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Research Showcase

AIDH Summit
2022

Mental health self-report instruments: a review approach

Zhao Hui Koh, Jason Skues, Greg Murray

BACKGROUND

Self-monitoring one's mental health through self-report instruments (questionnaires) is time-consuming compared to self-monitoring physical health. **Digital technologies** (online, mobile apps, health kiosks) can help people measure and monitor their mental health with less effort. However, out of hundreds of self-report mental health scales available, there is a lack of consensus on what such instruments should be.

This study is the first step in a multi-study project that will develop an optimised and dynamic digital instrument for mental health self-monitoring. The study aims to systematically audit **existing self-report mental health instruments** designed to measure and monitor the **mental health and mental well-being** of the **general adult population**.

METHOD

1. We conceptualised mental health with a broad provisional framework because mental health is not the same as the absence of mental illness.
2. The framework guided the search strategies, which returned a large number of articles (approx. 96,000) from five databases: Scopus, Web of Science, PubMed, PsychInfo and Psychology & Behavioural Sciences Collection.
3. We used a text-mining approach (term matching using regular expression, weightings & scoring) to screen eligible articles through multiple iterations.
4. We used a semi-automated supervised machine-learning tool (ASReview) to validate our screening effort (train-test split) to increase the reliability and confidence of the result.

ASReview

A semi-automated tool for screening large literature datasets

RESULTS

The percentile of term scores for eligible articles (manually screened) is higher than for ineligible articles (Figure 1), suggesting the term scores could be a good indicator for identifying eligible articles.

ASReview was trained with 70% of the manually-screened articles and tested with the rest of the articles. Eligible articles were more likely to be ranked first (Figure 2), validating our manual screening effort.

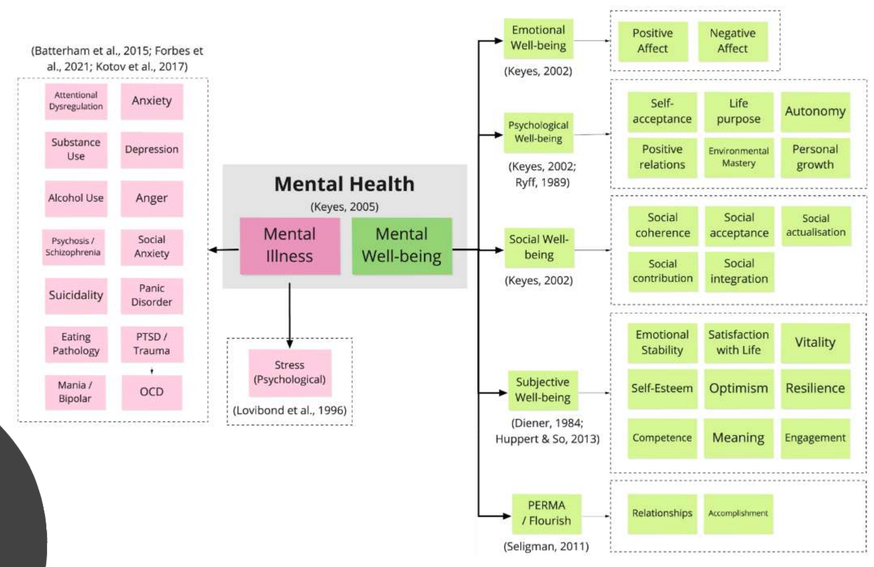
DISCUSSION

Reviews on broad topics with many results can take tremendous manual effort and time. Furthermore, manual screening of a large volume of articles could be error-prone.

Using text-mining tools in manual screening and validated with a semi-automated tool could potentially improve the effectiveness and consistency of subsequent updates of these reviews.

1

Conceptualisation



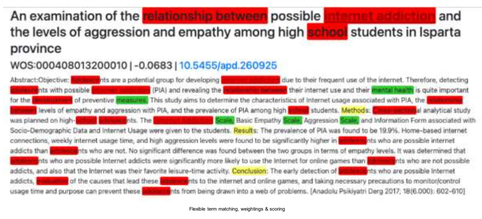
2

Literature Search

Use Technology to Better Inform Consumers & Carers in Mental Health!

3

Screening Title and Abstracts



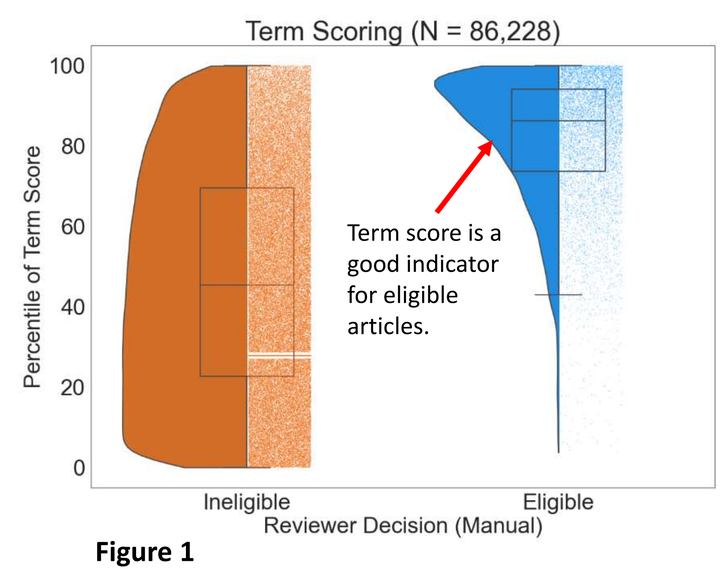


Figure 1

4

Validation (Train-Test Split)

Training (n=63,752), Testing (n=27,119)

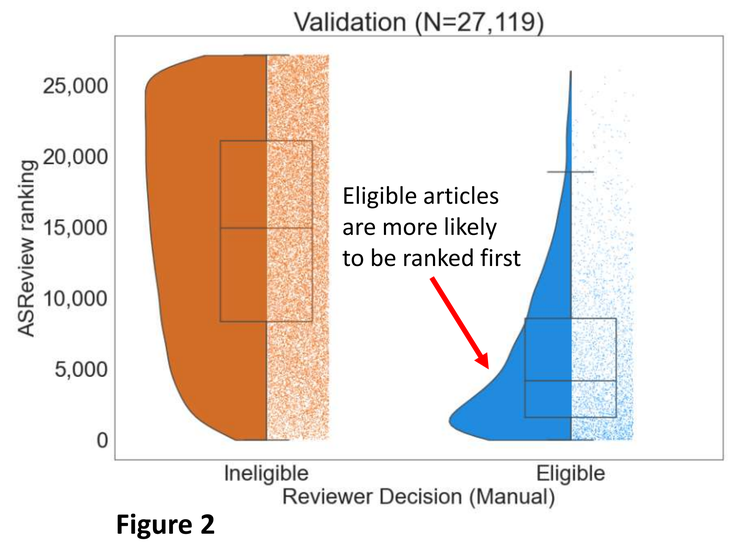


Figure 2

ACKNOWLEDGEMENTS

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DEVELOPING AN EVALUATION FRAMEWORK FOR PAIN PREVENTION DIGITAL HEALTH APPLICATIONS

Belle Hart (DHCRC), Cindy Wills (DHCRC)

LA TROBE UNIVERSITY | digital health crc | DEAKIN UNIVERSITY | BODYGUIDE | Australian Government Department of Industry, Science and Resources | AusIndustry Cooperative Research Centres Program

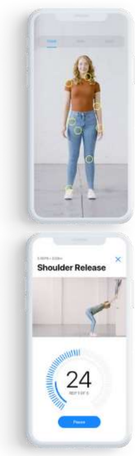
PREVENTATIVE HEALTHCARE IS THE NEW FRONTIER OF DIGITAL HEALTH

Chronic pain is a leading cause of disability and work absenteeism globally[1], and timely, affordable access to care are major treatment barriers. Prevention is an under-capitalised, under-resourced pivotal point for intervention.

BodyGuide is a digital health application that empowers consumers to take control of managing their aches and pains. With an intuitive app for consumers, the platform offers:

- Asynchronous interaction with health professionals
- Tailored exercise programs
- User education

Validation of preventative health initiatives is difficult across digital health, because of the need to simultaneously evaluate the effectiveness of the health interventions and the usability of the technology.



There is no existing evaluation framework to assess both best practice healthcare interventions and digital usability.

By analysing and building upon established tools, this project will develop an evaluative framework and survey to measure usability and preventative health outcomes for pain interventions within a biopsychosocial model. This framework will be implemented to evaluate the performance of the BodyGuide digital health intervention platform within the Australian workforce.

