) is a key clinical document on My Health Record (MHR) that represents a patient's health at a moment in time. However, currently it is difficult to link the SHS with many of the clinical software (such as clinical information systems) that GPs use, and a GP has no easy way of comparing the information in MHR and what is in their own system.

The POLAR (POpulation Level Analysis and Reporting) System is a clinical Business Intelligence (BI) and analytics platform that integrates data from multiple clinical software to provide GPs and Primary Health Networks (PHNs) with clinical insights.

In this test bed, the Agency partnered with Outcome Health, the service provider of the POLAR System, to develop new functionality that would improve a POLAR System user's interaction with MHR. This would enable them to see any differences, more easily update the patient's SHS on a regular basis and ensure they have a complete patient record. This test bed ran from June 2018 to June 2020.

Aims

This test bed aimed to:

1. Create an improved view of the MHR SHS for the POLAR System.
2. Develop POLAR functionality that shows differences in clinical information between a patient's MHR and their local patient record (on their clinical information system).
3. Develop patient timeline functionality for POLAR that shows when a patient has visited a GP and key events across time e.g. reason for the visit, medication and diagnostic discrepancies, pathology requests.

Methods

Design

An agile design methodology was used to develop and build the technology required. The front-end design changed significantly throughout the project based on user feedback. Training in POLAR was provided by the PHNs, with a training page developed on how to find the new functionality.

User testing was conducted with GPs at three practices in the CESPHN.

Participants

Practices were recruited via Central Eastern Sydney Public Health Network (CESPHN). There was no individual patient recruitment undertaken: use of the tool in 'testing mode' was at the discretion of the GP under agreement with CESPHN. Several other PHNs provided input to the project (Gippsland PHN, South Eastern Melbourne PHN and Eastern Melbourne PHN).

Research ethics approval

The POLAR system has standing ethics that covers the collection and storage of data from general practice.

Results

The following was achieved:

1. New POLAR functionality (Figure 3) that shows differences in clinical information between a patient's MHR SHS and their local patient record.
2. Patient timeline functionality for POLAR (Figure 4) that shows when a patient has visited a GP and key events across time.

Figure 3: Viewing a patient's MHR SHS against their local record on POLAR

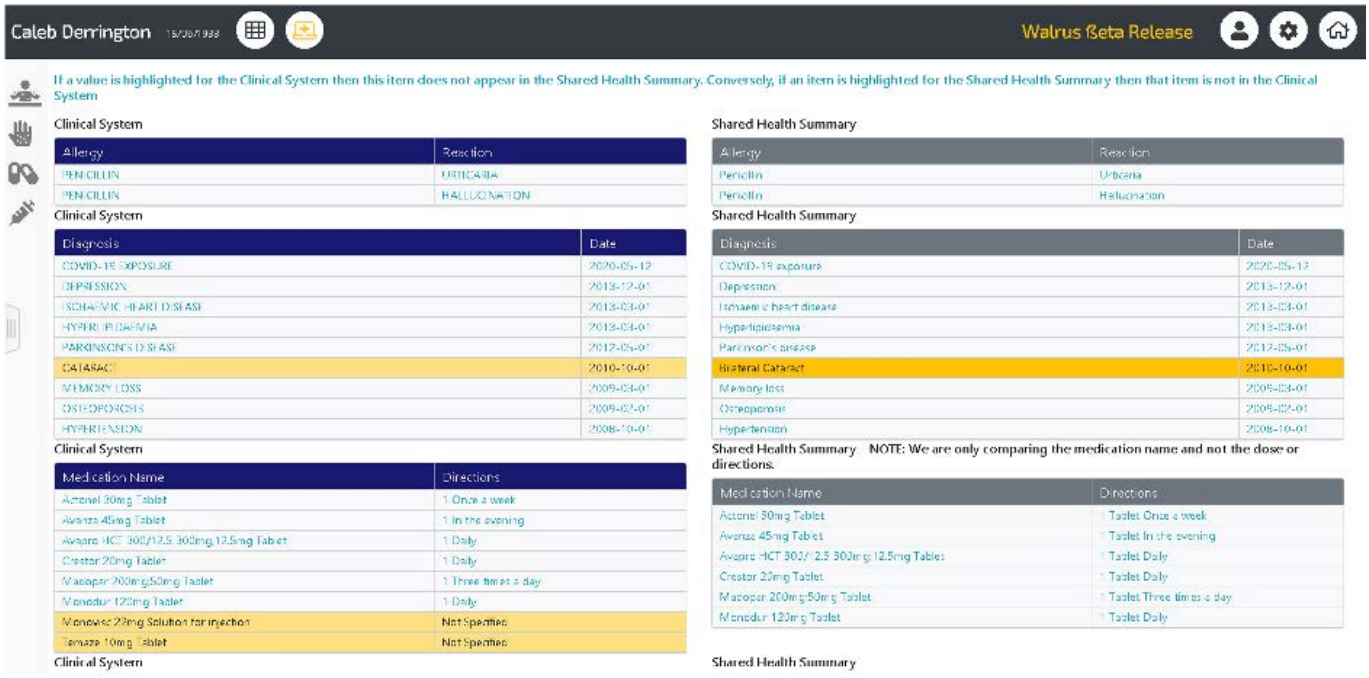
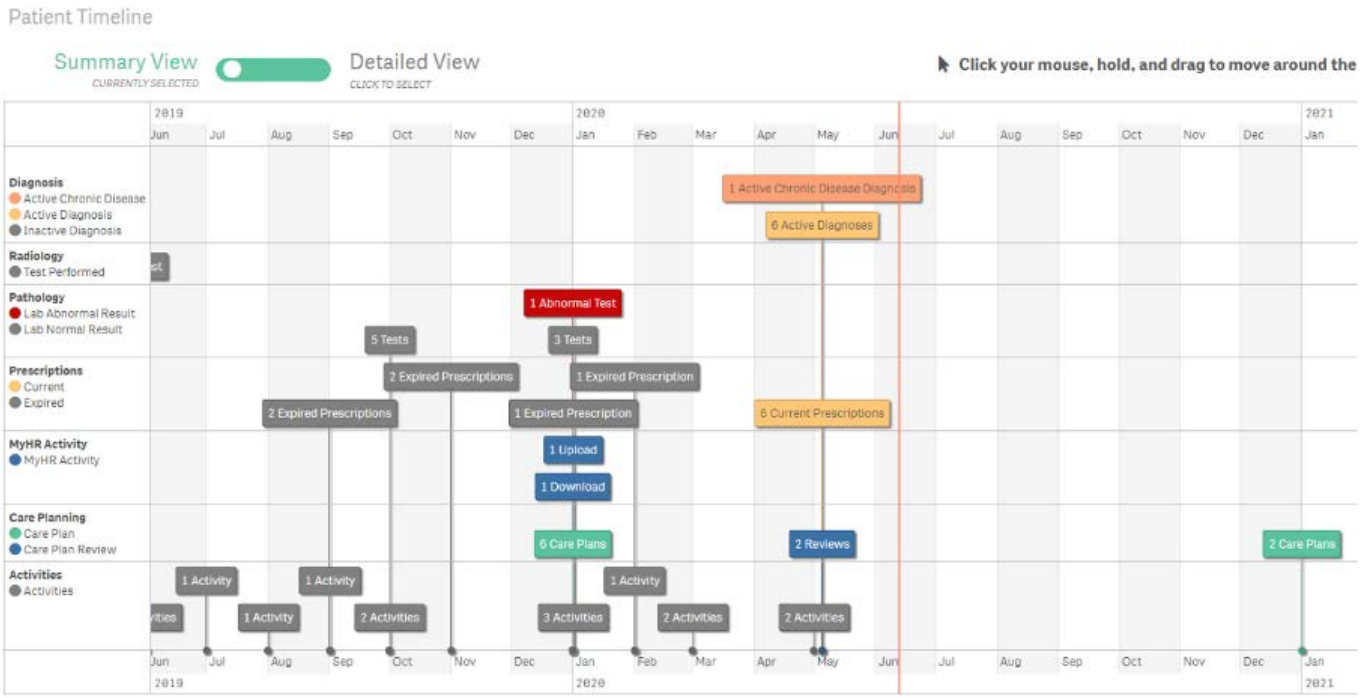


Figure 4: A Summary View of a Patient Timeline on POLAR



Results from user testing suggested that most GPs would find these functionalities beneficial, and they would encourage GPs to update records on their local system and then upload a corrected SHS. It was noted that this platform would especially benefit doctors new to a practice who are familiarising themselves with patients.

Discussion

Learnings

This test bed demonstrates that software functionality to compare information in a patient's SHS on MHR and their GP's local clinical information system is useful for GPs and should lead to improvements in the quality of content stored in the SHS.

However, a number of issues relating to the recording of medications for the SHS remain and need to be resolved for this to be useful to practitioners. These include:

1. Different format of medication details: Data is not being split into individual fields (specifically medication dose and frequency) when uploaded to the SHS. Further compounding this issue is that the field is populated in a different order and format depending on which software package (e.g. Best Practice, Medical Director, Zedmed) uploads the SHS. This meant that it was only possible to compare the medication name, not the dose or directions.
2. Different naming conventions: The medications uploaded to the SHS use a mix of generic and brand names and at the time of the test bed, there was no specific protocol on how this should be handled within a SHS. It currently relies on the local GP system input.

Recommendations

Recommendations for future related work were identified by the project team and include:

- Promote adoption of standards, such as the Australian Medicines Terminology, for consistency in medications terminology (e.g. standardise the use of generic or specific brand names) to enable a consistent upload format into the SHS from GP clinical information systems.
- Determine how tools like this can be more efficiently integrated into clinician workflow for maximum uptake, such as by minimising the number of clicks and actions required to use.

The project team also separately identified recommendations for the Agency related to MHR improvements.

Conclusion

Through this test bed a solution that simplifies and contextualises information about a GP's patient in their MHR was developed. All 1,000+ practices using the POLAR System now have access to components of this solution, improving data quality flow across the Australian health system.

SOFTWARE INTEROPERABILITY AND USABILITY

Aggregating historical pathology results into one digital platform to reduce inefficiencies

Introduction

Background

Due to an ageing population and the increasing prevalence of chronic disease, the demand for pathology tests is projected to increase[5]. However, a recent review suggests that diagnostic tests are currently over-ordered at rates ranging from 10–64%[6]. Digital health technologies, particularly clinical decision support systems[7] and electronic medical records[8], have the potential to reduce unnecessary diagnostic testing and improve other metrics of patient care.

However, there are still numerous barriers to incorporating fragmented pathology data in one central source. There are variations in how different pathology laboratories report their results, for example in structure and coding categories[9], as well as measurement units and formatting[10]. Furthermore, the challenge in automating patient matching across electronic and paper reports and across different pathology providers means that currently there is no central source of aggregated historical pathology test data for Australian public health providers.

Due to the large number of different diagnostic tests (10,000 and growing) and the challenges in data standardisation and patient matching, any solution for aggregating historical pathology data would have to be interoperable and accommodate variability in data, terminology, and patient matching. In this test bed, the Agency partnered with Kabisa Medical (a Western Australian digital health service provider) to explore a solution that has addressed many of these issues. This test bed ran from June 2018 to March 2020.

Aims

This test bed aimed to identify the clinical and financial value of using an online system (myPathology) to collate and display historical pathology test results from 2005 to the present day, from multiple diagnostic providers, to support clinical decision-making in an outpatient setting.

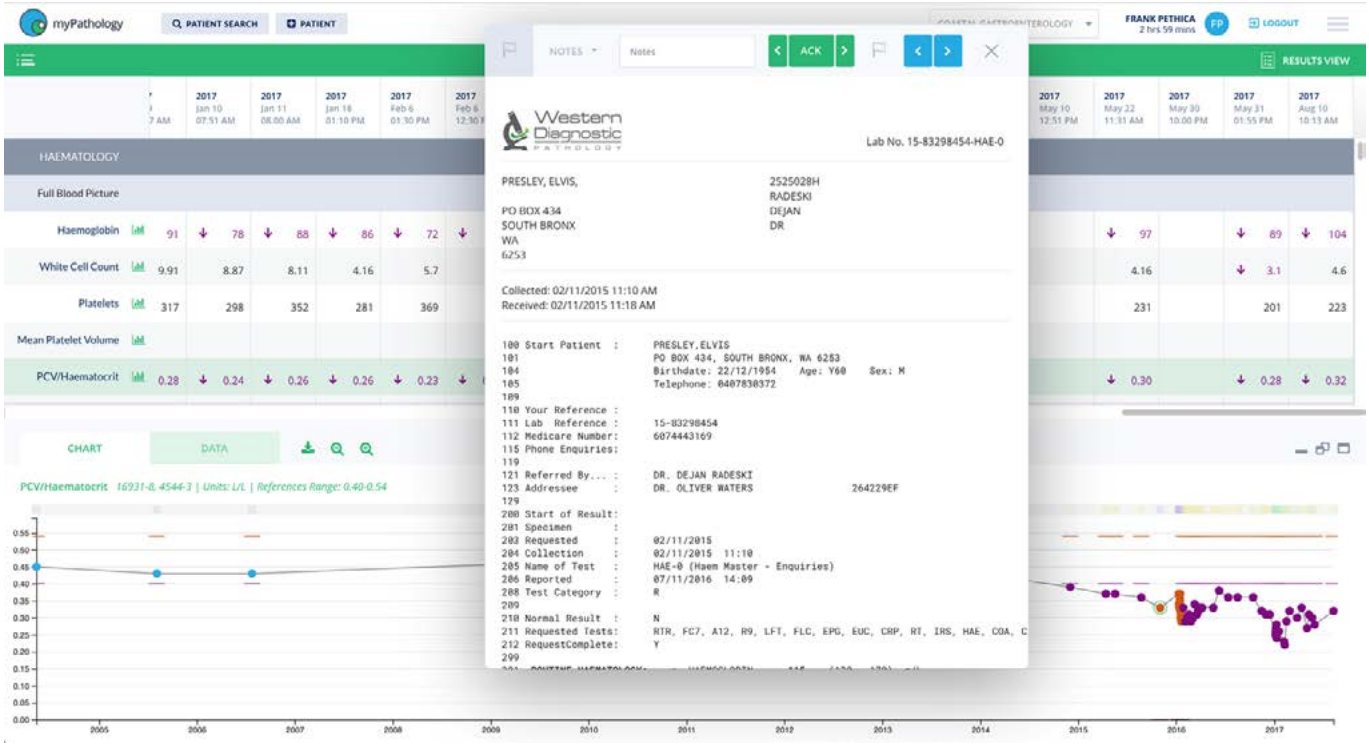
Methods

Design

Specialists and GPs at four research sites (one GP clinic, two specialist clinics and one metropolitan hospital outpatient department) were given seven months' access to myPathology. Four pilot research activities were planned to address study aims. These included:

- Clinician surveys relating to care provision and impact of myPathology, administered during the period they were given access to myPathology.
- A comparison of MBS pathology spending data for the hospital study site between September to December 2019 (when myPathology was in use) and the corresponding months in the year prior (September to December 2018).
- Patient surveys relating to their experience with blood test results and attitudes towards health data privacy, administered before they were given access to myPathology.
- Patient surveys relating to their experience with using myPathology, administered after they were given access to myPathology.

Figure 5: Viewing historical pathology test results on myPathology



Data collection was conducted between August 2019 and March 2020. Due to the increased demands on the medical sector because of the COVID-19 pandemic, the post-implementation patient and clinician surveys were unable to be administered and the trial was closed in March 2020.

Participants

This study was conducted in multiple healthcare settings in Western Australia, with participants recruited from all four research sites. 113 patients responded to the baseline patient survey and 21 clinicians to the clinician survey (18 specialists and 3 GPs). The follow-up surveys did not proceed due to the COVID-19 pandemic.

Research ethics approval

This test bed was assessed as a quality improvement activity through the Governance, Evidence, Knowledge, and Outcomes (GEKO) framework[11] and was approved by the South Metropolitan Health Service.

Results

Clinician survey

Clinician survey results show that using an online data platform that aggregates historical pathology results could lead to benefits in reduced time wastage, fewer follow-up appointments, less unnecessary duplication of tests and earlier initiation of treatment. Specialist physicians reported experiencing greater benefits than GPs and reported more positive outcomes. When historical data was available on myPathology, 95% of clinicians reported it saved them time in clinic, with specialist physicians reporting it saved them an average of 16 minutes per clinic.

81% of clinicians also reported ordering fewer pathology tests due to having access to historical pathology data through myPathology. Specialist physicians reported requesting an average of 8.3 fewer tests per clinic, and GPs reported requesting an average of 2 fewer tests per clinic.

72% of specialist physicians reported being able to initiate treatment sooner on patients due to access to historical pathology results, and a mean of 2.4 patients were reported as starting treatment sooner per specialist clinic. 67% of specialists reported reduced need to bring patients back to clinic and on average one fewer patient was required to return per specialist clinic.

Finally, while only 22% of specialists used My Health Record at the time of surveying, 78% expressed that they would include My Health Record in their workflow if a tool like myPathology were to be a My Health Record feature.