PROJECT OVERVIEW

Scoping Review 1 and 2 → Framework Development → Survey Development → Small Scale Validation → Larger Scale Pilot

METHOD: WHAT WE DID

Scoping Review 1

Methods for implementation and evaluation of existing asynchronous coaching platforms

Six asynchronous coaching platforms identified.
Implementation method: randomised controlled trial
Evaluation methods: RE-AIM Framework and Normalisation Process

Framework Development

Scoping reviews revealed that no robust, comprehensive, and validated framework for evaluating asynchronous digital health pain interventions exist.

A framework was developed (see Framework Development) to wholistically evaluate the impact of preventative healthcare delivered digitally.

Scoping Review 2

Identifying existing evaluation frameworks

Forty-four assessment frameworks identified.
Most used: EQ-5D, HADS, ÖMSPQ, PCS and SB
Fifteen health domains (See Framework)
Fourteen usability domains (See Framework)

Survey Development

In order to measure the efficacy of BodyGuide based on the developed framework, a survey was created.

This survey measures pain and usability outcomes throughout the consumer journey using BodyGuide.

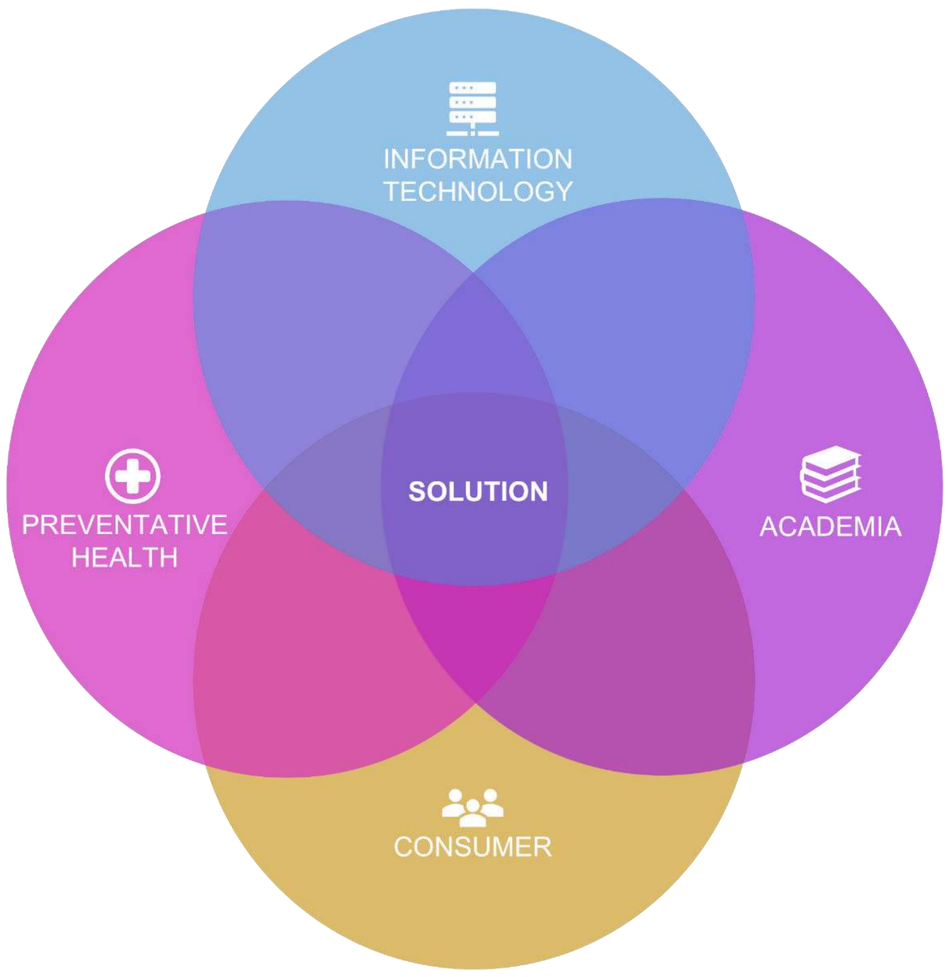
Preliminary Survey Validation

The survey was tested in a sample (n=23) of consumers with varying levels of lived pain experience, likely to reflect the demographic utilising BodyGuide in the larger scale pilot.

Initial validation of the survey, and thus framework, indicates it is fit for purpose.

Preliminary Survey Results

Digital health opinions:
Previous use of a digital health platform encourages future use
Usability:
Initial data showed positive results
Internal consistency:
Investigates how consistently the questions were answered by participants, it was measured using Cronbach's Alpha.
Health outcome questions = good internal consistency
Usability outcome questions = all domains were acceptable or greater. Functionality however was in the unacceptable range.



This professional internship project has **FOSTERED THE COLLABORATION BETWEEN FIELDS THAT WOULD OTHERWISE OPERATE IN SILOS.**

The result is a robust, interdisciplinary implementation and evaluation framework with potential applications for use with other digital health solutions designed to prevent and manage pain.

RESULTS: WHAT WE DEVELOPED

Framework Development

Identify existing digital health usability frameworks
Does the framework have domains?
Yes | No
List domains | Assign domains

Identify existing biopsychosocial frameworks
Does the framework have domains?
Yes | No
List domains | Assign domains

Combine the domains

Consolidate the list of domains

Update the domains for this research context

Update domains for consistency

Framework

Health Outcomes

- Pain or Discomfort
- Psychology
- Health Literacy
- Function and Movement
- Kinesiophobia
- Employment Impact
- Treatment
- Medication
- Social Impact

Usability

- Engagement: Interest, Impact, Digital Health Opinion
- Functionality: Performance, Ease of Use, Navigation
- Information: Goals, Quality, Quantity
- Subjective Quality: Continued Use, Recommend
- Aesthetic: Imagery, Readability

CONCLUSION

Scoping reviews revealed that no robust, comprehensive, validated frameworks exist for evaluating asynchronous, preventative digital health platforms for pain management interventions.

This informed the development of an evaluation framework and survey tool with themes including: pain, fear of pain, health literacy, quality of life, and platform usability.

The next phase of the project will utilise the framework and survey to evaluate the performance, usability, and impact of the BodyGuide. Beyond this is the opportunity for further validation and widespread implementation of the framework to other asynchronous solutions designed to prevent pain.

ACKNOWLEDGEMENTS

Prof. James Boyd (La Trobe University)
Dr. Urooj Raza Khan (DHCRC)
Matthew Green (BodyGuide)
Chetan Arora (Deakin University)

The traditional country of the Gadigal people of the Eora Nation and pay respect to elders past, present, and emerging.

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Estimating value from CDSS before use

Rex Parsons[1], Robin Blythe[1], Adrian Barnett[1], Susanna Cramb[1, 2], Steven McPhail[1, 3]

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{predictNMB}

Estimate when and where a model-guided strategy would outperform a treat-all or treat-none approach

BACKGROUND

- Clinical prediction models are used in healthcare settings to guide treatment decisions. But may not be effective at reducing healthcare burden or costs when implemented.
- The value of clinical decision support systems (CDSS) is often measured after implementation. But cost savings are possible if estimates were made before investment.
- These estimates can be used to compare between models, interventions or factors relating to the target healthcare setting.

METHODS

- To better inform decisions regarding the development and implementation of model-guided care, we developed an R package, predictNMB, to simulate and evaluate model-guided care.
- Users can evaluate hypothetical changes to the model, the effectiveness and cost of care being guided, and the prevalence of the event.
- Models are evaluated in terms of Net Monetary Benefit (NMB), with built-in summary and visualisation methods help communicate results to stakeholders and decision makers.

Main features

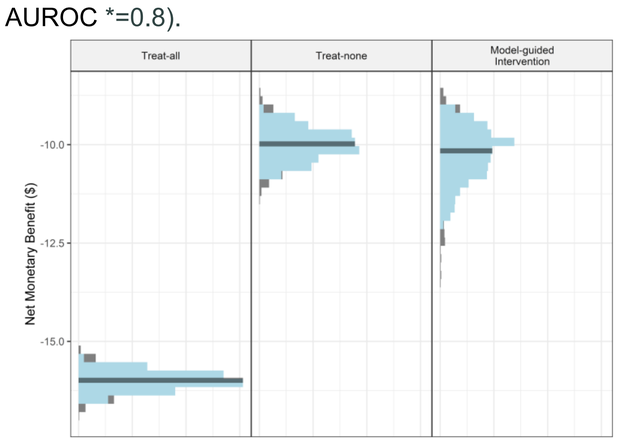
- R package to estimate when and where a model-guided strategy would outperform treat-all or treat-none guidelines.
- Evaluation of the Net Monetary Benefit (a monetary value that encompasses both healthcare costs and patient outcomes).
- Evaluate a range of hypothetical scenarios to further evaluate the model-guided approaches (prevalence of outcome, treatments available, and model performance).
- Allows user to evaluate how a CDSS that guides the allocation of an intervention may perform before its implementation.
- Enables decision makers to better prioritise the development CDSS to areas that maximise value-based care.
- The software is freely available with guides and examples online.

PRACTICAL EXAMPLE

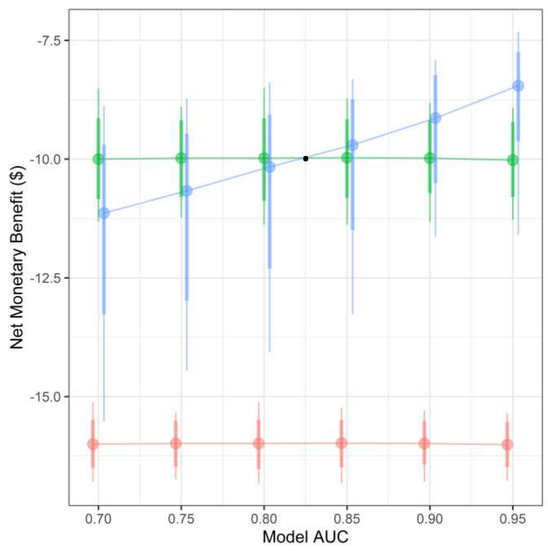
For a hospital to evaluate how they should be allocating the pressure injury (PI) prevention interventions, they can compare potential models before implementation.

Questions that can be answered using predictNMB:

- Is the treating only the high-risk group (model-guided intervention) better than a treat-all or treat-none strategy in my patient population (prevalence =10%) and with my model performance (model AUROC *=0.8).



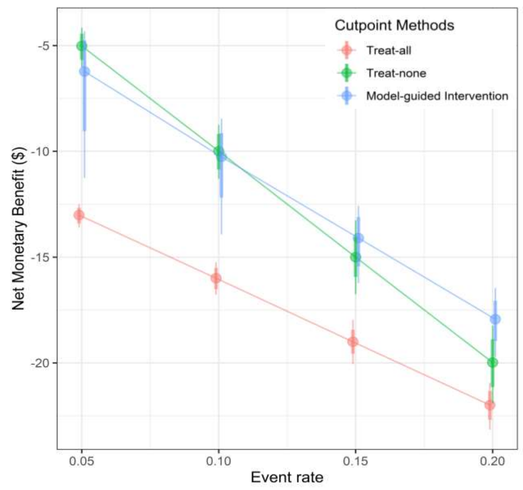
- What is the relative benefit of the model-guided intervention as the **model performance** (AUROC) improves? At what AUROC does my model outperform a treat-all/none strategy?
  - Only when the blue line crosses over the green line, does the model-guided intervention provide the best NMB (AUC > 0.82).



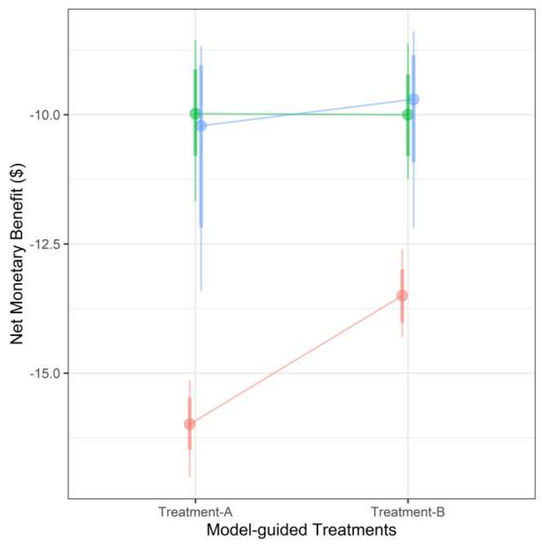
*AUROC = Area Under the Receiver Operating Characteristic

Cost of pressure injury (PI): $ 100
Cost of PI prevention: $ 10
Effectiveness of intervention: 40%

- What is the relative benefit of using the model-guided intervention as the **rate of the pressure injuries** increases in different hospitals or wards?



- What is the relative benefit of using the model-guided intervention when the rate of injuries remains the same, but the **cost and effectiveness of the intervention** is different (cost=$7 and effectiveness=35% reduction)?



CONCLUSION

The use of predictNMB may improve hospital resource allocation and orient future CDSS towards value-based care. This approach is applicable to any clinical prediction model, diagnostic or prognostic, where the outcomes of possible classifications can be costed.

TRANSLATION & IMPACT

The predictNMB R package is available at rwparsons.github.io/predictNMB/. You can use this to better inform decisions regarding the development and implementation of model-guided care within your specific healthcare settings. It can also be used when developing clinical prediction models to better direct efforts to address healthcare challenges where model-guided care is most likely to be cost-effective.

CO-DESIGNING RECOMMENDATIONS FOR THE PreHaRM INTERFACE

Adverse events are common and costly across the health system. Researchers are developing an algorithm capable of predicting specific events amongst hospital in-patients. To use this algorithm effectively, however, health professionals need the results displayed in a format they can action.

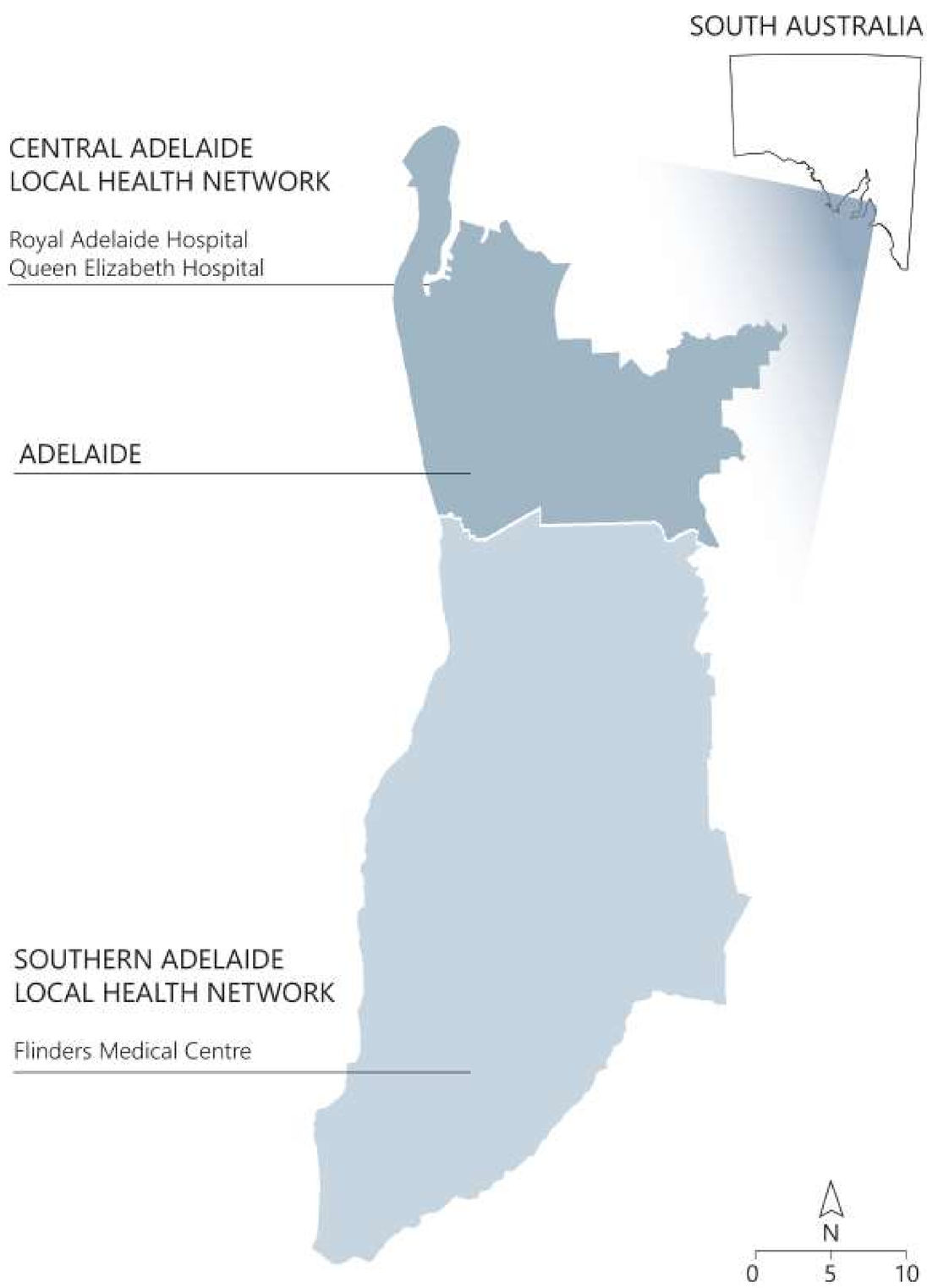
The 'PreHaRM: Predictive Harm Response Management algorithm risk tool' project will use an iterative co-design process with 36 health professionals from two Adelaide health networks. Over three workshops researchers will identify use scenarios, develop prototypes and confirm recomendations for the appearance of the PreHaRM interface.