Comparison of MBS pathology spending

MBS pathology spending in the hospital study site between September to December 2019 was $69,014 (corresponding to 4,059 tests). In comparison, MBS pathology spending in that site between September to December 2018 was $190,153 (corresponding to 7,924 tests). While other external factors could also have contributed to this decrease in pathology spending, this suggests that a system like myPathology could bring benefits to clinicians and healthcare services.

Patient surveys

Finally, baseline patient survey results suggest that while patients getting blood tests generally prioritised convenience, a subset (35%) had spent extra time travelling to their hospital's pathology provider of choice. Furthermore, 14% of patients reported having experienced their doctor being unable to locate previous test results, with 4 patients repeating tests as a result. 64% of patients felt that doctors in their care team should have access to their medical test results, whilst 53% thought this should apply to other healthcare professionals (such as allied health professionals). 75% felt they should also be able to electronically access their own test results.

Discussion

Learnings

The findings of this test bed suggest that a digital platform that integrates historical pathology test results with new test results and displays them over time in a way that is searchable and easy to understand would be useful to specialist physicians, GPs and consumers. GPs and specialists reported that tools like myPathology saved them time and made it easier to locate past test results, with specialists saying they ordered less tests as a result. While data transfer between pathology providers and myPathology was conducted manually during this pilot, which limited the size of the test bed, in the future this process could be automated with an application programming interface for large volume data transfers.

The test bed also demonstrates that despite significant data and terminology variations between pathology providers, pathology data can be effectively presented and utilised. These structural variations in the data posed significant technical challenges and required a large allocation of resources to resolve. Given that new diagnostic tests are constantly being developed (e.g. new tests for COVID-19), adopting an approach of presenting pathology data that focuses less on rigid data conformity and more on promoting clinician access, understanding and interpretation via warnings and prompts may be a more practical strategy to utilise the large volume of untapped diagnostic data that currently exists.

This test bed utilised an active patient consent process which allowed patients to directly request their historical pathology results. Active engagement of patients in their own care and self-management[12] is well documented to improve patient outcomes and enable more personalised care plans. This should also include diagnostic and pathology data. Fully integrating such technologies into the Australian health care system could place patients closer to clinicians and as more equal participants in their healthcare and promote shared decision-making[13].

Recommendations

Recommendations for future related work were identified by the project team and include:

- Establish clear guidance for pathology and diagnostic providers for automated data transfer and auditing (e.g. results display, cybersecurity standards) to improve health service and pathology provider confidence.
- Explore avenues (policy included) to incentivise digital health practices, such as the use of pre-existing atomic data in clinical decision-making or the integration of test result delivery (to either the patient's electronic device or their My Health Record) into the scope of diagnostic services.

Conclusion

Overall, the findings of this test bed provide initial evidence for the clinical and financial feasibility of deploying technologies like myPathology in healthcare settings and the improvement in patient and cost outcomes these technologies could realise. Test bed findings suggest these types of technologies would be acceptable to users, and could improve healthcare efficiencies, engage and empower patients by further democratising patient data, and support the development of clinical decision support tools in the future.

HEALTH IN PATIENTS' HANDS

Prototyping a mobile app for people with pancreatic cancer

Introduction

Background

Pancreatic cancer is one of the top ten most common cancers in Australia, with five-year survival rates as low as 11%[14]. In 2018, pancreatic cancer was the fourth most common cause of cancer deaths in Australia, with an estimated 3,300 Australians dying from the disease and 3,933 new cases diagnosed[14]. Due to the disease's rapid development and sudden changes in symptoms, having a well-managed and well-monitored treatment plan is vital.

Mobile apps could enable consumers to more easily record their own health data and provide this to practitioners in near real time. This could improve the patient experience, allow practitioners to respond to sudden changes in symptoms, and provide patients with greater access to their treatment plan. This could potentially improve survivorship and demonstrate how digital tools can improve the model of care for all cancer patients. In the longer term, large quantities of patient-generated data could also provide valuable new insights into the disease and potentially lead to the development of new treatment plans.

In this test bed, the Agency partnered with Bilue (a mobile and emerging technology company), Avner Pancreatic Cancer Foundation and SAP Software Solutions. This test bed was supported by industry-leading partners and Sydney's Royal North Shore Hospital (RNSH) and ran from November 2018 to March 2020.

Aims

This test bed aimed to simplify a patient's experience during treatment for pancreatic cancer and increase their adherence to their treatment plan through:

1. Providing a mobile application (PanCan – the Pancreatic Cancer Companion App) for a patient to view, track and record their prescribed treatment plan.
2. Providing clinicians with a portal to create and review the patient's adherence to their treatment plan. In addition to the data provided by the patient, this would leverage My Health Record (MHR) and electronic medical record data to provide a holistic overview of the patient's health.

Methods

Design

Prior to the initial project submission, Bilue had already worked in collaboration with its partners to develop designs of a digital solution for people with pancreatic cancer. The project would undertake further discovery work to finalise the design, build the solution and conduct a six-month closed pilot with real users. If successful, a national rollout plan would be developed.

The digital solution initially consisted of the following key components:

- Patient-facing mobile application.
- Clinician-facing web portal.
- Clinician-facing secure patient messaging mobile application.
- SAP Health – Patient Engagement.

Delays were experienced in getting agreement amongst numerous clinical stakeholders for the desired functionality, concerns over medicolegal implications and having to meet all required security, privacy and ethical requirements. The MHR mobile gateway also paused taking on new entrants in August 2018 and reopened in early 2020, so the planned integration could not go ahead. Hence, it was agreed to descope the clinician-facing secure patient messaging mobile application and any integration with My Health Record.

A working version of the digital solution was completed and in February 2020 it was agreed to progress with running the closed trial at the RNSH. However, the COVID-19 pandemic led to all work halting and the test bed officially closing in March 2020.

Participants

The key user groups were clinicians involved in the treatment of pancreatic cancers and patients with Stage 1 pancreatic cancer.

Patients were to be recruited through The Australian Pancreatic Centre at RNSH for the initial trial.

Research ethics approval

The ethics approval process was underway in early 2020 but was halted with the close of the test bed.

Results

This test bed further developed the PanCan app and portal through collaborative design with clinicians and patients. Due to the disruption caused by the COVID-19 pandemic, it did not proceed to implementation.

Discussion

Learnings

Like many projects in 2020, this test bed was impacted by the COVID-19 pandemic and unable to move into implementation. Whilst a working product using a collaborative design method was achieved, getting to an agreed design took much longer than originally envisaged due to the complexities of the health sector.

Medical practitioners and professionals raised concerns about medicolegal frameworks and how they might be applied regarding the collection of 'real time' patient data and analytics. As medicine is a time-poor setting, medical practitioners were wary of malpractice suits if they did not respond straight away to real time data submitted by a patient. A level of consent would be required from patients that would protect doctors from this expectation.

Recommendations

Recommendations for future related work were identified by the project team and the Agency:

- Engage early and consistently with Local Health Districts to promote local buy-in.
- Explore development of a Digital Health Security Framework to address requirements specific to data privacy and security for mobile health apps.
- Explore development of guidelines for medicolegal issues associated with real-time messaging in digital health technologies, that can provide a suggested patient consent model and clinical governance framework.

Conclusion

Many consumers are now taking care management into their own hands by downloading apps that are freely available, even if these have not been clinically assessed as suitable. The health sector faces a challenge in catching up with this demand, and the development of new national frameworks and guidelines may be required to support it.

HEALTH IN PATIENTS' HANDS

Piloting clinical administration of a digital patient experience measure in cancer care

Introduction

Background

In 2016–17, 1,228,905 cancer-related hospitalisations were reported nationally, which represented one in nine hospitalisations that year[15]. The same report estimated that 144,713 new cases of cancer (excluding basal and squamous cell carcinoma of the skin as they are not notifiable diseases) would be diagnosed in Australia in 2019, i.e., approximately 396 cases diagnosed each day.

Patient-Reported Experience Measures (PREMs) are increasingly recognised as important quality improvement tools that can support patient-centred cancer care. PREMs quantify the patient experience, such as communication and shared decision-making, and articulate patients' perceptions of the way services are designed, integrated, accessed and delivered. This includes whether services meet their needs. There is compelling evidence that incorporation of PREMs into routine clinical practice, and timely response to this feedback, improves clinical outcomes as well as overall quality and safety of care delivery at similar or reduced cost[16]. However, paper-based collection methods of PREMs are often expensive to conduct, have higher rates of errors, and require a significant amount of time to process. Digital collection methods would improve this and hopefully increase patient engagement with PREMs while they are outside the hospital.

To support this, The Clinician (a technology provider) developed the electronic Actionable Patient Perspectives (eAPP) module within the ZEDOC platform (Figure 6). ZEDOC is a cloud-based healthcare platform that digitises the process of collecting patient data, from inviting patients to provide data to analysis and conversion into actionable insights. For example, eAPP can be configured to trigger an automated alert to a patient's assigned clinician whenever the patient reports their physical needs were not met or when their condition severely deteriorates. Each of these rules can trigger their own set of notifications, allowing different members of the clinical care team to have separate alerts with different protocols in place. These alerts can also flow onto other health information systems such as electronic health records.

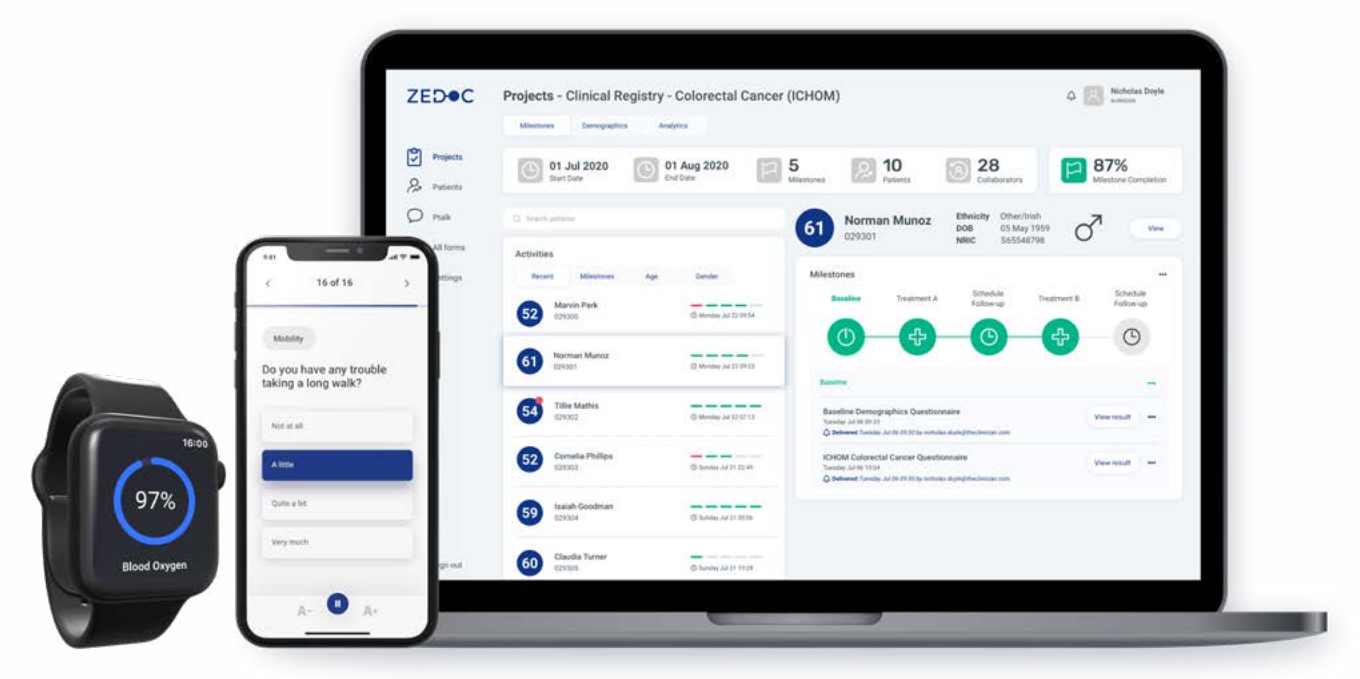
In this test bed, the Agency partnered with Princess Alexandra Hospital (PAH) and The Clinician to pilot the use of the ZEDOC platform in a cancer care environment. This test bed ran from June 2018 to December 2020.

Aims

This test bed aimed to:

1. Deploy a software solution (the eAPP module within the ZEDOC platform) to collect PREMs information from cancer patients treated in the Division of Cancer Services, PAH, and turn them into actionable alerts.
2. Iteratively develop a pathway for onboarding PAH cancer patients onto eAPP and ZEDOC.

Figure 6: eAPP and the ZEDOC platform



Methods

Design

The pre-implementation phase consisted of the following main activities: software development and testing, software configuration (of a knowledge base of rules tailored for the Division of Cancer Services, PAH), software deployment, staff training, and an initial in-clinic validation trial with a limited patient cohort. Healthcare professional and patient insights were collected and used to refine the patient onboarding process for implementation.

Patients were asked to complete the PRE-C questionnaire. PRE-C quantifies patient experience in cancer and takes about 15 minutes to complete on a tablet. Validation of the PRE-C was conducted across multiple studies and sites in Australia and New Zealand, with results finding an overall good model fit with good reliability and validity[17]. Publication of further results by the PRE-C team is underway.

In the implementation phase, eAPP data was collected at PAH from October to November 2020. Patients could choose to complete questionnaires with either in-clinic devices or their own personal devices. Those choosing the latter were sent a link to complete the questionnaire via email and SMS.

Feedback was collected from healthcare professional users on technology usability, issues encountered, the data collection process and ease of patient recruitment (relative to earlier implementations of PRE-C via the ZEDOC platform). General feedback on completing questionnaires on eAPP was also collected from patients.

Participants

During implementation, 118 patients were recruited for the study from PAH and one of their out-clinic settings.

Research ethics approval

Received from the Metro South Human Research Ethics Committee.

Results

95 patients completed the PRE-C digitally, with 39 doing so on an in-clinic device and 56 doing so remotely via their personal device (resulting in a 78% remote questionnaire completion rate). The patients who opted for the in-house device tended to be aged over 65 years.

The PAH clinical manager responsible for ongoing recruitment reported overall positive feedback from patients. Similarly, overall positive feedback was reported from clinical staff. They found that the addition of the remote completion option enabled quicker recruitment and completions, as well as this being safer and less onerous for staff due to less time spent handling and cleaning in-clinic devices.

Preliminary evidence was also collected that showed eAPP and the ZEDOC platform was an effective and efficient way to notify clinical teams of who require attention from a patient experience point of view.

Discussion

Learnings

The process of administering PREMs via mobile devices and integrating this into clinical and administrative workflows in a hospital cancer care unit was developed and refined over this test bed, with the final process and questionnaire found to be acceptable by patients and clinical staff. The use of automatic reminders through email or SMS also helped support patients to complete questionnaires outside the clinical setting.

More broadly, this test bed demonstrated the feasibility of digitising PREM collection processes in a way that is highly automatable and tailored to the clinical context of a typical cancer care unit. In particular, the smooth and rapid recruitment in the one-month implementation period indicates the ability for this or similar technologies to scale out to other hospitals and clinics in the Metro South Health catchment. In doing so, consideration must be given to practices that may make scaling up easier, for example minimising the number of disparate information systems at a state or national level.

Recommendations

Recommendations for future related work were identified by the project team and include:

- Have appropriate onboarding/introduction of patients to ensure patient retention.

Conclusion

The findings support the technical and clinical feasibility of applying this technological solution more widely across hospitals in Australia and of incorporating a wider variety of patient-reported experience and outcome measures.

At the close of this test bed, the project team was in the process of preparing to deploy eAPP for other clinical use cases, including the implementation of patient-reported outcome measures (PROMs) and remote symptom monitoring (i.e. from wearables) at PAH. More broadly, further integrations of technologies like eAPP and the ZEDOC platform with other clinical systems (e.g. for dispensing medication) could support early intervention and the delivery of more comprehensive and patient-centred care.

HEALTH IN PATIENTS' HANDS

Digitising and linking Advance Care Directives with My Health Record

Introduction

Background

Presently, most of those who die in Australia do not receive end-of-life care that meets their needs and preferences. Only 25% of Australians have formally documented their end-of-life preferences[18], resulting in ambiguity in their wishes for care.

An Advance Care Directive (ACD) is a formal document that records a person's directions for their future care and treatment. However, there are low rates of completion of these typically paper documents in Australia[18]. To support advance care planning, GP Partners Australia (a not-for-profit organisation supporting GPs across South Australia) developed, maintained and distributed a Patient Purple Hand-held Record (the 'Purple Book'). The Purple Book is a physical information pack that aims to provide all GPs and health providers caring for a palliative patient (or a patient facing end-of-life) in South Australia with key information, including their ACD, 7-step resuscitation plan, GP information, allergies and medication summary, prescribing protocols and important contact information.

Like the Purple Book, most advance care planning processes are largely paper based. Moving them to a digital platform could potentially deliver a number of benefits, such as increasing the numbers of people documenting their end-of-life preferences, improving awareness amongst the individual's care team of an ACD being in existence and reducing the number of people dying in a place not of their own choosing.