The PreHaRM algorithm examines three in-patient **adverse events** types, two of which will be the focus of the co-design process.

ACCIDENTAL FALLS

RESPONSIVE BEHAVIOUR

MEDICATION ERROR



Health professional **participants** include:

- Nurses
- Medical staff
- Allied health professionals
- Management/administrative staff

Workshop 1: **Context**
Understanding health professional preferences and approaches to software use.

- Survey
- Group discussions

Workshop 2: **Development**
Enabling health professionals to design what they want to use in the way they want to use it.

- Generative toolkits
- Group discussion

Workshop 3: **Confirmation**
Health professionals testing and confirming the interface and design recomendations.

- Scenario testing
- Group discussion

The PreHaRM project will **produce** a set of consensus driven design recommendations that will inform Australia's first user-defined interface for the prediction of adverse events.

AUTHORS

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Education and Training Framework for Implementing Digital Interventions

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

CREATE CHANGE

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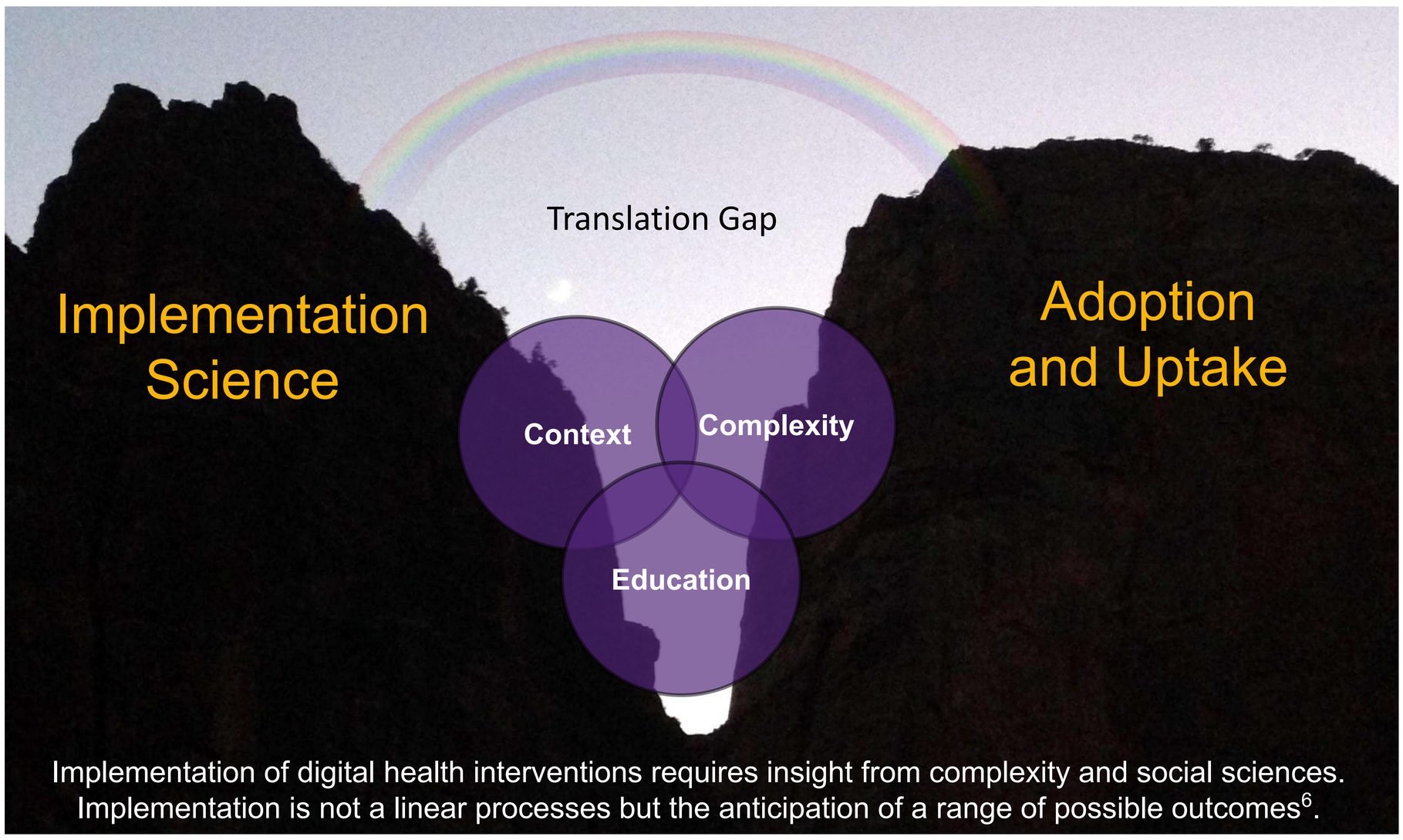
BACKGROUND

Digital health interventions are **complex to implement**[1]. Individual factors such as technology acceptance, skill and usability affect uptake as does the organisational context, wherein lies both barriers and enablers for adoption[2]. At a time of ever-increasing demand on the health workforce, digital health interventions provide the opportunity to improve efficiency, enhance patient outcomes and quality of care[3]. **Staff education and training is essential** to the success of implementation of digital health technologies[4]. Although implementation frameworks exist for digital interventions[5], there is a lack of specific focus on training considerations.

METHOD

This research aims to develop an evidenced based education and training package for the implementation of an Electronic Medical Record (EMR) intervention in the acute stroke setting. A **rapid literature review** was used to assess the optimal strategies for education and training for the EMR. The concepts identified were then mapped against **contextual factors** of the individual, team and organisation to develop an interprofessional education and training package for staff. The **NASSS framework** (Non-adoption, Abandonment, Scale-up, Spread and Sustainability) was used to identify, understand and manage the complexity of the implementation.



Implementation of digital health interventions requires insight from complexity and social sciences. Implementation is not a linear processes but the anticipation of a range of possible outcomes[6].

RESULTS

The rapid literature review resulted in three key concepts:1) approach to training, 2) training strategies and 3) modality of training.

Approach to training	One-on-one training[Peer-coach training Classroom training (CRT) Computer-based training (CBT) Blended training
Training strategies	Baseline assessment of user capability Scheduling education sessions close to the actual use of the system Engaging key stakeholders and staff champions Social nature of learning Incremental approach to training/ staged approach
Modality of training	Hands-on practice Case based training/scenarios Video tutorials Simulation Team training

The evidenced-based pragmatic **Complexity-Context-Delivery (CCD)** framework was developed to guide education and training when implementing EMR interventions. It is designed for multiple disciplines including medical, nursing and allied health and offers guidance for other digital health interventions.

1 - Define/Manage complexity of the digital intervention

Recommend use of a theoretical framework to assess barriers and enablers to implementation

2 - Understand context

Determine contextual factors that may enhance or mitigate the complexity of implementation (consider individual, team and organizational context)

3 - Determine education delivery and iterate

Consider evidenced based training approaches, strategies for training and modalities of training suitable for the intervention and context. Anticipate iterations to education delivery based on context.

CONCLUSION

This CCD framework acts as a **pragmatic approach to education and training of staff**; it can be used by health professionals, managers and teams to inform the design and approach to training as well as determining the level of education and training that may be needed to embed the digital intervention. For example, the framework encourages educators to determine the level of complexity of the intervention and implementation (step 1) and contextual factors (step 2), which can act as a guide when choosing optimal approaches, strategies and training modalities (step 3).

TRANSLATION & IMPACT

We are currently using the CCD framework to implement an EMR intervention for stroke across four different health services in Queensland. The framework is expected to assist in implementation of the EMR intervention, promoting uptake by clinicians and efficiency of service delivery.

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Optimising data extraction & EMR data analytics

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RESEARCH QUESTION:

What are the lessons learnt from other health organisations' experiences using OMOP CDM for standardising the data extraction and validation?

BACKGROUND

The availability of digital data opens an opportunity for enabling secondary use of this data.