In this test bed, the Agency partnered with GP Partners Australia to develop a digitally enabled platform for aged care residents and older South Australians in the wider community. This would allow them to complete a personal ACD. This test bed ran from June 2018 to March 2021.

Aims

This test bed aimed to:

1. Digitise the Purple Book.
2. Streamline the patient interface with My Health Record (MHR) via a user-friendly user interface.
3. Enable patients to conveniently upload their ACD and resuscitation plan (including hospital transfer preferences) to MHR.

Methods

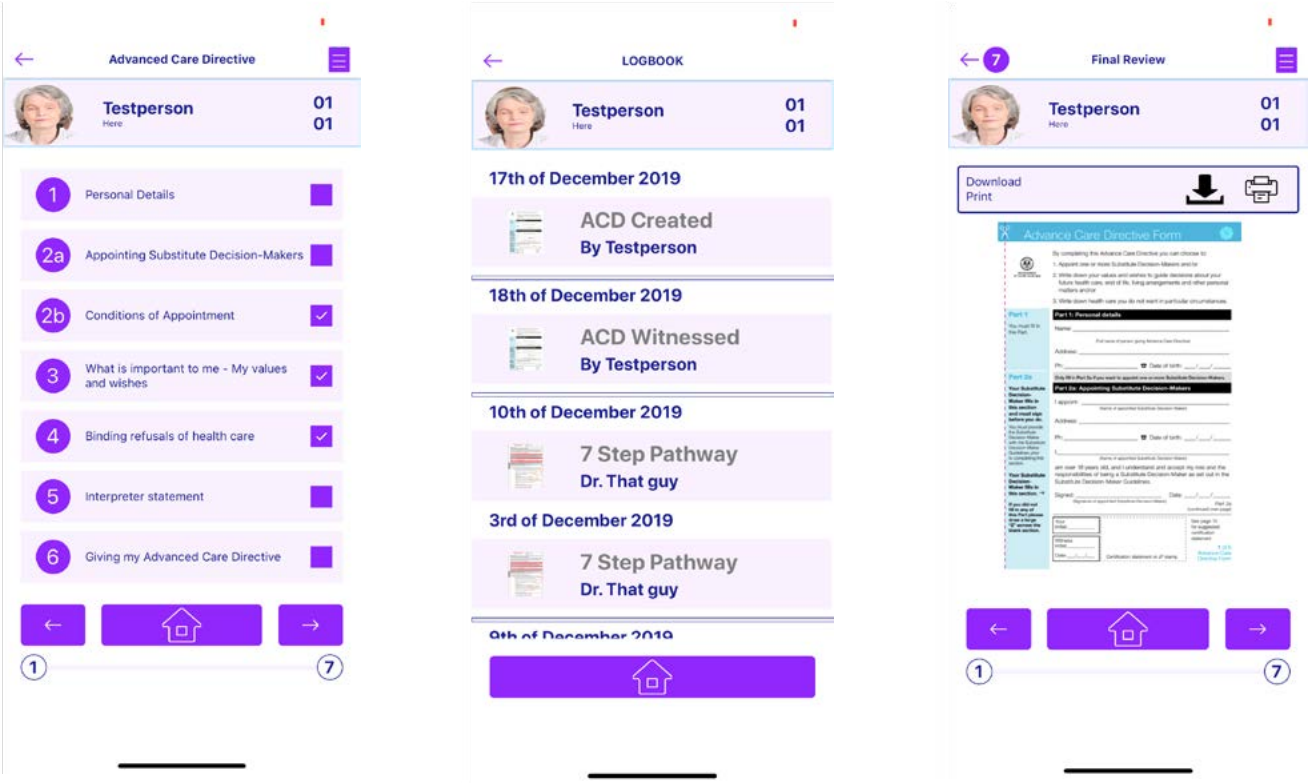
Design

A Clinical Governance Committee was formed to oversee project development and implementation.

In the project's initial phase, the Purple Book was analysed and discussed from multiple perspectives, including its implementation in electronic form and which features would add value for patients and families. Interviews were held with key stakeholders, including GPs, GP practice managers and Ambulance Services to gather their feedback. Practice workflows were developed and mock-ups were created, translated into prototypes and field-tested.

The MHR mobile gateway paused taking on new entrants in August 2018. This necessitated a change of scope as the app could no longer display information from MHR nor upload directly to MHR. An abridged version of the app was therefore designed, focusing only on creating ACDs and on linking its users to the MyGov login portal (through which MHR could be accessed). The resulting app was named 'ACDCare' (Figure 7).

Figure 7: ACDCare app screenshots



After successful testing, ACDCare was deployed in the Google Play Store and Apple App Store ready for trial participants to use and evaluate. A web platform was later launched to assist desktop-based users to fill out their ACDs.

COVID-19 impacted implementation and who could be included in the trial (see *Participants* section below) and led to several changes in the evaluation approach. The final evaluation design involved a mixed methods approach, combining a quantitative survey with two qualitative methods (personal interviews and focus groups) to collect user perspectives.

Participants

The initial plan was to implement and evaluate the app in South Australia and Northern Territory across 5-8 GP practices and around 100 users. Due to the outbreak of COVID-19 impacting on GPs' ability to participate, as well as travel restrictions, the project was subsequently amended to focus instead on Residential Aged Care Facilities (RACFs) in South Australia.

Unfortunately, access to visiting RACFs was also limited due to the pandemic and recruitment proved difficult. The plan was therefore further amended, with a general call out sent to GP Partners Australia's network, as well as to Flinders University researchers, to find volunteers interested in participating in the ACDCare testing and evaluation. These could be any individuals aged 18 and over who lived in South Australia and who had engaged with the ACDCare app.

5 community members participated in the online survey, 11 community members participated in the interview and 10 Flinders University researchers (staff and students) participated in the focus groups.

Research ethics approval

Received from the Human Research Ethics Committee at Flinders University.

Results

Community members and digital researchers felt the app was a good idea and attempted to address barriers to end-of-life planning. The app was found to be attractive, convenient and mostly functional. However, none of the evaluation participants had completed and submitted an ACD form to their MHR by the end of the test bed and multiple usability issues were identified.

A key barrier reported was that individuals are likely to delay their advance care planning documentation, with or without an app, as advance care planning is difficult and uncomfortable. This outcome may be partially a result of the young average age of the evaluation participants, but even older interviewees did not have ACDs in place. The evaluation cohort had a limited understanding of ACDs, and the app was not able to address their questions and concerns about advance care planning.

When asked about using the app in future, younger participants were ambivalent but older participants were mostly united in their intention to use the ACDCare app (or one like it) to document their advance care planning preferences.

Overall, users recognised the importance of advance care planning but would need to see some changes to the app before they would recommend it to others or use it themselves for creating ACDs.

Discussion

Learnings

Whilst an app was delivered that enabled the online creation of ACDs and that successfully facilitated discussion around advance care planning, technical issues meant a fully digitised and streamlined process between the app and MHR could not be achieved and no ACDs were added into an evaluation participant's MHR as a result of this test bed.

COVID-19 also significantly impacted who could be recruited in the trial, with many involved in the evaluation being younger than the app's target cohort. The test bed was therefore unable to evaluate many of its original aims, such as seeing if the app would increase the number of South Australians documenting their end-of-life preferences or contribute to a reduction in individuals dying in hospital.

Conclusion

This test bed was unfortunately unable to achieve its original aims due to the impact of COVID-19. However, it demonstrates the potential for advance care planning apps for both older people as well as a younger audience who could be educated about advance care planning when they have fuller capacity and clarity about their personal wishes.

DATA FOR PUBLIC HEALTH AND RESEARCH PURPOSES

Developing the Western Sydney Diabetes Data Hub

Introduction

Background

Diabetes is the fastest growing chronic condition in Australia with approximately one in 20 Australians diagnosed with diabetes[19]. Of these, 90% of cases are type 2 diabetes, which is largely preventable. Western Sydney has been identified as a 'hotspot' for diabetes, with 12% of the Western Sydney population estimated as having diabetes and a further 35% being at risk of developing type 2 diabetes[20]. In response to these challenges over 120 organisations led by Western Sydney Local Health District (WSLHD), WentWest (Western Sydney Primary Health Network), the Department of Planning, Industry, and Environment, PwC Australia and Diabetes NSW/ACT formed an alliance named Western Sydney Diabetes (WSD). The alliance's aim was to 'take the heat' out of the Western Sydney hotspot through a variety of prevention, surveillance and intervention programs.

This test bed ran from July 2018 to October 2019. In this test bed, the Agency partnered with WentWest, WSLHD and PwC Australia to design and develop two data and analytics platforms. They were the Western Sydney Diabetes Interventions Monitoring Platform (Platform 1) and the Dashboards for People with Diabetes (Platform 2).

Platform 1: Western Sydney Diabetes Interventions Monitoring Platform

WSD has a suite of interventions underway across the spectrum of primary prevention for people at risk of diabetes (e.g. GP walking groups) through to secondary prevention and case management of people with diabetes (e.g. routine HbA1c testing and Save a Leg, a 60-second diabetic foot screening tool). At the start of this test bed, these interventions were not monitored consistently.

Developing an intervention monitoring platform could enable WSD to evaluate interventions and seek further investment for those interventions proven to work so that they could be taken to scale.

Platform 2: Dashboards for People with Diabetes

While dashboards were already being used within Western Sydney hospitals to support care of patients with diabetes at the start of the test bed, they lacked metrics focused on care quality, care efficiency and data fields that would improve aspects of transfer of care back to the GP following discharge from hospital.

Integrating coded inpatient data to existing dashboards to establish ongoing aggregate analysis of the diabetes population interacting with WSLHD hospitals, and linking this data with external datasets where possible, could support clinical decision-making for improved patient care.

Aims

This test bed aimed to create data and analytics platforms to:

1. Monitor WSD's existing suite of diabetes interventions in Western Sydney (Platform 1).
2. Use patient-level and population-level data to support clinical management of patients with diabetes in Western Sydney (Platform 2).

Methods

Platform design and development

Platform 1

For the design and development of Platform 1, PwC collaborated with stakeholders, clinical experts and platform users to confirm platform design and contents and identified 49 intervention metrics to monitor. A platform configuration period then followed before User Acceptance Testing (UAT) was conducted to ensure the platform would be acceptable to its end users. Collaboration and data sharing agreements (e.g. with intervention providers) were obtained from all relevant parties.

PwC then conducted a Security Architecture Review to ensure the platform complied with all relevant standards and guidelines before ingesting intervention data into the platform and implementing an operating model to support the ongoing maintenance of the platform and regular data refreshes.

Platform 2

As with Platform 1, PwC collaborated with stakeholders, clinical experts and platform users to confirm design and contents for Platform 2 before conducting UAT. WSLHD inpatient data was also linked with two external data sources:

- Public Health Information Development Unit (PHIDU) Social Health Atlas of Australia (specifically data relating to diabetes disease prevalence in Western Sydney).
- Socio-Economic Indexes for Areas (SEIFA) – Index of Relative Socio-Economic Disadvantage and Index of Relative Socio-Economic Advantage and Disadvantage.

Both platforms went live in March 2019.

Research ethics approval

There was no requirement to seek ethical clearance for this test bed as it does not classify as a research study.

Results

Platform 1

The intervention monitoring platform was built and launched in March 2019 for the use of key WSD Alliance members including the Head of Diabetes & Endocrinology and other specialty heads at WSLHD, as well as key managers at WentWest.

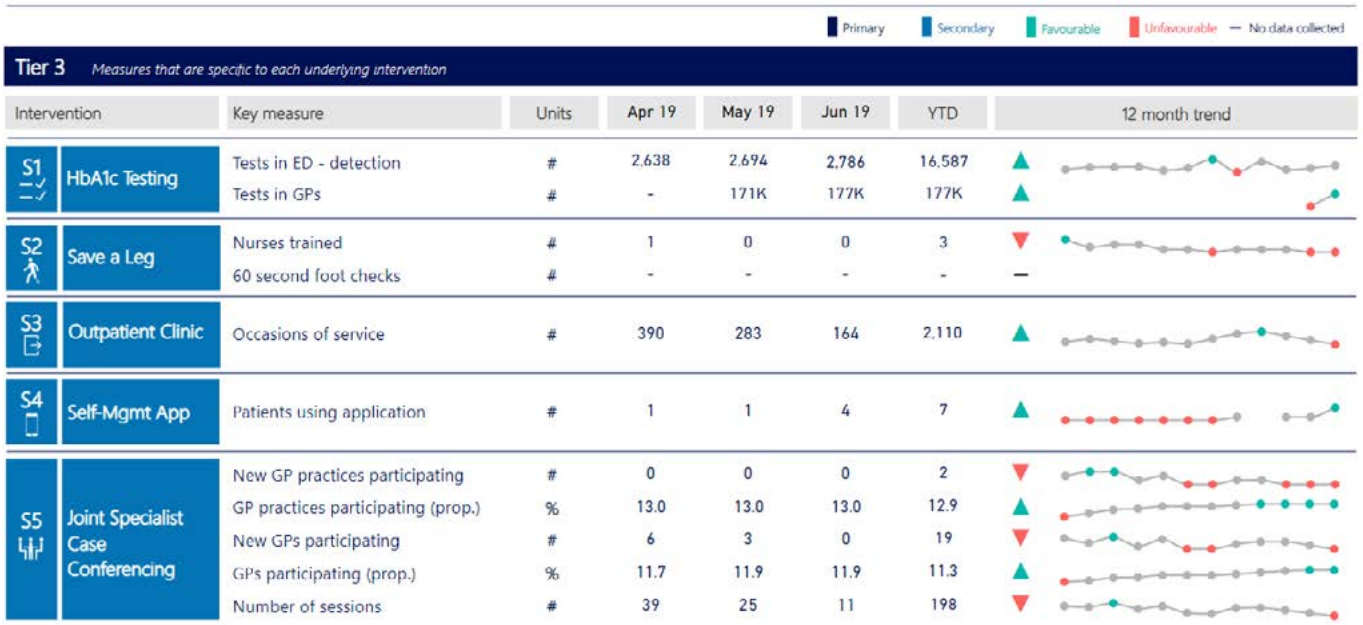
The platform is accessed through a secure user portal and contains information on three types, or 'tiers', of metrics:

- Tier 1: Patient level – Patient weight and HbA1c test results aggregated by GP cohort.
- Tier 2: Service level – Number of GP visits within the last 12 months by patients with Type 1 and Type 2 diabetes, and inpatient admissions and ED presentations of people with Type 1 and Type 2 diabetes.
- Tier 3: Intervention level – Activity and performance of currently running interventions for people at risk of diabetes (primary prevention interventions), as well as those of currently running interventions for people with diabetes (secondary prevention and case management interventions).

The dashboards within the platform have several analytics layers that incorporate a summary view of Tier 1, Tier 2 and Tier 3 metrics. These dashboards highlight trends in the metrics over the last quarter, year to date, and 12-month periods. Users can drill down into each individual metric to see a more detailed view, along with a detailed description of the metric, the source of the data, and prior years (where available).

At the start of this test bed, only 3/49 WSD intervention metrics were centrally monitored. At the close of this test bed this rose to 38/49.

Figure 8: Western Sydney Diabetes Interventions Monitoring Platform (Platform 1) – Tier 3 (intervention level) dashboard



Primary | Secondary | Favourable | Unfavourable | No data collected

Tier 3 *Measures that are specific to each underlying intervention*

Intervention	Key measure	Units	Apr 19	May 19	Jun 19	YTD	12 month trend
S1 HbA1c Testing	Tests in ED - detection	#	2,638	2,694	2,786	16,587	▲
	Tests in GPs	#	-	171K	177K	177K	▲
S2 Save a Leg	Nurses trained	#	1	0	0	3	▼
	60 second foot checks	#	-	-	-	-	–
S3 Outpatient Clinic	Occasions of service	#	390	283	164	2,110	▲
S4 Self-Mgmt App	Patients using application	#	1	1	4	7	▲
S5 Joint Specialist Case Conferencing	New GP practices participating	#	0	0	0	2	▼
	GP practices participating (prop.)	%	13.0	13.0	13.0	12.9	▲
	New GPs participating	#	6	3	0	19	▼
	GPs participating (prop.)	%	11.7	11.9	11.9	11.3	▲
	Number of sessions	#	39	25	11	198	▼

Platform 2

The Dashboards for People with Diabetes were built and launched in March 2019 for the use of the WSLHD Head of Diabetes & Endocrinology, relevant specialists, and members of the Joint Specialist Case Conferencing service offered by WSD.

Each of the dashboards can be filtered for Type 1 and Type 2 diabetes, diabetes in pregnancy and other types of diabetes, as well as other characteristics such as facility, gender and specialist. The dashboards are refreshed each day and display the most recent coded data available.

Three types of data were tracked:

- Tier 1: Patient level – A monthly summary of inpatients with diabetes compared to inpatients without diabetes, including number of admissions, number of complications, average HbA1c and range, length of stay, BMI and demographic information.
- Tier 2: Specialty level – A monthly summary of the number of patients with diabetes a specialty has seen and their profile including medications prescribed and rates of complications.
- Tier 3: Population level – This dashboard linked to external datasets (PHIDU and SEIFA) to display summary data for diabetes patients by postcode and GP, including diabetes prevalence, socio-economic status, rate of potentially preventable hospitalisations, BMI and rate of in-hospital admissions. It was intended for use by WSD to present to GPs as part of their Joint Specialist Case Conference service, to assist understanding of the health status of their local diabetes population.

Data from the life of this test bed (April to September 2019) shows that these dashboards were accessed approximately once a week (or a mean of 4.3 sessions per month) by team members in the WSLHD Diabetes team. The population health dashboard was accessed more often (mean of 5.2 sessions per month) than the patient- and specialty-focused dashboards (mean of 3.4 sessions per month).

Figure 9: *Dashboards for People with Diabetes (Platform 2) – Population-level dashboard*

Discussion

Learnings

This test bed aimed to create data & analytics platforms to monitor diabetes in Western Sydney.

For Platform 1, a majority of scoped intervention metrics were able to be integrated into the intervention monitoring platform by the end of the project, however the large number of organisations involved was challenging for the project team to manage. This was especially so for primary prevention interventions as they tended to be from more disparate sources and produce less data than secondary prevention interventions. Irregular intervention schedules also complicated platform development and data integration.

Platform 2 successfully brought together patient-, specialty- and population-level data (integrating both WSLHD data and external datasets) into a dashboard for the use of WSLHD Diabetes and WSD staff. Data from the life of the test bed suggests sustained and moderate use over the life of the test bed; however, it is not possible to ascertain whether this use was associated with clinical decision-making.

After the close of this test bed, the dashboards have continued to be used by WSD to inform clinical resourcing and remote patient management (particularly during active outbreak situations) in hospitals. They have also been used to make decisions on how best to respond to diabetes in Western Sydney. For example, dashboard insights identified high rates of diabetes in the Filipino community in Western Sydney and prompted the creation of diabetes prevention initiatives led by healthcare professionals working with this community. The infrastructure powering the dashboards, that was set up as part of this test bed, has also provided WSD with an easily accessible and reliable source of important data, such as obesity in the community.

Recommendations

Recommendations for future complex data collaboration projects in healthcare, or other related work, were identified by the project team and include:

- Focus contemporary health data and analytics solutions on decision support to answer the strategic and tactical decisions of healthcare and health systems.
- Clearly articulate the benefits of use of health data for research and public health purposes to each stakeholder.
- Develop a transparent informed consent model tailored to the solution and context of data use.
- Develop legal frameworks that enable contracts to evolve alongside the complex project designs required to achieve complex goals.
- Parties handling personal health information should assess their ability to achieve and maintain compliance to Australian Government information security requirements.
- Establish a robust pilot intervention framework prior to the intervention and take decisive action on whether to adjust, scale or divest from the intervention based on evaluation results.
- Establish a robust data governance model that incorporates data security and privacy principles, decision rights and escalation processes for those handling the data, and an operating model that supports the timely provision of data to inform the strategic and tactical decisions of an individual or organisation.

Conclusion

This test bed developed two new diabetes monitoring platforms on which WSD and WSLHD staff can monitor diabetes interventions and hospital patient metrics. At the conclusion of the test bed, both platforms were handed over to WSD and WSLHD. These platforms continue to be used to this day to inform the provision of diabetes care in hospitals, as well as a wide variety of WSD initiatives, including reporting, diabetes education programs and supporting local GPs in continuous quality improvement.

DATA FOR PUBLIC HEALTH AND RESEARCH PURPOSES

Developing an algorithm predicting risk of unplanned hospitalisation

Introduction

Background

Reduction of avoidable hospital admissions is key to improving quality of life of patients, effectively managing expensive hospital resources and the overall cost to the taxpayer. With the reduction of avoidable hospitalisations as one of the goals for Primary Health Network activities[21], a clinically evaluated point-of-care mechanism to highlight patients at risk is essential[22].

The POLAR (POpulation Level Analysis and Reporting) System is a clinical Business Intelligence (BI) and analytics platform that integrates data from multiple clinical software to provide GPs and Primary Health Networks (PHNs) with clinical insights.

In this test bed, the Agency partnered with Outcome Health, the service provider of the POLAR System, to design and develop a point of care tool which measures a patient's risk of Emergency Department (ED) presentation based on data in their GP's clinical information system and their My Health Record (MHR) Shared Health Summary. The test bed ran from June 2018 to June 2021.

Aims

This test bed aimed to:

1. Link hospital and GP patient data across several health networks.
2. Create a 'hospitalisation risk prediction' algorithm based on GP data and incorporate available MHR data into that algorithm. This would result in a 'live' risk assessment tool (known as 'Diversion + MHR') that calculates and displays a patient's risk of ED presentation within the next 12 months.
3. Release the Diversion + MHR tool to PHNs and GPs using the POLAR System.

Methods

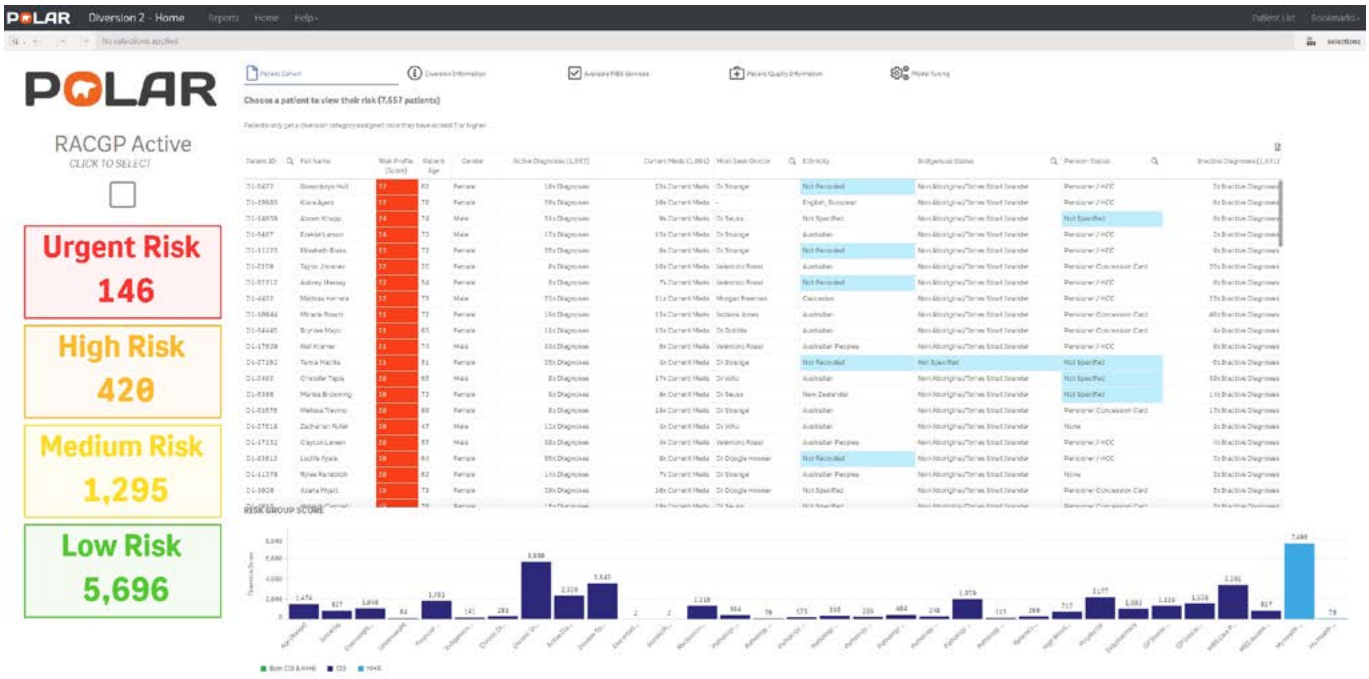
Design

Prior to starting development work, interviews were conducted with three GPs and a practice manager about current tools they use and how this tool could best suit their workflows. Following this, the work packages were categorised into three separate streams:

1. Design, look and feel of the report – which included the development team working with a small group of GPs to create prototypes of initial designs.
2. Development of the technical solution – utilising the existing core POLAR architecture.
3. Core algorithm development – adapted from an existing Outcome Health algorithm. 36 separate variables were fed in, including demographics, lifestyle profile, clinical assessment, service utilisation and MHR interaction. Analysis of algorithm result outliers allowed the team to configure scoring thresholds for the risk categories.

Due to limitations with access to private patient data and the quality of unstructured data fields (e.g. GP diagnosis), extensive data cleaning and redaction techniques were applied before data could be accessed and processed by the POLAR System. During this data cleaning process, substantive Natural Language Processing and machine learning processes were used to enable unstructured data to be transformed into values that could feed the algorithm engine.

Figure 10: Main interface of Diversion + MHR on the POLAR System



Thresholds in algorithm scoring were determined by what was a 'workable' number of patients for a clinician to work with, especially regarding urgent risk. This considered that if the number was too large then the clinician may be deterred from working with the cohort, whilst if too low, patients may miss out from a timely review. The algorithm ended up classifying patients into Urgent, High, Medium and Low groups, with approximately the top 5% of risk scorers within the practice classified as urgent.

Importantly, 'risk', as indicated by this tool, is not a reflection of gaps in the care GPs are providing (which may well be optimal), but rather a measure of the patient's overall risk factors. The tool's purpose is therefore to highlight that risk to the GP.

Once the tool was developed, further model tuning and associated adjusting for participant feedback were undertaken.

While hospital linkages would have allowed a more comprehensive retrospective analysis of the data to examine if ED presentations did occur as predicted in the risk model, hospital data had to be descoped from the project due to delays in getting approvals and the impact of COVID-19. In the absence of hospital data, a range of other measures, including Victorian admitted and ED data, were used to assess differences and identify outliers.

Participants

Three Victorian PHNs (Eastern Melbourne PHN, Gippsland PHN, South Eastern Melbourne PHN) participated in the project. Three general practices in the POLAR network across Melbourne and Sydney also participated in the evaluation of the tool when built. COVID-19 had a major impact on General Practice and PHN availability to participate in and contribute to the project.

Research ethics approval

Received from the Monash Health Human Research Ethics Committee.

Results

The tool was successfully built and uses a wide range of clinical and demographic inputs to enable GPs to make real-time decisions based on key patient data. The end product:

1. Allows GPs to see either individual patients or an 'at risk' cohort of patients, i.e. a GP can view a group of their own patients at 'urgent' risk of hospitalisation.
2. Highlights a range of missing data quality items, where the presence of these items correctly recorded would likely alter the final risk score.
3. Suggests additional actions that can be pursued by the GP, particularly in the area of MBS utilisation; i.e. highlighting to GPs what additional activities can be conducted with their patients most at risk, for example care planning.
4. Enables GPs to see the individual elements that have contributed to the patient's risk score.

The tool was evaluated in three general practices across the POLAR network. Participants agreed that:

- The report was easy to use and understand.
- The report provided the information expected.
- The risk indicators presented accurately represented status of patient health.
- The additional patient information presented is useful.

Additional feedback from the evaluation sites included that the tool helped identify patients who required additional attention, helped promote the use of Shared Health Summaries and prompted clinicians to think more about what they could do to help higher risk patients.

Discussion

Learnings

This test bed provides evidence for the feasibility and usefulness of applying risk assessment algorithms to patient information in clinical information systems, i.e. at the point of care. While in-practice testing of the tool yielded positive results and feedback from GPs, further research is required to determine actual clinical effectiveness.

Challenges experienced during this test bed also highlighted a number of inconsistencies in the way different vendors send information to MHR from their clinical systems, which impacted on the final product that could be delivered. These included:

- The way medications are stored with inconsistent 'free text' in the dosage and frequency.
- The medication uploaded is not consistent in the use of generic ('Frusemide') or brand ('Lasix') names; in most cases this was not an issue, but in cases where a specific topical or reason for a brand name was required, this added complexity.
- The lack of coding in diagnosis, which resulted in an extra processing step of converting free text diagnosis to SNOMED-CT-AU.
- The persistent lack of Shared Health Summaries downloaded to GP clinical information systems.

Recommendations

Recommendations for future related work were identified by the project team and include:

- Incorporating the other documents stored in the MHR with the risk algorithm could help eliminate identified barriers and further enhance the use and application of MHR and the algorithm.

- A reciprocal risk generation process, where a similar risk score would be calculated based on data uploaded to MHR by the GP, could encourage more GPs to engage with and upload to MHR.

The project team also separately identified recommendations for the Agency related to MHR improvements.

Conclusion

Through this test bed, a tool that predicts risk of ED presentation based on patient data within their GP's clinical information system and their MHR Shared Health Summary was created. Initial user testing found that this tool was well received by GPs. The tool is now being rolled out by PHNs and is available to general practices in Australia who are part of the POLAR network. Following this test bed, the project team intends to continue pursuing a state linkage system of data sharing, including hospital ED data, and adding this to the tool over time.

SECTION 2

Implementation test beds

This section looks at:

Improving the accessibility and adoption of digital health services

- Effective medicines safety at transition of care
- Enhancing medicine reconciliation delivered by community pharmacies
- Prescribing personalised health information at hospital discharge in Indigenous communities
- Connecting chronically ill patients to their digital health ecosystem through a mobile app

Implementing Agency initiatives within less digitally mature settings

- Maintaining continuity of care for prisoners released from incarceration
- Promoting My Health Record and secure messaging in the aged care sector
- Promoting My Health Record and secure messaging among specialists

IMPROVING THE ACCESSIBILITY AND ADOPTION OF DIGITAL HEALTH SERVICES

Effective medicines safety at transition of care

Introduction

Background

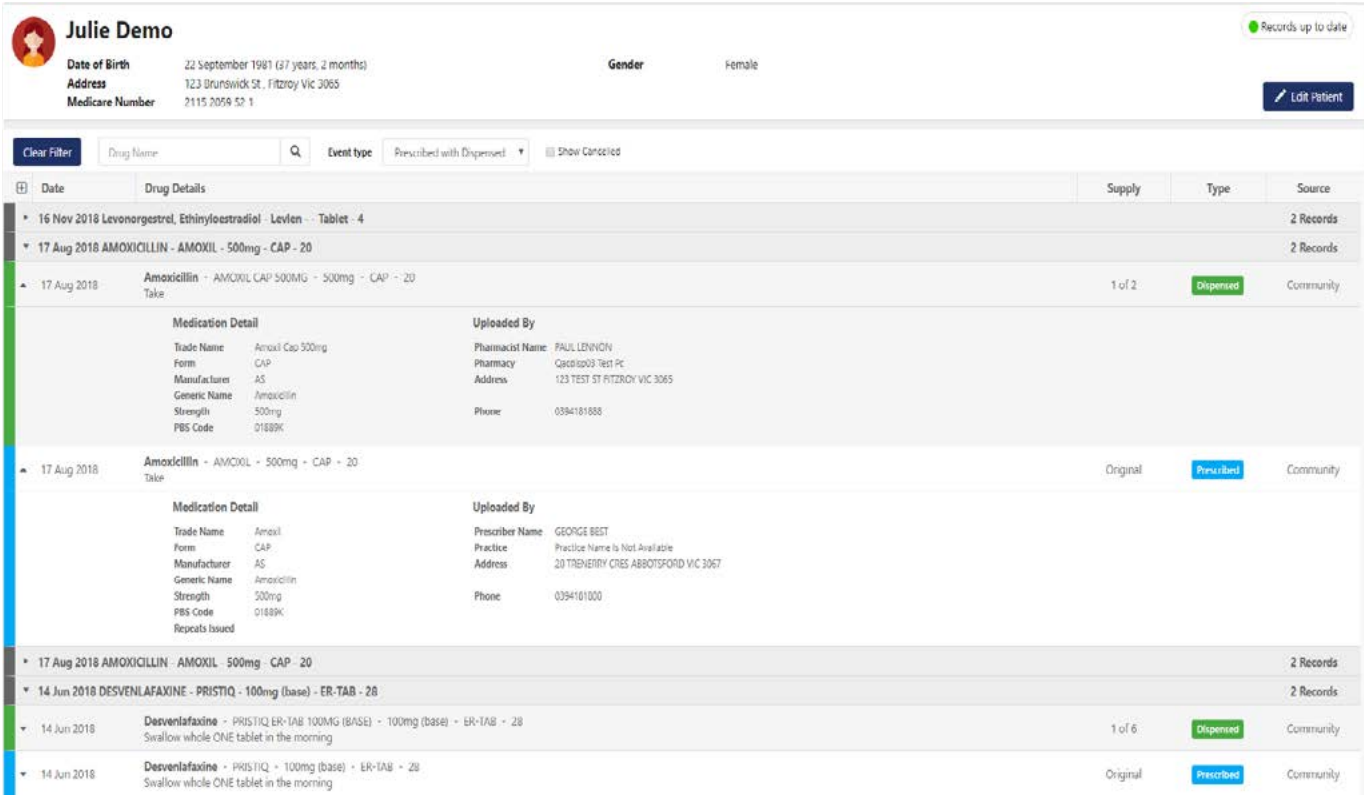
In Australia, 250,000 people are hospitalised per year due to medication-related problems, at a cost of $1.4 billion per year, and approximately 50% of these are preventable[23]. Transition points of care are particularly prone to gaps in knowledge of current medicines resulting in unintended changes in medicine regimes and other medication errors. Better medication management at these transition points is critical, especially for patients with multiple chronic illnesses and chronic medication use[24-26].