The literature shows that limited value is derived by using the Electronic Medical Record (EMR) as simply "electronic paper", rather the true value lies in re-using the data collected during routine care for quality improvement and research. [1]

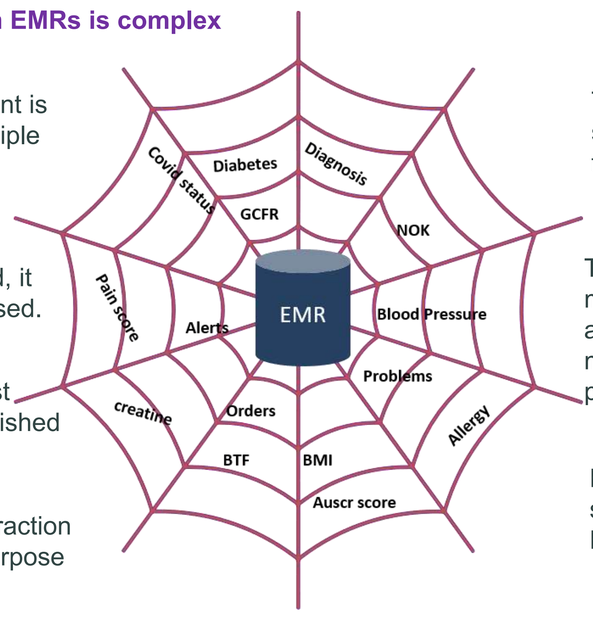
Extracting data from EMRs is complex

The same data element is often recorded in multiple areas of the EMR [2]

Once the data is successfully extracted, it may not be standardised.

Difficult to discern best practice from the published literature [2]

Commercial data extraction tools are not fit for purpose



The EMR data are often spread over complex nests of tables within the database [3]

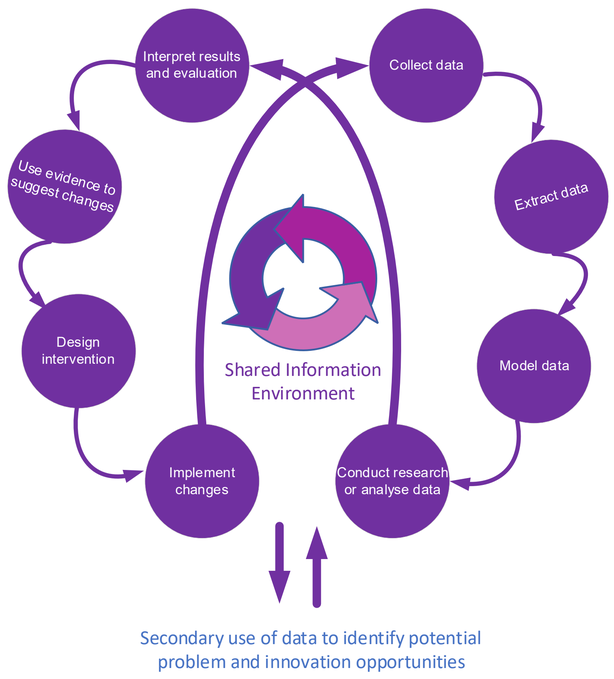
The current data extraction methods from an EMR system are typically performed by manual and inconsistent processes [4]

Each health service starting "from scratch" to learn how to extract EMR data after implementation [3]

OBJECTIVE

To address this problem, this project aims to analyse the current state of the EMR data extraction process and the inherent challenges with a view to providing guidance on how the process can be streamlined and optimised. We hypothesise that the process of data extraction and validation from EMRs can be compared using OMOP CDM as a common standardised outcome.

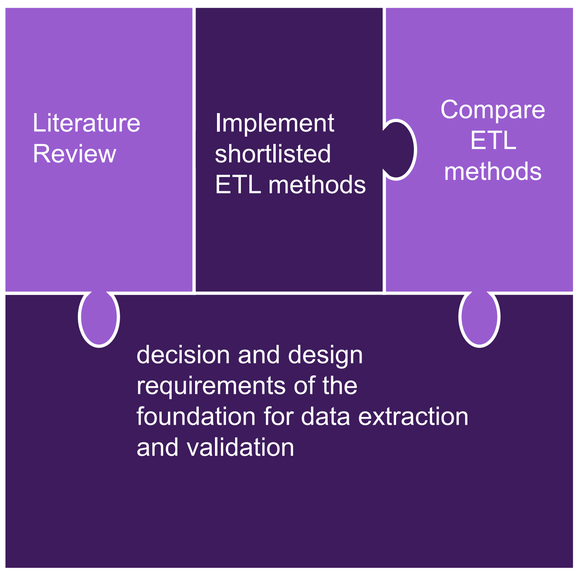
The Observational Medical Outcomes Partnership Common Data Model (OMOP CDM) [5] is an international industry standard that standardises data structure, format, and vocabulary to support secondary use of data, for example, medicinal products and clinical conditions to support a systematic and collaborative research process. However, the OMOP CDM is only standardised after the data has been extracted.



The study will involve:

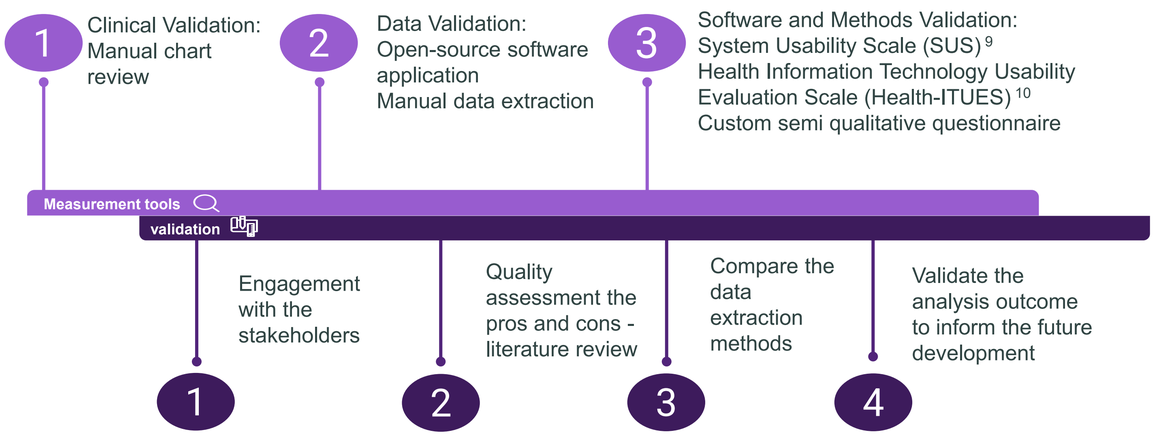
1) a literature review of published research on EMR, Extraction-Transformation-Load (ETL) and OMOP;
2) a narrative synthesis of the literature to identify the most suitable process;
3) implementation of the most suitable data extraction and validation process using the EMR synthetic data set; and
4) the project team's EMR Subject Matter Expert (SME) and Data Engineer will perform a comparative assessment between the existing and new method for data extraction and validation.

METHODOLOGICAL APPROACH



1. A narrative synthesis of the literature will be performed to shortlist 3 most suitable ETL (Extraction-Transformation-Load) methods based on the following key criteria:
   - Time saving
   - Reduce manual steps and maintenance
   - Automation
   - Easy to use
   - Data formation/transformation
   - Data quality and integrity control
2. The shortlisted data extraction and validation methods from the literature review would be implemented by using the QH's existing infrastructure
3. Compare with the existing extraction and validation method.

MEASUREMENT TOOLS USED



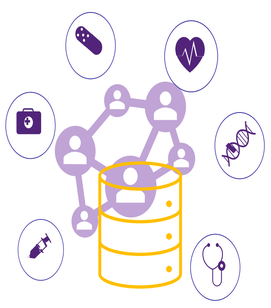
RESEARCH CONTRIBUTIONS

- Conceptual (adapted) framework for near real-time clinical analytics implementation across the horizons of digital health to enable continuous quality improvement in a learning healthcare system
- Uncover the gaps and design requirements for an optimised data extraction method for Queensland Health.
- Standardise the existing processes from all sites into a consistent standardised process of Queensland method integrated process.

VISION: Data Intelligent Patient Care Model by 2027

By 2027, we will have an integrated tool that works for all certified EMR databases and allows health organisations to download and install the tool to integrate with EMR software for data extraction and validation end-to-end process to support AI and machine learning solutions.

The machine learning solutions will allow organisations to learn and train patient data across the public and private hospitals in Australia.



For example, the EMR from St. Andrew private hospital would be able to learn from previous experiences from other hospitals by sending the data into the secured central health repository (e.g., OMOP CDM) via an FHIR API for a recommended Data intelligent Patient Care outcome.

OUTCOME: Conceptual (adapted) framework[8]

Levels of Outcome

Evaluation Approach	Technical	Clinician	Patient

Metrics:	• Data accuracy
	• Dashboard usability
	• User mental demand
	• User usage
	• User satisfaction
	• Design biases
	• Algorithm sensitivity and specificity/ROC
	• Eye-tracking data
		• Efficiency
		  ◦ Task time
		  ◦ Decision time
		  ◦ Information search time
		• Effectiveness
		  ◦ Reduced errors
		  ◦ Decision quality
		  ◦ Compliance to guidelines
			• Efficiency
			  ◦ Reduced time in care
			• Effectiveness
			  ◦ Reduced adverse events
			  ◦ Better care outcome

Methods:	• Data accuracy (TAM, UTAUT and WebQual) • Usability (Brookes) • Workload (NASA-TLX) • Automated usage monitoring • Usability (Health-ITUES) • Eye-tracking (Tobii T120 system)	• Observation • Interviews • Questionnaire • Survey • Automated monitoring • Questionnaire (SUS, SAI, PSSUQ)	• Random controlled trial • Automated monitoring (care time, adverse events) • Before & after • Interrupted time series • Repeated treatment study
Context:	Synthetic test cases Pilot evaluation (1 site | multi-site) Live business-as-usual evaluation (1 site | multi-sue)		

Abbreviations: TAM = Technology Acceptance Model, UTAUT = Unified Theory of Acceptance and Use of Technology, NASA-TLX = National Aeronautics and Space Administration-Task Load Index, WebQual = A Web Site Quality Instrument, ROC = Receiver Operating Characteristic, Health-ITUES = Health Information Technology Usability Evaluation Scale, SUS = System Usability Scale, SAI = Situational Awareness Index, PSSUQ = Poststudy System Usability Questionnaire

CONCLUSION

The project's findings will contribute to understanding the current state and challenges of extracting data from an EMR and the methods that are currently being used by different EMR clients to present the data. Using Queensland Health and the international OMOP common data model as a test case, to the study will contribute to the development of design requirements for an optimised data extraction method for Queensland Health. These design requirements can then be scaled in future to other states and territories to support digital health data optimisation nationally.

ACKNOWLEDGEMENTS

ADVISORY TEAM

- A/Professor Clair Sullivan –Digital Health Research Network, The University of Queensland
- Dr Anton Van Der Vegt – Postdoctoral Research Fellow, School of Information Technology and Electrical Engineering
- Professor Raymond Choo – Professor & Cloud Technology Endowed Professorship, The University of Texas at San Antonio

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SCAN ME

What behaviour change techniques should we use in cardiovascular disease smartphone apps to increase physical activity?

***Action Planning** and **Graded Tasks** may be effective*

Behaviour change techniques used in cardiovascular disease smartphone apps to improve physical activity: Systematic review and meta-regression

Kacie Patterson [a], Rachel Davey [a], Richard Keegan [a], Brea Kunstler [b], Andrew Woodward [a], & Nicole Freene [a]
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Medical Research Future Fund
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BACKGROUND

More than 1.2 million Australians suffer from cardiovascular disease which makes it the highest burden of disease in Australia, costing the healthcare system over $10.4 billion per year. Increasing physical activity is recommended as a means of managing the condition, however, we know behaviour change is difficult and people with cardiovascular disease often do not meet physical activity guidelines. Healthcare providers are increasingly using smartphone apps to assist with behaviour change around increasing physical activity due to their accessibility and potential cost effectiveness.

However, the question is which specific behaviour change techniques are being included in apps and how effective are they?

METHOD

1) We undertook a review of the literature in six databases to identify interventions using apps to target physical activity for people with cardiovascular disease (Figure 1).
2) To explore which techniques were used in the apps, we used the validated Behaviour Change Technique Taxonomy (v1). This taxonomy can be used to identify 93 different techniques that are known to be used in behaviour change interventions.
3) In order to see if a technique was associated with an increase in physical activity levels, we completed a meta-regression analysis.

RESULTS

40 behaviour change techniques (out of the possible 93) were identified across 19 apps.

Apps most frequently used **Self-monitoring of Behaviour** to target increases in physical activity.

Action Planning and **Graded Tasks** were associated with increases in physical activity levels when used in an app (with medium effect, Figure 2).

Apps that were based on **Self-monitoring the Outcomes of Behaviour** (e.g. blood pressure and body weight), **Biofeedback**, or **Information About Health Consequences** from physical inactivity, had no impact on increasing physical activity and in fact, participants appeared to do less physical activity as a result.

WHAT'S NEXT?

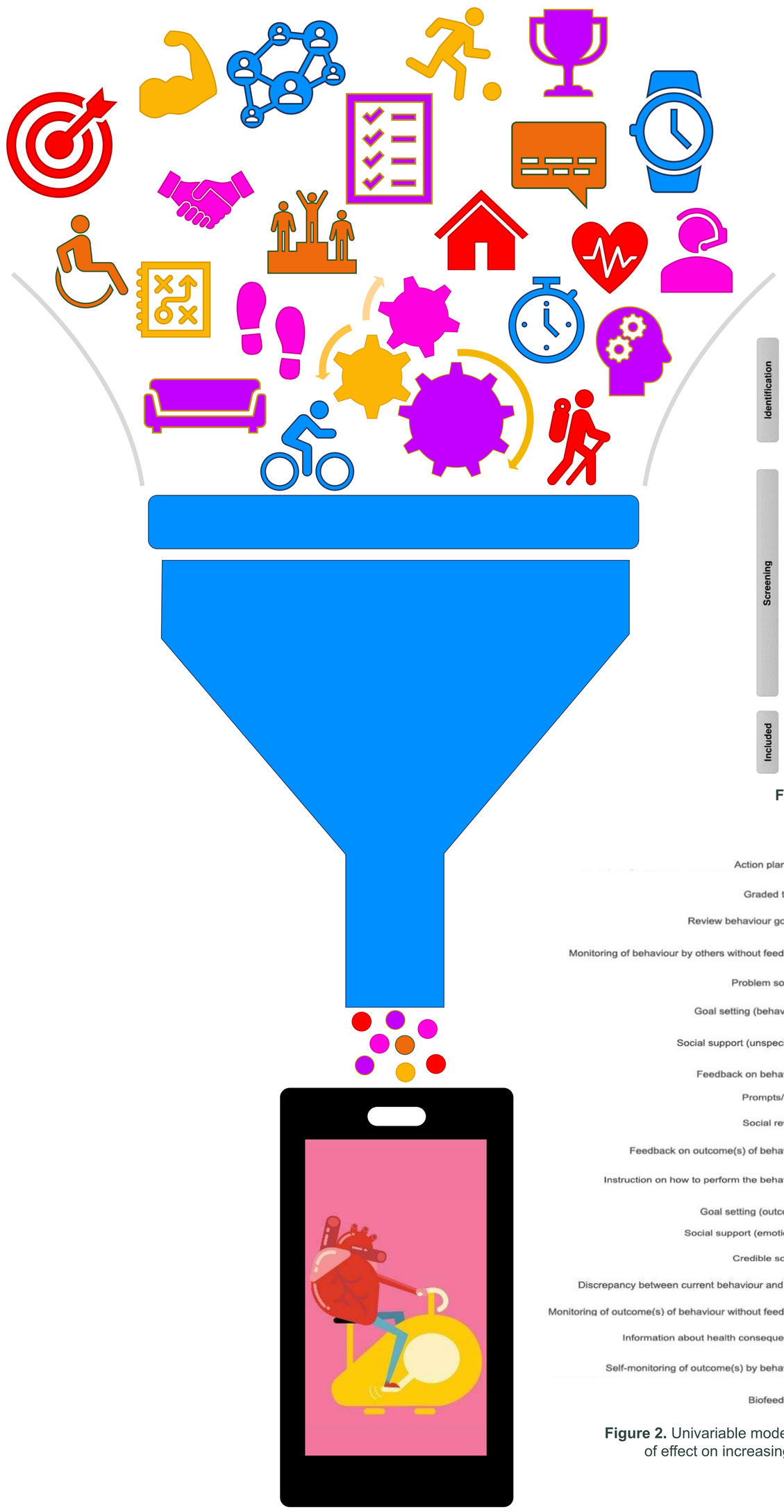
While only **Action Planning** and **Graded Tasks** were associated with increasing physical activity, further investigation is required to determine if the relationship is causal.