Medicine reconciliation is a process undertaken during transfers of care. This process involves the identification of the most accurate list of all medicines that the patient is taking, including name, dosage, frequency and route, based on at least two information sources (such as the patient themselves or their community pharmacist).

MedView is a cloud-based platform that hosts a range of electronic prescription-related applications populated by data from the Fred IT Group's eRx Script Exchange, such as patients' prescribed and dispensed medication histories. The potential was identified for MedView to assist hospital pharmacists in conducting quick and accurate medicine reconciliation during the patient admission process.

In this test bed, the Agency partnered with Fred IT Group and the Centre of Medicine Use and Safety, Monash University, to explore the impact of implementing platforms like MedView at the point of admission to hospital. This test bed ran from July 2018 to May 2021.

Figure 11: Prescribed and dispensed medicines history on MedView



Aims

This test bed aimed to:

1. Investigate the impact of implementing platforms like MedView within hospital admissions on medicine reconciliation.
2. Investigate MedView user acceptability and preferences.

Methods

Design

A General Medical Ward in a public hospital (Site A) and an Emergency Department in a private hospital (Site B), both in Victoria, were identified as research sites. Clinical pharmacists working in these sites were trained in the use of MedView, including to view consolidated prescription and dispensing histories for the purpose of performing medicine reconciliations and to curate medicine lists for patients admitted to their hospital.

Quantitative phase

A pragmatic pre-post quantitative study evaluated timeliness and completeness of medicine reconciliation before and after MedView was implemented in both hospital sites. To assess timeliness, clinical pharmacists at both sites recorded the time taken to complete medicine reconciliation at baseline (before pharmacists had access to MedView, representing current best practice) and post-implementation (once the pharmacists had access to MedView). Two measurements were taken: the time taken to conduct medicine reconciliation (TTM) and the total elapsed time (TET) that included time taken doing other tasks. As this was an observational study, no significance testing was performed.

To assess completeness, Medicine Reconciliation Forms (MRFs) at baseline and post-implementation from each hospital site were analysed. Differences between the MRFs and the prescribing/dispensing history recorded on MedView were computed and used as the primary indicator of completeness (or agreement).

Qualitative phase

A qualitative study was also conducted to investigate MedView user acceptability and preferences. Pharmacists from both hospital sites who had used MedView for at least three weeks were interviewed for 30 minutes via Zoom. The semi-structured interview contained comparative, evaluative and descriptive questions that assessed interviewees' opinions on MedView's user experience and functionality.

Participants

To qualify for study inclusion in the quantitative phase, MRFs had to be of adult inpatients (aged over 18) with a chronic disease taking 4 or more regular medicines. 300 MRFs at baseline and 256 MRFs at post-implementation were collected from Site A, while 285 MRFs at baseline and 247 MRFs at post-implementation were collected from Site B.

In the qualitative phase, ten pharmacists were interviewed.

Research ethics approval

Received from the Monash University Human Research and Ethics Committee as well as the relevant committees at each hospital. Names of each hospital are omitted to preserve anonymity, which was a condition of ethics approval.

Results

Quantitative phase

No differences within or between hospitals were observed in numbers of medication, readmission rates, days to readmission or the time taken post-admission to complete a MRF in both baseline and post-implementation phases, indicating a similar cohort of patients were sampled in both hospitals and data collection periods.

The number of information sources used in medicine reconciliation increased in both hospitals from a median of 2 sources (baseline) to a median of 3 sources (post-implementation), consistent with the introduction of MedView. A more detailed investigation of reported information sources showed that after MedView was implemented, it became the most frequently used information source, with a utilisation rate of 33% in both hospitals. The increase in MedView use was accompanied by corresponding decreases across time in the use of other information sources, particularly the patient's community pharmacy.

Comparisons of TTM and TET showed no difference for median TET between baseline and post-implementation, while TTM (time taken to complete an MRF) decreased by 25% for Site A and 21% for Site B, representing a cumulative time saving of approximately 48 hours for Site A and 12 hours for Site B in the six-week post-implementation period.

There were low rates of full agreement (defined as a 100% match between the MRF and the prescribing/dispensing history on MedView) of MRFs at baseline, with 14.7% of MRFs in Site A and 6% of MRFs in Site B being fully complete. At post-implementation, this figure rose to 18% in Site A and 13% in Site B respectively. However, MRF accuracy increased post-implementation, with the total number of omissions decreasing by 40% in Site A and 67% in Site B. These improvements were mostly associated with improved recording of prescription medicines as well as medication dosage attributes (e.g. dosage frequency), particularly strength.

Further investigation of both datasets compiled via the medicine reconciliation process and available in the MedView platform found that each method identified medicine not identified by the other method. MedView prescribing/dispensing history was more likely to omit over-the-counter (OTC) medications, while pharmacist completed MRFs were more likely to omit prescription medicines. Examples of these medicines include analgesia, NSAIDs, vitamins, calcium, magnesium and salbutamol, typically prescribed items that may be cheaper to obtain OTC.

Qualitative phase

Interviewed pharmacists endorsed the accuracy, ease of access, speed and overall utility of MedView, ranking it as their top or second-highest medicine information source out of a list of ten provided by the interviewers in all four categories except accuracy (where it was ranked fourth). Overall, when asked for their most preferred sources for complete medicine reconciliations, participants ranked the patient or carer as first, MedView as second, the patient's own medicines as third, and the patient's community pharmacy as fourth.

In their consolidated assessment of MedView functionality, participants gave MedView the following scores:

- 1.4/5 for ease of access, where 1= very easy.
- 1.6/5 for ease of use, where 1= very easy.
- 3.6/5 for data completeness, where 5 = complete.
- 4.2/5 for data accuracy, where 5 = very accurate.
- 1.1/5 for ease of becoming proficient in using MedView, where 1= very easy.

Eight of the ten participants reported that MedView's accessibility (including on mobile devices) and speed of response were critical factors in their decision to use MedView. All ten participants reported MedView was a useful additional resource for completing medicine reconciliations and four reported it was an essential resource. Participants also found the consolidation of many years of prescription and dispensing data across multiple pharmacies on MedView valuable as they could use it to assess patient compliance and identify the pharmacies attended by patients.

However, participants raised concerns about whether the data on MedView was complete, particularly when some pharmacies did not feed data into the platform.

Discussion

Learnings

The findings from this test bed provide evidence that implementing a tool that provides access to electronically generated prescribed and dispensed medication histories, such as MedView, has the potential to improve the completeness and timeliness of medicine reconciliation conducted by hospital pharmacists for adults with chronic disease taking 4 or more regular medicines.

In this test bed, using MedView was associated with an over 20% reduction in the time spent conducting medicine reconciliations in both sites. These time savings could potentially be used to conduct more medicine reconciliations or to perform other clinical duties that could improve quality use of medicines. However, as the total elapsed time (from start of medicine reconciliation to finish) remained similar before and after MedView was implemented, there may be a natural limit to the number of medicine reconciliations that can be completed per day. This could be due to a lag in information delivery from other sources (e.g. from the community pharmacy) or a reflection of hospital pharmacists' busy schedules that require frequent multitasking.

The implementation of MedView appeared to be associated with a reduction in use of other information sources during medicine reconciliation, particularly the community pharmacy. This could be considered a positive for community pharmacists, as they will have fewer disruptions by their hospital pharmacy colleagues requesting information about the medication profiles of their patients. However, reduced regular communication between hospital and community pharmacies may not be beneficial in the long term, as awareness and open channels of communication in both directions is important to reduce medicine errors at transitions of care.

Sub-analyses of MRFs and the MedView prescribed/dispensed medicine histories found that MRFs were more likely to omit OTC medicines and that the MedView history was more likely to omit specific types of prescription medicines. Both the OTC and the types of medicines are typically cheaper or more convenient to purchase over the counter (compared to being dispensed by a pharmacist) and represent a systematic gap in electronically generated medicine prescription and dispense histories. This highlights the need for pharmacists and other healthcare professionals to use at least two different sources to complete a medicine reconciliation.

MedView provides quantitative data on how often and when a patient obtains repeat dispensing of their prescription since it was last prescribed. The pharmacists interviewed in this test bed found this a valuable surrogate for medication adherence and compliance, and such functionality could act as a clinical decision-making aid to prompt pharmacists to initiate further discussions with patients to understand why they may have not been using (or getting dispensed) a particular medication.

Recommendations

Recommendations for future related work were identified by the project team and include:

- Pharmacists at transitions of care should have access to an electronically generated list of prescribed/dispensed medicines as an additional source of medication information.
- Hospital EMR systems should be required to upload and download medicines information to and from clinical information systems outside the hospital setting, including prescribed and dispensed medicines and any changes made during hospital admission.
- Similarly, all prescribing and dispensing data from all primary care sites (e.g. GPs, community pharmacies) should be made accessible to hospitals.

Conclusion

Overall, technologies such as MedView appear to offer advantages to improve the accuracy and efficiency of medicine reconciliation at transitions of care. However, systematic omissions of OTC and prescription medicines from both the pharmacist conducted medicine reconciliation process as well as the electronic prescribed/dispensed medicine list on MedView present challenges for the generation of a 100% accurate medicines list that can act as a single “source of truth”.

IMPROVING THE ACCESSIBILITY AND ADOPTION OF DIGITAL HEALTH SERVICES

Enhancing medicine reconciliation delivered by community pharmacies

Background

The period immediately following hospital discharge has been identified as holding a particularly high risk for medication-related problems[27], and a report from the Pharmaceutical Society of Australia states that 9 in 10 patients have at least one medication-related problem soon after hospital discharge[28]. A lack of proper medicine reconciliation following discharge from hospital can increase patients' risk of readmission to hospital for medication-related reasons.

As community pharmacists are visited regularly, community pharmacy-led medicine reconciliation could deliver pharmaceutical care to at-risk community members[29] and resolve common medication-related problems such as insufficient knowledge of drug use and fears of side effects[30]. However, in practice this is challenging as medication communications to patients post-discharge are of inconsistent quality and local community pharmacies are rarely included in the discharge information loop[31].

Uploading a discharge summary to My Health Record (MHR) at the point of hospital discharge could provide community-based health professionals access to a patient's discharge information loop and support the medicine reconciliation process. At the start of this test bed, this was not yet widely available.

In this test bed, the Agency partnered with Eastern Health, Monash University, Deakin University and the Pharmaceutical Society of Australia to pilot a community pharmacy medicine reconciliation intervention. This test bed ran from July 2018 to October 2020.

Aims

This test bed aimed to:

1. Develop and evaluate a community pharmacy-based medicine reconciliation service designed to integrate with the MHR Discharge Summary.
2. Determine any barriers to its wider implementation.

Methods

Design

A structured medicine reconciliation service named DCMedsRec was developed from a literature review, expert input and input from community pharmacies around the process and logistics of delivery. The version of DCMedsRec that was evaluated in this test bed consists of the following steps[31]:

1. Use discharge summaries uploaded to a patient's MHR alongside other sources to create a best possible medication history (BPMH).
2. Confirm the BPMH's accuracy.
3. Identify and resolve any discrepancies between medications and records.

Upon discharge from hospital, hospital pharmacists who agreed to participate in the study assessed consumer participants for eligibility and allocated eligible participants to either the intervention or control group using sealed envelope randomisation methods[31]. Participants in the intervention condition received information on DCMedsRec in their discharge information, including how to access the intervention (through a participating community pharmacy). Community pharmacists then delivered the intervention to consenting participants.

The primary outcome of interest in the pilot evaluation was the rate of unplanned readmission to hospital within 30 days of discharge. Multiple sources of data were used to address study aims, including DCMedsRec service delivery and intervention outcomes extracted from community pharmacist claim forms, relevant hospital patient data (including admissions and discharge prescriptions), surveys and focus groups. Both quantitative and qualitative methods were used to analyse the data.

Participants

118 community pharmacists who worked in 54 community pharmacies in the Box Hill Hospital catchment area (25% of all local community pharmacies) agreed to participate and received CPD-accredited training on using DCMedsRec to provide medicine reconciliation services to eligible clients.

Consumer participants were recruited from April 2019 to March 2020. Participants were considered eligible if they were aged 18 years or over, had been admitted to an acute inpatient bed for over 24 hours, had been prescribed four or more medications at hospital discharge and had been discharged to their private residence.

Overall involvement was as follows:

- community pharmacist claim forms for each DCMedsRec recipient (n=56).
- an optional post-intervention telephone survey following a DCMedsRec appointment with consumers (n=34).
- post-training evaluations provided by community pharmacists (n=118).
- online survey responses from hospital pharmacists (n=15).
- focus group sessions with community pharmacists (n=13) and hospital pharmacists (n=6).

Research ethics approval

Received from the Eastern Health Human Research Ethics Committee.

Results

Key outcomes

This test bed recruited 529 patients to its control group and 924 patients to its intervention group before stopping recruitment activities in response to the COVID-19 pandemic. While 924 patients were offered access to DCMedsRec, only 56 approached community pharmacies to access it. Of these, 8 patients were excluded from analysis for not adhering to study protocol (e.g. readmission to hospital before attending DCMedsRec). The final sample size of DCMedsRec recipients (n=48) is too small to allow for meaningful statistical analysis. Regardless, the planned intention-to-treat and as-treated analyses were conducted and showed no statistical difference in 30-day unplanned hospital readmission rate between the intervention and control groups.

Evaluation of the secondary outcomes considering stakeholder experience, process and barriers generated useful findings for future related projects. Overall, all three main stakeholders (patients, community pharmacists and hospital pharmacists) found DCMedsRec both acceptable and beneficial.

In the survey, consumers reported a high level of satisfaction with the service, with 97% finding it helpful, 100% stating they would access the service again if discharged from hospital in the future and 94% recommending the service to family and friends on medicines when they leave hospital. Older consumers tended to express more interest towards DCMedsRec than younger consumers.

Community pharmacists reported feeling well trained and prepared to deliver the DCMedsRec service. Evaluation of the face-to-face training indicated good understanding of the project aims, processes and role of the community pharmacies, and there was strong consensus that DCMedsRec was relevant to current pharmacy practice and would fit alongside other services provided by pharmacies such as influenza vaccinations and MedsCheck.

Pharmacists typically use multiple "sources of truth" when performing medicine reconciliation. In this test bed, participating community pharmacists reported that the MHR Discharge Summary was their third-most referenced source (with the patient and their medicines physically brought to the pharmacy being the first and second-most referenced sources).

Finally, hospital pharmacists reported a good understanding and clarity of the randomisation process and acknowledged the value of interventions like DCMedsRec in supporting community follow-up on medication-related problems not suitable for addressing in the acute hospital setting, such as existing chronic conditions. However, they also experienced difficulty in integrating patient recruitment into their daily workflow, with only 13% reporting that this was easily done.

Barriers identified

The evaluation also identified a number of general implementation and stakeholder-specific barriers.

Wider implementation barriers

- Poor consumer understanding of medicine risk and consumer perceptions of inadequate benefits for accessing medicine reconciliation services such as DCMedsRec, particularly in the face of 'information overload' during discharge.
- Hospital pharmacists found it difficult to integrate research activity (in this case patient recruitment) in their normal workflow, particularly in the limited time they had to discharge patients.

Hospital barriers (workflow)

- Some hospital pharmacists worked part-time or frequently rotated around clinical areas, and therefore had fewer opportunities to build clinical rapport with discharging patients, increasing the difficulty of recruitment.

Community pharmacy barriers

- It was difficult to recruit participants due to the study design requiring patients to provide consent by actively making contact and requesting the DCMedsRec service.
- Quality of hospital discharge summaries was a challenge as information layout and terminology were not user friendly.
- Community pharmacists expressed concerns that information in MHR is incomplete.
- As medicine reconciliation services take around 15-30 minutes, they require an appointment which is at odds with the current "walk-in" or "service on request" model typical of a community pharmacy.

Patient barriers

- Both community and hospital pharmacists identified lack of knowledge related to medicine risk as a barrier, with patients frequently providing the feedback that "[DCMedsRec] sounds like a good idea but I don't think I need it".
- Logistical factors impacted recruitment, including ease of pharmacy access (as only 25% of pharmacies in the catchment area participated in this test bed) and poor ongoing health post-discharge.

- The COVID-19 pandemic and public health messages to 'stay at home' severely disrupted patient recruitment.

Discussion

Learnings

Findings from this test bed demonstrate the feasibility of implementing post-discharge medicine reconciliation services like DCMedsRec in metropolitan community pharmacy settings. While patients, particularly those with complex medicine needs, do not tend to have a full understanding of medicine safety risks, community pharmacists are well-placed to deliver medicine safety interventions.

Recommendations

Recommendations for future related work were identified by the project team and include:

- Improve perceived benefits from attending the intervention by providing easily understandable information on medicine risk to consumers during hospitalisation instead of at discharge.
- Enable other healthcare professionals to undertake participant recruitment, such as nurses who could contact patients before admission or who could offer DCMedsRec referral as part of a discharge checklist. General Practitioners (GPs) or community pharmacists could also refer the patient once they are back in the community.
- Expand recruitment avenues to additional community options. This would increase the accessibility of the service, for example to homebound patients. There is precedence in the in-home medicine reconciliation service model and this could also be adapted for telehealth. It could also be expanded to include other healthcare professionals in the patient's care team, such as their GP.
- Explore avenues to allow integrating research activity into pharmacist workflow, such as additional funding or CPD points.