For researchers and industry partners:

- ✓ Continue to test the use of **Action Planning** and **Graded Tasks** in isolation or combination in future apps.
- ✓ Try out other techniques that have not yet been tested in apps for people with cardiovascular disease.

For clinicians and other consumers:

- ✓ Choose apps that specifically target physical activity.
- ✓ Look for behaviour change techniques like **Action Planning** and **Graded Tasks** within the apps we choose and recommend.



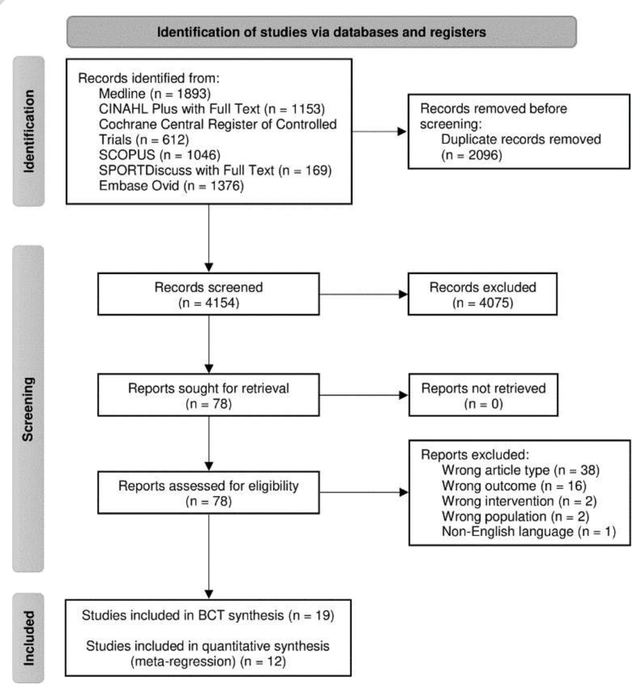


Figure 1. PRISMA flow diagram demonstrating the flow of studies through the review

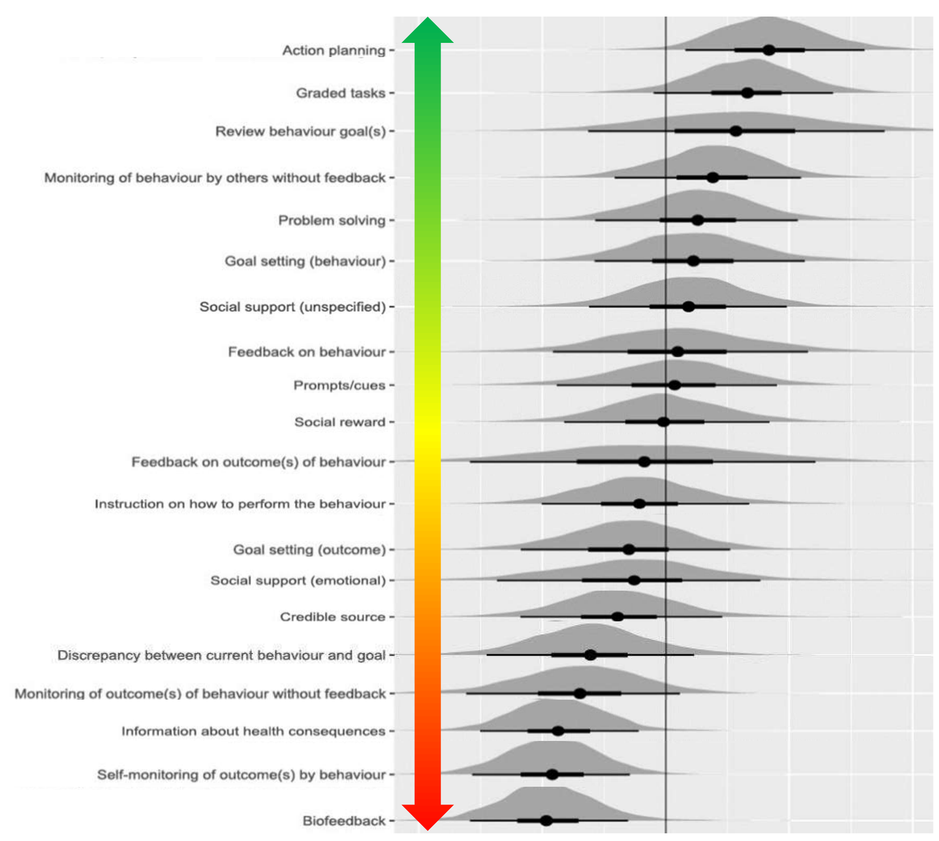


Figure 2. Univariable model distribution plot of behaviour change techniques in order of effect on increasing physical activity to reducing physical activity levels

Take a picture to download the full paper

Developing the CareMappr App: UI/UX Co-Design with Consumers & Carers

Anna Logounov, Bronwin Patrickson, Eva Kemps, Niranjan Bidargaddi

BACKGROUND

My Health Record collects and links routinely-collected health data from medical appointments and health service utilisation in Australia. Secondary uses of this data are intended to improve health outcomes and clinical practice. Current initiatives focus on the data-driven insights for health system or healthcare professionals, however consumers or carers could also benefit from access to learn from patterns in their own health data.

This project uses data merged from My Health Record to help consumers make sense of patterns in their health data and use those insights to communicate with their clinicians and carers to manage their health. A co-design process was used with consumers and carers to analyse their interactions and support requirements, and these insights informed the development of the UI and UX of the CareMappr app platform.

CO-DESIGN OF USER INTERFACE (UI) & USER EXPERIENCE (UX)

Consumers

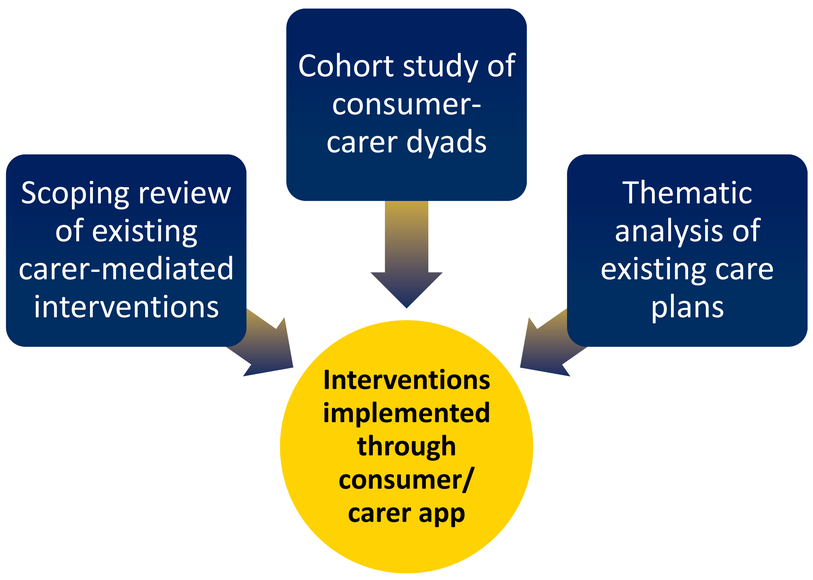
- Require psychosocial support not just medical
- Increasing multimorbidity / complexity
- Illness can affect employment, relationships, social connectedness, life purpose