The project team also separately identified recommendations for the Agency related to MHR improvements.

Conclusion

Through this test bed, an intervention that uses MHR to support medicine reconciliation in a community pharmacy setting was developed and piloted. Positive feedback on the solution was received from all main stakeholders (patients, community pharmacists and hospital pharmacists), highlighting the benefits of undergoing a systematic process to generate a BPMH. In particular, community and hospital pharmacists noted that this intervention could "close the loop" as it offered community pharmacists access to discharge summaries and hospital pharmacists the ability to support long-term community care. A wider implementation of this intervention could potentially reduce medicine misadventure risks in the post-discharge process and support a service-focused rather than supply-focused approach to patient care.

IMPROVING THE ACCESSIBILITY AND ADOPTION OF DIGITAL HEALTH SERVICES

Prescribing personalised health information at hospital discharge in Indigenous communities

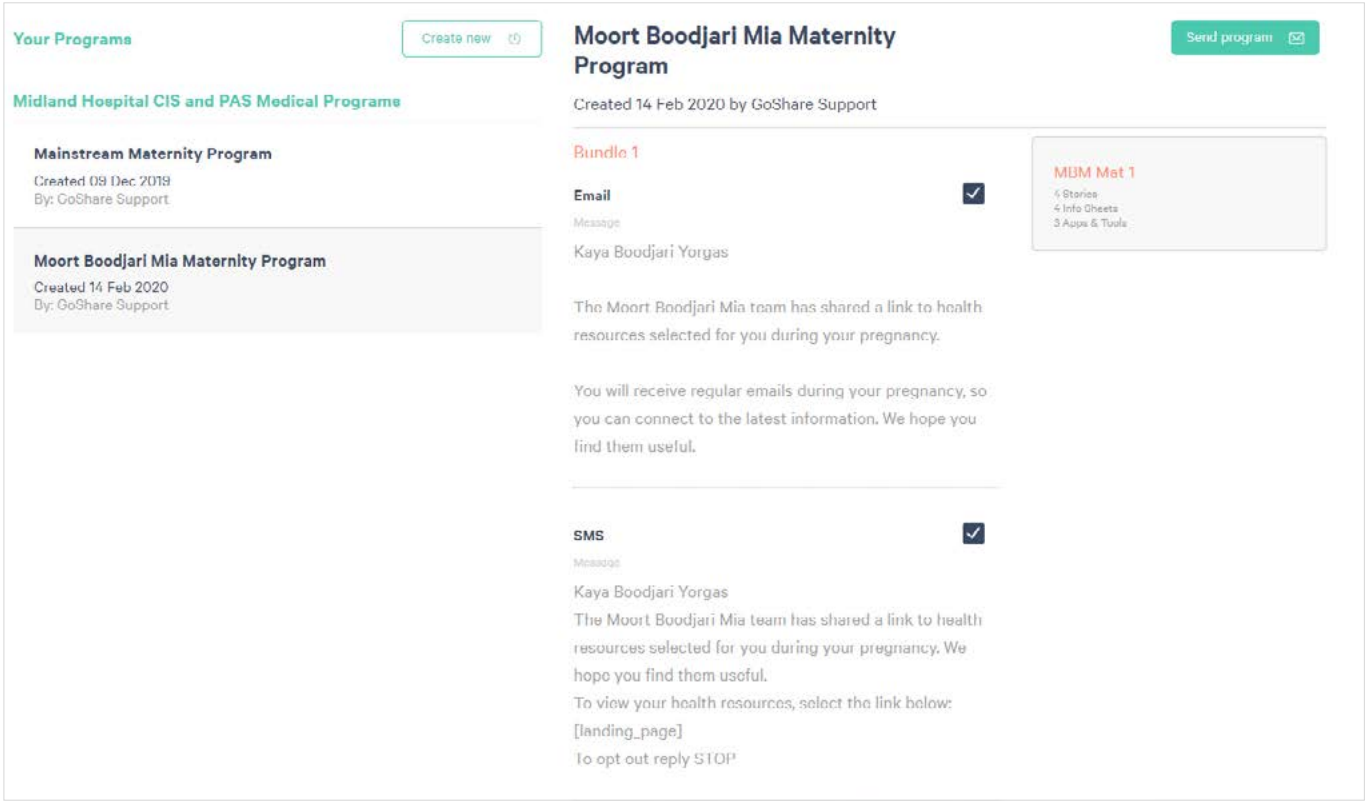
Introduction

Background

Compared with non-First Nations Australians, First Nations Australians experience a higher prevalence of chronic disease[32]. Research suggests that enhancing health literacy among these populations can help reduce health inequities as well as allow patients to take an active role in the management of their health and wellbeing[33-34]. Previous studies have shown significant associations between increased access to digital health information and a range of factors associated with health benefits, including improved health knowledge, more healthy lifestyle choices, increased medical compliance and improved communication between patient and healthcare professional (HCP)[35-37].

In this test bed, the Agency partnered with St John of God Health Care (SJGHC) and Healthily (specialists in patient education and behaviour change) to explore the value of digital information prescription to patients and HCPs at St John of God Midland Public Hospital (SJGMPH). This was done through the GoShare Healthcare platform (the Platform). The Platform is provided by Healthily and allows HCPs to send customised bundles of credible and evidence-based health resources to their patients via email and/or SMS (Figure 12). These information bundles can be prescribed based on a patient's medical needs and include tools, contents, programs and videos of patient stories, all tailored to a patient's literacy level. This test bed ran from June 2018 to December 2020.

Figure 12: Example GoShare configuration during the test bed



Aims

This test bed aimed to pilot the implementation of digital information prescription pathway through a digital patient education platform in a hospital setting.

Methods

Design

Four departments at SJGMPH were selected for the trial: the Emergency Department (ED), Mental Health Unit (Mental Health), Maternity Unit (Maternity) and Moort Boodjari Mia (MBM). MBM is a maternity service for Aboriginal and Torres Strait Islander peoples and their families. To prepare for implementation of the Platform, designated champions in each department facilitated solution preparation sessions that focused on how to use the Platform, selecting resources for the digital information bundles and developing processes to send and promote information bundles to patients. New resources for pregnancy, such as videos of MBM patient stories and scheduled packs based on weeks of pregnancy, were also developed in consultation with patients.

The COVID-19 pandemic delayed the start of bundle distribution in all departments. This started in Maternity in March 2020, MBM and Mental Health in April 2020 and in the ED in May 2020. Maternity and MBM patients were sent information bundles after outpatient appointments, while Mental Health Unit and ED patients were sent bundles on discharge.

Following the launch of the Platform, patients at the participating departments were asked if they would consent to receiving health information digitally. If they agreed, they were asked to provide their email address and/or phone number. Patients then received an email or SMS with a link to an electronic information booklet tailored for their health requirements. When the content was viewed, the Platform logged their activity as complete.

Platform data on HCP activity, including the number of digital information bundles distributed electronically from each department per month and title of the bundle, was collected. Data on patient activity was also collected, including number of digital bundles received by patients and the number of patients who 1) opened the email/SMS and 2) viewed the information bundle contents.

A survey to evaluate the Platform was also administered to HCPs from the participating departments. This survey assessed HCP perceptions of the Platform, its content and the Platform's impact on patients' self-management.

Participants

32 HCPs across the four departments (19 ED, two Mental Health, eight Maternity and three MBM), who had used the Platform to distribute digital information bundles, completed the evaluation survey.

Research ethics approval

This test bed was designed to be a quality improvement project which meant ethics approval was not sought.

Results

Platform data

Throughout the trial period from March 2020 to November 2020, the project distributed 33,604 information bundles electronically to patients, with the majority of the bundles sent from the Maternity Unit (26,424; 78.7%) and the fewest sent from the Mental Health Unit (925; 2.8%). Table 1 shows a breakdown of number of digital information bundles sent to, opened by and viewed by patients attending each department.

Table 1: Number of digital information bundles sent, opened and viewed, organised by department

Department	Sent	Opened (% of sent)	Viewed (% of sent)
Maternity Unit	26,446	13,175 (50%)	771 (3%)
Moort Boodjari Mia	2,858	1,260 (44%)	74 (3%)
Mental Health Unit	925	336 (36%)	15 (2%)
Emergency Department	3,375	1,539 (46%)	530 (16%)

Survey findings

Perception of the Platform

23 out of the 32 HCPs surveyed (72%) considered the Platform easy to use and navigate, and 20 HCPs (63%) agreed that digital information bundles were easy to find and send, and that the GoShare platform was effectively integrated with hospital systems. 26 HCPs (81%) also indicated that their department encouraged the use of this Platform. However, 8 HCPs (25%) did not think they received appropriate training to use the Platform.

Perception of bundle content

Most of the HCPs surveyed considered the bundle content to be useful and of value to their patient's healthcare education. 26 HCPs (81%) agreed the reading material was written in plain language and felt it would be easily understood by patients, and 22 HCPs (69%) felt the information sheets would enhance patient interest in the relevant topics and that overall the content on the Platform was accurate and would result in effective patient engagement.

Perception of patients' journey and self-management of their conditions

As above, a majority of HCPs surveyed agreed that the Platform could lead to positive patient outcomes, including their self-management skills (n=21; 66%), accessibility to educational resources (n=27; 84%), improved communication (n=22; 69%) and compliance with care plans and shared goals (n=20; 63%). 22 out of 32 (69%) HCPs also agreed that the Platform increased their patients' capacity to learn new information due to the various formats available, and notably, none disagreed with this statement.

Discussion

Learnings

Overall, this test bed provides preliminary evidence supporting the digital prescription of information packs within a variety of hospital and post-discharge settings, including a maternity service for Aboriginal and Torres Strait Islander peoples and their families. HCPs surveyed in this test bed considered the bundle content delivered by the Platform to be appropriate for their patients' literacy levels and felt that the information would contribute to increased patient engagement. However, some felt they did not receive sufficient training on the use of the Platform. More regular training, online user support and promotion of Platform use could potentially have benefited HCP confidence in using the Platform.

Test bed results also suggest that compared to those of other participating departments, ED patients are more likely to view digital information bundles. This could be due to the unpredictable and often stressful nature of ED admissions and the convenience of receiving information digitally (as opposed to easily misplaced paper leaflets) and in multiple formats. However, further research is required to investigate any differences between departments, as well as consumer perceptions of the Platform, the appropriateness of its content and how it could impact their health knowledge and self-management.

Like with many other projects in 2020, this test bed was significantly disrupted by the COVID-19 pandemic, which led not only to Platform launch delays but also to a low number of non-maternity hospital presentations and admissions. The results of this test bed should be contextualised accordingly. Despite the challenges this test bed faced, however, several future use cases for digital information prescription within a hospital setting have been identified, including postsurgical care (e.g. orthopaedic exercise education following surgery) and chronic disease management.

Recommendations

Recommendations for future related work were identified by the project team and include:

- When devising initiatives requiring staff training, schedule in regular training sessions and consider use of online user support/reference content, to account for turnover.
- Conduct more controlled and larger scale evaluations of digital information prescription technology for healthcare and its potential impact on HCPs and consumers.
- Explore potential applications of digital information prescription technology for managing health conditions.

Conclusion

This test bed integrated a digital information prescription platform with SJGMPH systems and piloted digital information distribution in four hospital departments. Promising results from a HCP point of view were achieved. Further research is required to identify the most effective ways to tailor and distribute digital information bundles, and to identify any potential benefits for health consumers.

IMPROVING THE ACCESSIBILITY AND ADOPTION OF DIGITAL HEALTH SERVICES

Connecting chronically ill patients to their digital health ecosystem through a mobile app

Introduction

Background

Nearly 1 in 2 (47%) of all Australians[38] have at least one chronic health condition. There is an established evidence base for the positive impact of patient-centred, integrated care on outcomes for people living with chronic and complex conditions[39-41].

The Primary Health Care Advisory Group Final Report[42] proposed an integrated cycle of care in which patients, families and their carers are partners in their own care. In this model, patients are activated to maximise their knowledge, skills and confidence to manage their own health, aided by digital technologies and with the support of a healthcare team. While there are many stand-alone patient apps aimed at encouraging patients to take more control of their own health, there has been little investigation of digital technologies that connect patients to their care team and engage them in the full cycle of patient-centred team care.

In this test bed, the Agency partnered with Precedence Health Care (who develop digital health solutions for integrated care) and partners (including WA Primary Health Alliance, Perth North Perth South and Country WA Primary Health Networks, Adelaide Primary Health Network, IPN Medical Centres and Movember Foundation Australia) to enable a patient to engage in all elements of their care through an innovative mobile app and patient portal (MediTracker). This test bed ran from June 2018 to March 2021.

Aims

This test bed aimed to:

1. Use the MediTracker portal and mobile app linked to the Inca Integrated Care Platform (a coordinated care platform) to connect 10,000 patients with their primary GP and their selected care team as well as their My Health Record (MHR).
2. Share the patient health record, including up-to-date GP clinical data, care team information, self-monitored patient data, care plans and the information in a patient's MHR with the patient and their care team.
3. Use the Inca coordinated care platform to enable the patient to engage fully in the end-to-end cycle of patient care.

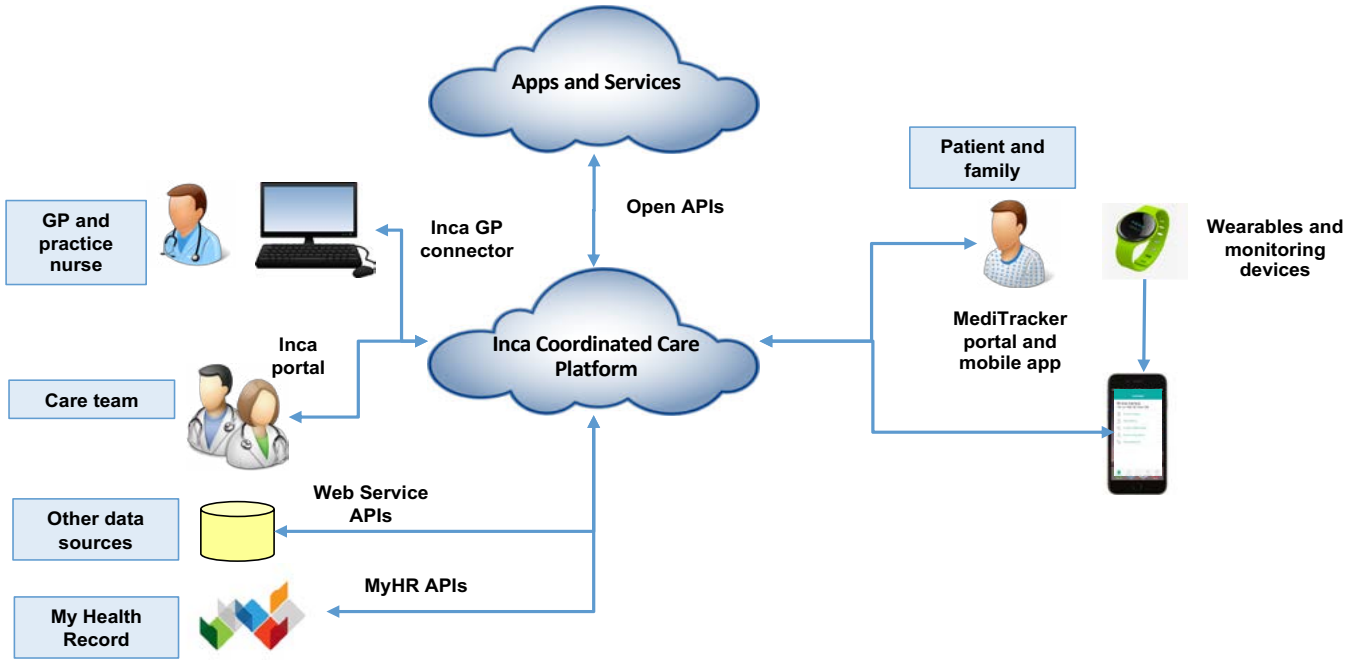
Methods

Design

The project used the Inca coordinated care platform, which supports all key elements of chronic disease management and was already widely used across Australia by healthcare professionals. As shown in Figure 13, MediTracker is a mobile app and web portal linked to Inca which:

- Connects the patient's current GP clinical record held at their GP's practice.
- Enables a patient to select and connect to a dedicated team of care providers and to share their health record with this care team.
- Links to Apple Health and Google Fit and the vast array of monitoring devices and wearables, to share this information with the patient and their care team.

Figure 13: The Inca Coordinated Care Platform and its wider ecosystem (including MediTracker)



- Connects to the patient's MHR, providing other information such as hospital discharge summaries.

The project engaged with GPs, other healthcare providers, and patients who were already using Inca in chronic disease programs and integrated care initiatives, including Health Care Homes, to participate in the trial and recruit patients. Use of the system was then monitored over time and key indicators tracked.

Collaborative design improvements were made to the MediTracker portal and mobile app to improve its functionality as part of the trial and it was provided free to all participants.

Participants

Six Primary Health Networks participated in the trial: Tasmania, Murray, Adelaide, Perth North, Perth South and the ACT. Sonic Clinical Services (IPN Medical Centres) were used. The project aimed to recruit over 10,000 chronically ill patients and over 150 GP practices.

Research ethics approval

Received from the University of Melbourne Ethics Committee.

Results

As of 27 November 2020, across Australia there were 13,450 patients with MediTracker, 332 practices connected to MediTracker and 796 GPs connected with a MediTracker patient. These numbers exceeded the aims of the trial.

Encouragement by a GP at the practice to download the app was much more successful than direct patient promotion or recruitment via SMS, possibly due to a wariness of unsolicited texts. SMS blasts to patients to encourage them to participate in engagement assessments were also ineffective (25 completed assessments from 8,803 SMS sent).

The number of patients with the MediTracker app more than doubled during the trial, with those on managed care increasing proportionally, substantially increasing access to their medications when needed. The number of practices who enabled the MediTracker app remained static over the trial.

The numbers of patients with the MediTracker app who were on managed care gradually increased over the 2.4 years, almost tripling for those with a care plan (GP Management Plan) and although the number of patients with a review in the prior six months did not match that of those with a care plan, it also increased over the trial.

The number of patients looking at their data 'recently' (in the last six months) did not increase over the trial.

At the time of the trial, use of linked mobile devices for measures such as oxygen saturation and blood pressure was still the domain of early adopters, resulting in limited data.

The availability of pathology and other information to the care team that was originally recorded in the patient's GP system was only accessed by small numbers of providers and even reduced over the trial.

The number of patients consenting to share their MHR with their care team increased over the trial and the number of times the MHR was accessed also increased.

Discussion

Learnings

This test bed digitally connected patients to their care team via the MediTracker app and the Inca coordinated care platform, which supported greater engagement of patients in managing their own care. It also increased collaboration between the patient and their care team, and increased use of digital health technologies by patients and their care team.

The trial has therefore demonstrated that consumers in primary care will use digital technologies to access their patient record data and GPs will facilitate this access. However, further research is needed into what impact this may have on their overall health outcomes and healthcare costs.

A number of major issues were experienced during the trial:

- The move to the national opt-out consent program for MHR sensitised the population to digital health technologies and led to them being 'digitally fatigued'. The capacity of GP practices to engage in the trial was also reduced as they needed to roll out MHR, and resulted in the trial start being delayed until February 2019.
- The MHR mobile gateway paused taking on new entrants in August 2018 and reopened in early 2020, impacting MHR integration.
- The COVID-19 pandemic impacted patient use of primary care services in the final year of the trial and provider engagement in the trial was substantially reduced.

Recommendations

Recommendations for future related work were identified by the project team and include:

- Greater consideration needed on how to track patient health outcomes over time.
- Use GPs and other trusted sources to encourage use of new digital technologies.
- Ensure sufficient time is allocated to the ethics approval process – for this project it took seven months.
- Recognise that the value of apps like MediTracker requires getting to a critical mass of users (both consumers and providers) who are regularly adding information to this system, and that this will take time.

Conclusion

This test bed achieved a substantial uptake of the patient app and provides an encouraging demonstration of the demand for a patient having easier access to their health record and improving guidance and information for people with chronic conditions.

Post-trial, the MediTracker app continues to be used and Precedence aims to re-establish the connection between it and the MHR.

IMPLEMENTING AGENCY INITIATIVES WITHIN LESS DIGITAL MATURE SETTINGS

Maintaining continuity of care for prisoners released from incarceration

Introduction

Background

The Australian prison population experience poorer health than the general population and are more likely to come from disadvantaged populations[43]. Across Australia, almost one in four (24%) of prisoners are diagnosed with a health condition while in prison and over half (54%) report that their health improved while in prison[44].

Effective discharge planning is vital for continuity of care. This involves providing clear referral pathways for prisoners, including finding a general practitioner, links to alcohol and drug treatment if required, and to other community and hospital-based services on an as-needs basis[45]. This assists them in building on and maintaining any health gains they made in prison, as well as helping to prevent relapse or deterioration of mental and physical health conditions.

Currently, Queensland prisoners may be provided with a paper-based health discharge summary. These are easily lost as prisoners may be moving long distances to return to their families or place of residence. There are formal discharge processes, but these may not include ongoing healthcare plans.

In this test bed, the Agency partnered with the Darling Downs and West Moreton Primary Heath Network (DDWMPHN), Metro North Health, Woodford Correctional Centre Health Services and the School of Public Health at the University of Queensland to improve continuity of healthcare for prisoners in relation to their transitions between correctional settings and upon release. This test bed ran from June 2018 to March 2020.

Aims

This test bed initially aimed to pilot health discharge planning and uploading of real-time patient health information to My Health Record (MHR) within a Queensland correctional centre. The patient health information, such as medical tests, treatment plans and medication regimes, would be added to prisoners' MHRs during their incarceration.

However due to identified administrative and interoperability requirements and changes to test bed settings, its scope was revised to identifying barriers and enablers to implementing MHR in the Queensland justice system.

Methods

Design

The original project design would initiate and embed the use of MHR in one Queensland correctional centre and evaluate its use. A nurse would be recruited to the correctional centre health services to lead implementation. They would be provided with:

- training tools and resources to assist prisoners in accessing their MHR.
- policy, guidelines, training tools and resources to assist prison healthcare staff to upload prisoners' health information into the MHR. Information included general health, dental, sexual health, pathology and prescriptions.

The evaluation was to be conducted over a 12-month period by the School of Public Health, University of Queensland. It would use quantitative data (such as number and proportion of discharged prisoners with a discharge plan and comprehensive health information and discharge summary uploaded to MHR) and qualitative data (such as interviews with prisoners and local GPs).

However, following promising initial negotiations with correctional centres, a large number of issues arose in terms of administrative and logistical impediments that ultimately meant the project could not proceed with implementing the use of MHR in a prison setting. The project was rescoped to focus on identifying barriers and enablers to project implementation through interviewing key stakeholders.

Participants

The original participants were prisoners and healthcare staff at the selected correctional centre.

With the change in project scope, five prison healthcare staff members were interviewed. Further interviews could not go ahead due to the COVID-19 pandemic.

Research ethics approval

Received from the University of Queensland Human Research Ethics Committee.

Results

Healthcare providers in prisons are generally supportive of electronic health records and MHR being used to facilitate continuity of care and better health outcomes for prisoners.

The project confirmed that there is a real gap in providing continuity of healthcare to prisoners when they are discharged and that MHR could be a potential solution. Certain issues and barriers were identified that would have to be overcome before full implementation is possible, including:

1. Further policy discussions are required to align all stakeholders with appropriate policy, privacy and risk assessments that take account of the unique privacy and safety considerations of this cohort.
2. A lack of electronic medical record systems meant correctional centres were unable to produce electronic discharge summaries and upload other information to the MHR. This was compounded by poor IT systems and lack of secure internet access for staff in prisons.
3. Some prisoners do not have a Medicare card and many prisoners go by different names, making it difficult to match records by usual identifiers (such as the Individual Healthcare Identifier). During this test bed, Services Australia solved this issue by agreeing to provide each prisoner with a Medicare number that does not entitle them to Medicare-funded services.
4. Prisoner discharge can happen at short notice and may not include up-to-date healthcare information. There may not be time to undertake formal discharge planning and have a health discharge summary prepared.
5. A Healthcare Provider Identifier – Organisation (HPI-O) is required for each organisation wanting to adopt MHR. If a prison's HPI-O is identifiable as a prison, former prisoners may experience stigma and discrimination when accessing mainstream healthcare services.
6. Prisoners face digital literacy barriers and may not be comfortable with digital health technologies[46].

Discussion

Learnings

The project was unable to achieve its original aims due to the various policy and interoperability issues encountered in introducing an electronic health record.

Whilst the project was unable to pilot the use of MHR to a sample prisoner population, it has identified the key enablers and barriers to any future implementation.

Recommendations

Recommendations for future related work were also identified by the project team and include:

- Actively scope out existing jurisdictional policies relating to prisoner health data being added to MHR and the feasibility of making any changes to these to support MHR use.
- Review the feasibility of any changes required in MHR to support deidentifying prison locations and healthcare practitioners when a prisoner's health information is uploaded.

If the above results in MHR remaining a potential solution for the prisoner population, for any future projects:

- Map out the requirements for approvals and any policy/legislative changes required to proceed with a similar innovation project.
- Identify and map out pathways for visiting healthcare professionals to input information into prisoners' MHR (or similar electronic health record).
- Ensure a change champion is identified in each of the participating stakeholder organisations.
- Engage with prisoner support organisations early on to ensure prisoners' views are represented and to help advocate for the project.
- Ensure long timeframes for negotiation and a suitable budget have been allocated in the project plan, due to the sector's complexity.

Conclusion

The need to improve continuity of healthcare for prisoners in Queensland remains. More research is necessary to explore if MHR or similar technologies is the best way of achieving this. While this test bed identified the key enablers and barriers to implementing My Health Record within the Queensland justice system, these findings are also applicable to other healthcare settings that are primarily paper-based and have low uptake of electronic health record systems, such as aged care, allied health and specialists.

IMPLEMENTING AGENCY INITIATIVES WITHIN LESS DIGITAL MATURE SETTINGS

Promoting My Health Record and secure messaging in the aged care sector

Introduction

Background

By 2035, current projections indicate that the number of people aged over 65 will have almost doubled to six million. With the associated increasing prevalence of chronic diseases and disabilities, Residential Aged Care Facilities (RACFs) will have to care for more complex health conditions, increasing the demand for quality and better integrated healthcare services in aged care facilities. Secure exchange of health information is a core foundation to better supporting this. For example, the GRACEMED study identified that less than 10% of residents' medication charts matched the records of their treating GP and suggested that improving the use of digital systems to support patient handover could improve patient safety[47].

In this test bed, the Agency partnered with the Sydney North Health Network (SNHN) to trial and evaluate new approaches to accelerate the use of My Health Record (MHR) and Secure Message Delivery (SMD) to connect Residential Aged Care Facilities (RACFs) with general practice, pharmacy and acute care providers. This test bed ran from June 2018 to June 2021.

Aims

This test bed aimed to:

1. Understand how RACFs engage with and use digital health technologies, to guide future work in scaling up the use of digital health in aged care settings.
2. Support RACFs in the region to connect to and use MHR and SMD.
3. Develop an online toolkit to support RACFs with connecting and using MHR.

Methods

Design

The aims of the test bed were to be achieved through a structured change management effort by SNHN, comprising communications, education workshops, online training, on-site visits and local RACF champions. Additionally, an online toolkit was developed which stepped through the MHR connection process in more detail. Once the facility was set up and using the MHR and SMD, clinicians who worked with the facility were invited to participate. Residents and their families were also engaged in trial sites. The project team continued to provide support to help embed use of the systems over time.

SNHN commissioned the Centre for Health Systems and Safety Research at Macquarie University to evaluate the test bed. A multi-method baseline evaluation consisting of semi-structured interviews and surveys was conducted with the RACFs recruited to the project. The survey was also distributed to Directors of Nursing and GPs within the health network. The evaluation focused on getting connected to MHR and SMD, including feedback on resources provided by the SNHN team to do so, use of MHR and SMD and benefits of their use, and impacts of COVID-19 on health technology use.

Participants

SNHN recruited 12 RACFs to the project. Existing relationships with RACFs resulted in the first four facilities joining the project, with the others joining from an open expression of interest email to all the RACFs within the region, followed up with phone and email communications.

For the evaluation of this test bed conducted by Macquarie University, 11 respondents completed the initial baseline survey and 19 the follow-up survey, with two respondents completing both baseline and follow-up surveys. Three qualitative interviews were also held.

Research ethics approval

Received from the Macquarie University Faculty of Medicine and Health Sciences Low-risk Human Research Ethics Subcommittee.

Results

Of the 12 facilities who participated in the project, five ended up connected to MHR and four completed their training. However, only one was an active MHR user by the end of the project (defined as greater than five views/transactions since connection). No RACF in the project could connect to MHR without regular face-to-face and online meetings to guide them through each step of the process. Non-conformance of clinical software was a huge issue, with the most common software in use at the RACFs not being conformant with the MHR until March 2021.

Only two RACFs asked for support with secure messaging, with the majority of RACFs advising they were not interested in SMD as it was too difficult to incorporate into their workflow and they could not justify the cost.

Based on the results of the evaluation surveys and interviews, none of the facilities who participated in the post-pilot interviews were currently using SMD. Two of the three aged care facilities interviewed had experience using MHR. One facility had been using MHR for 10 days at the time of the interview. The other facility was not currently using MHR, but had previously used MHR for one month, before ceasing to do so. In both the interviews and survey, RACF staff generally reported positive attitudes towards MHR use in the future. These positive views were largely due to having ready access to resident information from external healthcare providers within the one portal. Direct and tailored support from a Primary Health Network (PHN) representative, an in-house staff 'champion' of MHR adoption, and ongoing external advice and training were seen as critical to successful ongoing use of MHR. Barriers to implement and use MHR were mostly technical difficulties experienced and a perceived redundancy of the MHR system given that RACF staff had other established means to source resident clinical information.

Discussion

Learnings

Despite a large amount of training, education and support being provided to participating RACFs to enable them to access and use the MHR, only one was using it by the end of the project. Although other facilities are connected, it is not yet part of their workflow to access MHR.

Issues faced with connecting to the MHR included setting up Provider Registration Online Digital Access (PRODA) accounts, identifying the Responsible Officer and loading the relevant digital certificates. Many RACFs have outsourced their IT and such installation requires complex technical support. Those with inhouse IT support managed the connection process far more effectively. There was also confusion with the IT providers as to whether NASH certificates were required for each 'network' organisation that sits underneath a 'seed' registration. Several participating RACFs got stuck on this issue and were unable to proceed further.

No traction was gained in SMD, with only two RACFs seeking support in this area and none reporting that they were using it by the end of the project. Some RACFs have registered for the free HealthLink Secure Messaging Portal. However, most prefer to continue to use fax and email, despite recognising they are not secure.

Recommendations

Recommendations for future related work were identified by the project team and include:

- Develop education packages for MHR for use by RACF staff.
- Ensure MHR is integrated into aged care clinical information systems.
- Maintain ongoing support for RACFs while they get connected to and during use of MHR and SMD, including streamlining the technical support assistance lines that RACFs can call for assistance.

- Encourage external healthcare providers connected to RACFs to use the MHR, such as GPs, hospitals, pharmacists and allied health.
- Create greater awareness of the benefits of using SMD for RACF staff.

It is noted that many of these recommendations align with the ones in the recent Royal Commission into Aged Care Quality and Safety.

The project team also separately identified recommendations for the Agency related to improving the MHR registration process. These were relayed to the responsible teams at the time, and it is now possible to register for MHR with a fully online process. The Agency will also establish a dedicated RACF support hotline to facilitate the MHR registration process for RACFs.

Conclusion

This test bed recruited 12 RACF organisations and identified numerous barriers and enablers to acceleration of adoption of digital health technology within RACFs. This was supported by an evaluation of the project undertaken by the Centre for Health Systems and Safety Research at Macquarie University.

The learnings, insights and resources developed will help inform future aged care sector programs of work stimulating digital awareness and adoption, MHR and SMD adoption within RACFs, and including implementation of the digital technology recommendations arising from the Royal Commission into Aged Care Quality and Safety. An Aged Care Transfer Summary is also being developed to assist external healthcare providers connected to RACFs in transfer-of-care situations where the RACF resident is being transferred to hospital care. This project has highlighted the amount of technical and change management support that is required to assist RACFs when first registering with and using MHR. It has also highlighted that a better business case for SMD is required before RACFs will be willing to adopt it.

IMPLEMENTING AGENCY INITIATIVES WITHIN LESS DIGITAL MATURE SETTINGS

Promoting My Health Record and secure messaging among private specialists

Introduction

Background

The Sydney North Health Network (SNHN) is home to several large private hospitals who are interested in further adopting digital technology, including improving the speed and precision of data transmitted between patients and doctors and between healthcare professionals. However, contractual relationships with individual private specialists makes wide-spread change and adoption challenging.

In this test bed, the Agency partnered with SNHN to trial and evaluate new approaches to increasing the use of My Health Record (MHR) and Secure Message Delivery (SMD) among private medical specialists. This would be achieved through a structured change management effort by SNHN, comprising communications, education workshops, online training and on-site visits. This test bed ran from June 2018 to June 2021.

Aims

This test bed aimed to:

1. Understand how private specialists engage with and use digital health technologies.
2. Support private specialists in the region to connect to and use MHR and SMD and embed this as part of their workflow.
3. Develop an online toolkit to support existing and future participants with connecting to MHR.

Methods

Design

SNHN recruited private specialists to the project who were then trained up in how to use MHR and SMD via face-to-face and online training. Practice staff were included where relevant. Additionally, an online toolkit was developed which stepped through the MHR connection process in more detail.

Once set up and using the MHR and SMD, the specialist would invite two to three members of their own clinical network to also participate so they could see the systems integration working firsthand. The project team continued to provide support to help embed use of the systems over time.

SNHN also commissioned the Centre for Health Systems and Safety Research at Macquarie University to evaluate the test bed. A multi-method baseline evaluation consisting of semi-structured interviews and surveys was conducted following the pilot implementation phase. The evaluation focused on getting connected to MHR and secure messaging, use of MHR and secure messaging, and impacts of COVID-19 on health technology use by private specialists recruited to the project by the SNHN team.

Participants

34 medical specialists and four private hospitals participated in the project. Recruitment was through a combination of existing SNHN Network relationships, contacting specialists in existing databases and referral through specialists already engaged in the project.

For the evaluation report, 21 respondents completed the initial survey and 23 the follow-up survey, with five respondents completing both baseline and follow-up surveys. Six qualitative interviews were also held. The SNHN test bed project team were responsible for distribution of the survey to specialists involved in the pilot phase of the project. The survey was also distributed to specialists from within the health network via the mailing list of those who have attended events hosted by SNHN.

Research ethics approval

Received from the Macquarie University Faculty of Medicine and Health Sciences Low-risk Human Research Ethics Subcommittee and the Adventist HealthCare Limited Human Research Ethics Committee.

Results

Of the 34 specialists who participated in the project, 18 ended up connected to MHR and 16 completed their training. However, only five became active MHR users (defined as greater than five views/transactions since connection). A key issue was the MHR connection process, with only two specialists able to complete this without assistance from the SNHN. Non-conformance and partial conformance (lack of functionality) of clinical software was found to be the single most significant barrier to specialist engagement with MHR, with nearly 30% of participants still having non-conformant software at project finish.

32 out of 34 specialists had secure messaging installed by the end of the project. Healthlink was the most used secure messaging provider with 28 (82%) of the practices installing it, followed by Argus with 20 (59%), then Medical Objects 7 (21%). Half the practices installed more than one provider, and two chose not to install any.

Based on the results of the evaluation surveys and interviews, use of MHR and SMD was seen to be useful for most specialists in sending and receiving of patient clinical information between various healthcare providers. At the start of the project, interviewed specialists were already using SMD and continued to so do. Regarding MHR, several barriers to getting connected to and using MHR were identified by specialists, such as non-conformant software, non-use by other healthcare providers and the current lack of information within a patient's MHR. The follow-up survey showed that most staff currently use SMD; however, their intention to use SMD in the future had declined. Furthermore, IT systems were reported to be more conformant with MHR, with available support for specialists at follow-up.

There was an increase in MHR use by staff in their practice, although this use was reported as less than once a month. At follow-up, staff used MHR to mostly view information; however, 40% did not believe that it saved them time.

Discussion

Learnings

Despite a large amount of training, education and support being provided to specialists to enable them to access and use the MHR, only a small percent were actively using it as part of their workflow by the end of the project. Many participants experienced issues with the MHR registration process, relating to creating and using a Provider Registration Online Digital Access (PRODA) account and PKI digital certificates. Where registration was successful, the clinical software itself was often not conformant with MHR, with only one additional vendor becoming conformant during the project timeline and many who stated they were conformant not being fully so (e.g. unable to send specialist letters). These issues led to some participants dropping out or no longer engaging with the project, whilst others turned to using the National Provider Portal (NPP) instead as the standard connection process was too complex.

Many specialists reported that they only see the value of accessing MHR if their administration staff can also access it, as this follows their workflow. They also reported too many troubleshooting contact numbers – for example, depending on the issue you may need to call the helpline of MHR, Health Professional Online Service (HPOS), PRODA or eBusiness Service.

The rollout of SMD was more successful. However, it is difficult for specialists to know which SMD platform to use as they don't know which SMD software their network recipients are using or what their own clinical system is conformant with (e.g. Argus, Healthlink or Medical Objects). This makes services such as eFax currently more user friendly than SMD.

Recommendations

Recommendations for future related work were identified by the project team and include:

- Review with software vendors if practice administration staff can be allowed to access MHR as well as clinical staff.
- Adopt a contracted service provider (CSP) model, where vendors co-manage the installation and maintenance of digital certificates.
- Streamline the support numbers that practices can call to help get connected to the MHR.
- Primary Health Networks to further support practices (including practice administrative staff) in signing up to and using SMD. This includes providing education and training on what SMD is and its benefits, visiting practices to provide training, troubleshooting (including support with managing various address books) and branding, so that practices are advertising their secure message delivery address (EDI) to other providers.
- Developing an address book to indicate which SMD platform a healthcare provider is using.

The project team also separately identified recommendations for the Agency related to improving the MHR registration process. These were relayed to the responsible teams at the time, and it is now possible to register for MHR with a fully online process.

Conclusion

The project successfully recruited 34 specialists and identified numerous barriers and enablers to acceleration of adoption of digital health technology within the private system. This was supported by an evaluation of the project undertaken by the Centre for Health Systems and Safety Research at Macquarie University.

The learnings, insights and resources developed can help inform future MHR and SMD adoption within private specialist practice. In particular, the project has highlighted the importance of technical and change management support being available to practices to assist them when first registering with and using the systems.

Conclusion and next steps

This section looks at:

What did the Digital Health Test Beds achieve?

What did we learn from the Digital Health Test Beds?

- End user acceptability of digital health solutions
- Clinician value proposition
- Large-scale interoperability and governance challenges

Moving forward: The Agency's new approach to innovation

- Digital technology is an enabler, not the solution
- New models of research required

What did the Digital Health Test Beds achieve?

The Digital Health Test Beds program was an ambitious program that aimed to pilot new digitally enabled models of care through partnerships between industry, government and healthcare provider organisations.

The technical test beds struck a balance between developing and piloting new and emerging technical solutions (e.g. for collecting patient-reported experience measures, page 25) and enhancing digital health solutions used by healthcare professionals today (e.g. improvements to the POLAR System, pages 16 and 36).

Of note are the initiatives that successfully designed and implemented solutions for the use of health information for research and public health purposes. For example, the Western Sydney Diabetes dashboards (page 31) have continued to be used by Western Sydney Diabetes and the Western Sydney Local Health District since the test bed closed in late 2019. These uses range from managing public healthcare allocations, supporting the provision of remote healthcare, identification of at-risk populations and tailored delivery of diabetes education to both healthcare professionals and consumers. The re-use of aggregated and de-identified health information in these ways demonstrates the exciting possibilities of how near real-time data can inform a public health response, even in high-uncertainty situations such as a pandemic.

Some technical test beds also progressed to evaluating the feasibility of using the solutions they developed in real-world environments and generated findings that are applicable both locally (within their specific context) and for digital health initiatives more generally. For example, the Princess Alexandra Hospital test bed (page 25) trialled the eAPP module for the collection of patient-reported experience measures and successfully refined the pathway through which it could be used in a cancer care environment.

Through this exercise, the test bed project team also established internal partnerships and set a precedence for the further collection of patient-reported measures, such as patient-reported outcome measures, within the hospital.

Of course, not all digital health solutions can be designed and developed from the ground up to align with the specific requirements of the setting (clinical or otherwise) they are deployed in. That is why the implementation test beds focused on embedding existing solutions into healthcare environments with minimal customisation (beyond what was already available) of the digital health technologies involved, and on identifying barriers and enablers to this approach.

Two of the implementation test beds that both focused on medicine reconciliation generated promising evidence for the usefulness of integrating digital health solutions into this process at hospital admission (page 42) and in the community after discharge from hospital (page 47). Together, they represent a closing of the loop when it comes to the electronic transfer and *use* of information critical for improving patient outcomes (in this case related to medicine safety). More generally, these test beds also demonstrate the feasibility of integrating electronic medical records into other clinical tasks that benefit from increased access to additional information sources, such as emergency triage.

There is no inherent value in clinical information until it reaches the people it is intended for and meaningfully influences clinical decision-making. The work the implementation test beds did in developing and evaluating pathways for the clinical use of this information is therefore a crucial step in the digital health research cycle. While some were deployed in complex and less digitally mature environments, and could not reach implementation as a result, all produced insights valuable for future digital health implementations at scale.

What did we learn from the Digital Health Test Beds?

Each test bed report contains a summary of individual learnings within the context of the test bed. Major overall learnings from the program are summarised here.

End user acceptability of digital health solutions

The Digital Health Test Beds program established that generally, consumers and healthcare professionals are positive about adopting digital health solutions. Several of the implementation test bed demonstrated that trusted healthcare professionals play an important role in encouraging their patients to participate in test beds and take up digital health technologies. The Digital Health Test Beds also found that while consumers are generally supportive of their healthcare professionals having access to their health information, they were still concerned about the privacy of this information.

Multiple test beds that focused mainly on older consumers also found a lack of digital literacy to be a challenge. Some test beds also experienced complexities in training healthcare professionals to access and use digital health solutions, particularly those in less digitally mature environments or those who work multiple locations in a week (such as hospital pharmacists). A majority of the implementation test beds found that having a person within implementation sites to push the test bed forward was useful. Ideally, this person would perform a joint "change champion" (continually advocating for the project to the multiple stakeholders involved) and "digital navigator" (helping stakeholders and participants with how to use the digital health solutions being trialled) role. This finding is consistent with current digital health research suggesting that placing a digital navigator as a new team member within health services can help overcome barriers to adoption and meaningful use[48]. The Agency is continually reinforcing this concept in clinician education and communication initiatives.

Clinician value proposition

The Digital Health Test Beds established that for digital health solutions to be successfully adopted in complex environments such as healthcare services there needs to be a clear value proposition. This is especially the case for digitally immature settings where a lack of digital infrastructure (or fragmented digital infrastructure) can coalesce with financial, policy and governance barriers to create a culture of resistance.

However, the Digital Health Test Beds also demonstrated that integrating digital health solutions into clinical workflows is possible, particularly in contexts where having access to multiple sources of information is valuable (such as transitions of care). The test beds that were most successful in doing this were embedded within the healthcare settings where the digital health solution was deployed. They also designed their digital health solutions (including workflows) to minimise negative impacts on clinical workflow.

Multiple implementation test beds experienced challenges related to the "network effect" – namely, that the utility of digital health solutions can only be fully realised once a critical mass of users (consumers and healthcare professionals) adopt them. Promoting widespread adoption across a variety of healthcare providers (e.g. allied health, specialists, hospitals) should therefore be a priority for future digital health initiatives.

Large-scale interoperability and governance challenges

The test beds underscored the issue that continues to face digital health solution implementation and that is that large-scale challenges are still unsolved and are inhibiting the implementation of digital health solutions at scale. For example, the Digital Health Test Beds project teams faced challenges relating to a lack of standardisation in the names and fields required for medication, pathology tests and advance care directives. Interoperability issues also complicated integrations between healthcare service, state and nation for multiple test beds.

A large amount of resources allocated to technical test beds were spent on developing solutions to these issues.

More broadly, the Digital Health Test Beds identified a lack of clear guidance related to key digital health functionalities such as the automated transfer of data and how this would interact with clinical governance. While participating healthcare professionals broadly recognised the value of 'real time' or near-real time patient data and analytics, some were cautious that being aware of a patient's deterioration yet being unable to act upon it (for example if it occurred outside working hours or in a geographically remote area) could lead them to be in breach of duty of care. Although the Australian digital health landscape has progressed significantly since 2018, more work remains to be done to increase its medicolegal maturity. There is also potential in exploring policy levers to promote digital health practices.

Moving forward: The Agency's new approach to innovation

Digital technology is an enabler, not the solution

The largest insight from the learnings and achievements of the Digital Health Test Beds program is that digital technologies in isolation cannot solve the problems and pressures of the health system. Rather, digital technologies enable and facilitate new models of care to be established — for example making the remote monitoring of diabetes within Western Sydney possible so as to inform clinical resource allocation, or providing additional sources of information to which trained pharmacists can refer during medicine reconciliation.

In other words, digital technologies are best viewed as components of wider digital health solutions. These solutions target barriers to digital health adoption and use in a more holistic manner and will require changes to traditional care pathways, a health service's workflows and clinical governance protocols, and health system standards.

Such solutions cannot be developed without in-depth consultation with end users (consumers, healthcare professionals and health service providers). Using co-design methodologies to design digital health *solutions* with end users could change digital health perceptions and readiness, create ownership of these solutions among these groups and contribute to the change in attitudes required for sustaining these solutions into the future.

New models of research required

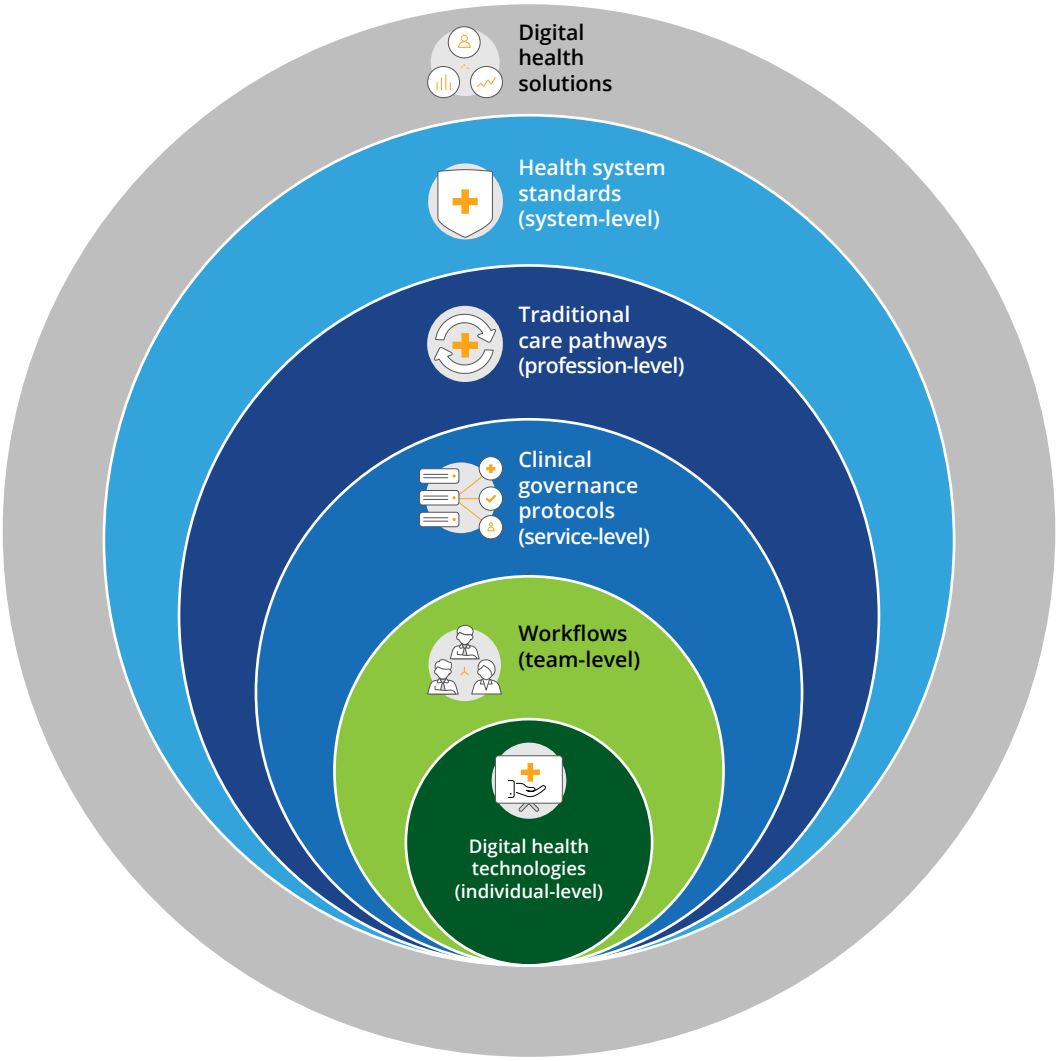
There is growing academic consensus that traditional methods of intervention evaluation such as the randomised controlled trial are not suitable for evaluating digital health interventions[49-50]. This is especially so for digital health solutions as they encompass all levels of the health system, from top to bottom and broad to narrow (Figure 14). Evaluations of digital health solutions must consider the varying goals and motivations of stakeholders at each level, and account for (instead of writing off) the interacting social and political contexts inherent in the implementation of digital health[51].

The Digital Health Test Beds experienced many challenges related to COVID-19 as research activities were paused so that frontline healthcare settings could respond to the healthcare needs of real people. They also showed that while digital technology has many possibilities, it also creates new gaps — for example in those with lower digital literacy and access. To identify and mitigate these gaps, digital health solutions that create the greatest possible benefit for as many stakeholders as possible must be trialled before implementation in the real world.

An alternate, simulated version of clinical and other environments could be an ideal setting in which these solutions can be trialled. Conducting evaluations in such a setting would allow unsuitable solutions to 'fail fast' with no real-world impact. Promising solutions could be identified and rapidly and iteratively improved, in a way that provides a level of external validity while still maintaining research rigour.

This simulated environment would allow for quick and flexible testing of different combinations of interventions and system standards, enabling the optimum combinations to be identified before they are implemented in the real world. This would minimise real-world disruptions while maximising the potential real-world benefits of these solutions.

Figure 14: Digital health solutions – comprising of new technologies, care pathways and clinical workflows and adhering to new clinical governance protocols and health system standards



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