Clinicians

- Increasing workload
- Less time available per consumer

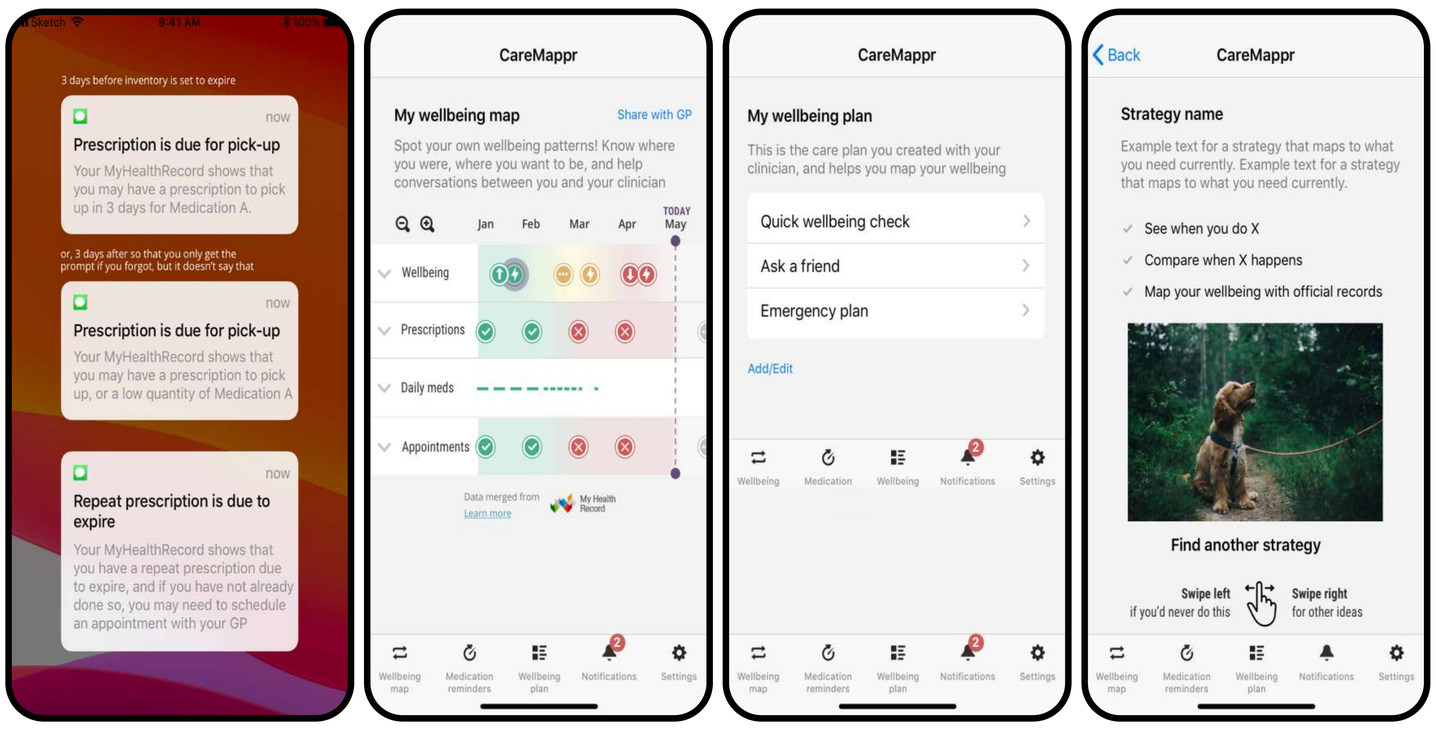
Carers

- Want to help, not sure how
- Often need support themselves due to caregiving burden
- Can assist due to their knowledge and care of loved ones



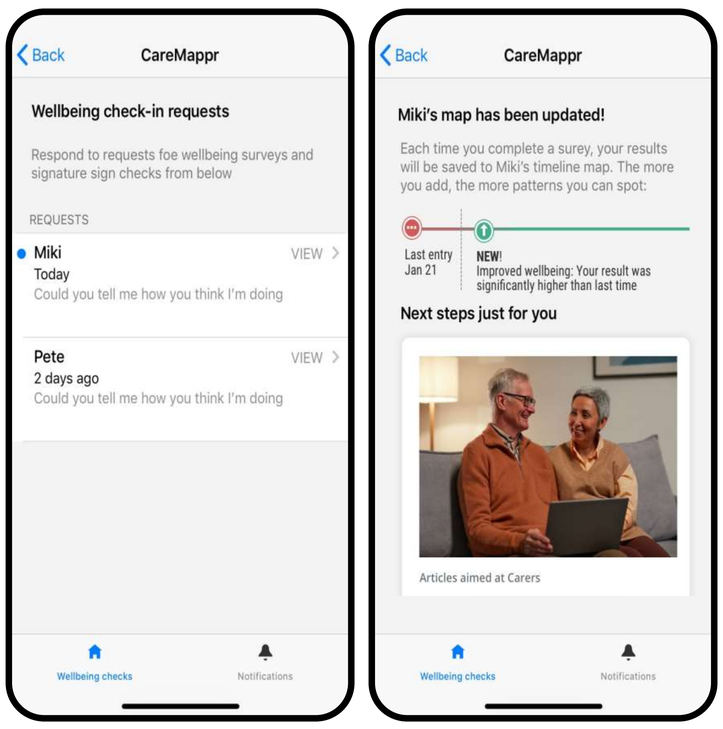
FOR CONSUMERS…

Consumers wanted a customisable app with the ability to grant access to their selected carer and to streamline communication with clinicians and carers regarding prescriptions, side effects, signature signs, dosage changes and wellbeing checks. Other features such as reminders to help with managing regular medications and appointments, the ability to make sense of patterns in their health data, their care plan being readily available and a bank of strategies to access and try were also requested.



FOR CARERS…

Carers wanted the ability to record and track signature signs and overall wellbeing of their cared for person. They desired more efficient communication with clinicians and timely information about health resources available for their consumers as well as how and when to utilise them.



CO-DESIGN ENHANCES CLINICAL TRANSLATION & IMPACT

Consumers

- Enhanced self-management through tracking of appointments, medication adherence and signature signs as well as customised strategies to support wellbeing
- Ability to see patterns in wellbeing and how they relate to own health behaviours
- Support outside of appointment times through suggested strategies and access to wellbeing plan via the app
- Promotion of shared decision-making

Clinicians

- More targeted provision of care due to better data around symptoms, medication adherence and symptoms including signature signs
- More efficient interactions with consumers and their carers due to extra support provided by app
- Enhanced therapeutic alliance with consumers and carers

Carers

- Ability to track signature signs and respond
- Enhanced data capture of consumer wellbeing through carer perspective
- Improved connection to health services and awareness of support options
- Potential to feel better supported in their role as carer

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Motivating children in rehabilitation using a humanoid robot's emotional touch

Leila Mouzehkesh, A/Prof Omar Mubin, A/Prog Fady Alnajjar, Dr.Michael Lwin, Dr.Aila Khan
Western Sydney University, Digital Health CRC

WESTERN SYDNEY UNIVERSITY

Australian Government Department of Industry, Science and Resources | AusIndustry Cooperative Research Centres Program

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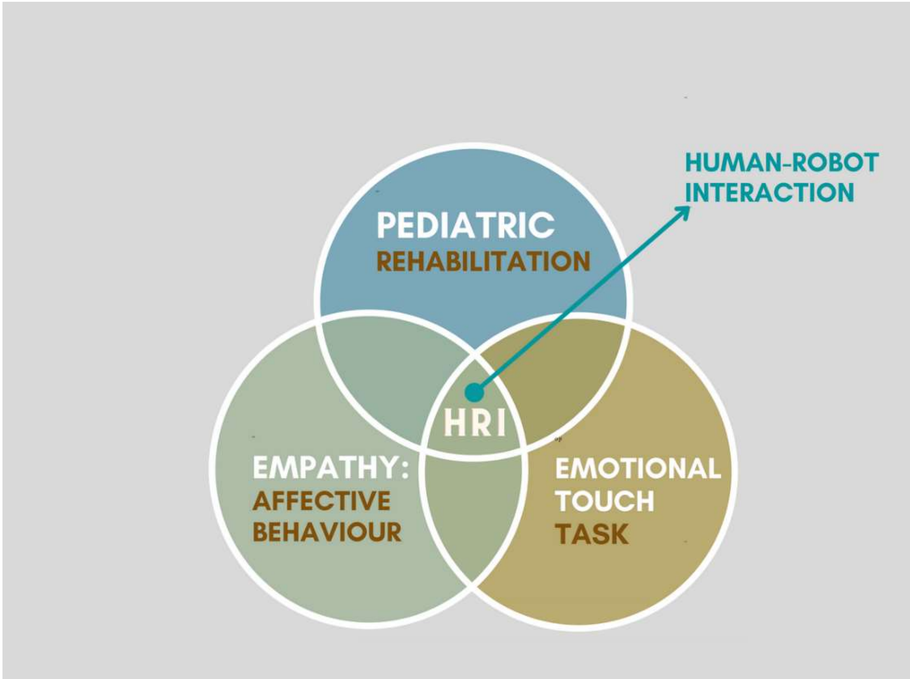


BACKGROUND (Pediatric Rehabilitation + Robots)

To improve independence and quality of life for people with physical disabilities, rehabilitation is essential. Social assistive robotics have the potential to provide new methods of monitoring, motivating, and coaching. By combining conventional treatment with Human-Robot Interaction (HRI), the child will be able to adapt to the new intervention using the humanoid robot.

Children in physical rehabilitation commonly suffer from low motivation to perform and progress in the physical exercises that improve their condition. This is a challenge for pediatric specialists. The healing process from various impairments might be sped up or eased with Robotic rehabilitation approaches. There are, however, limits to how realistic and empathic Robot's interactions with children are. We could improve the quality of the humanoid robot's performance in care-taking situations such as those required in pediatric units, thereby increasing the efficacy of using humanoid robots in medical environments.

Study Design

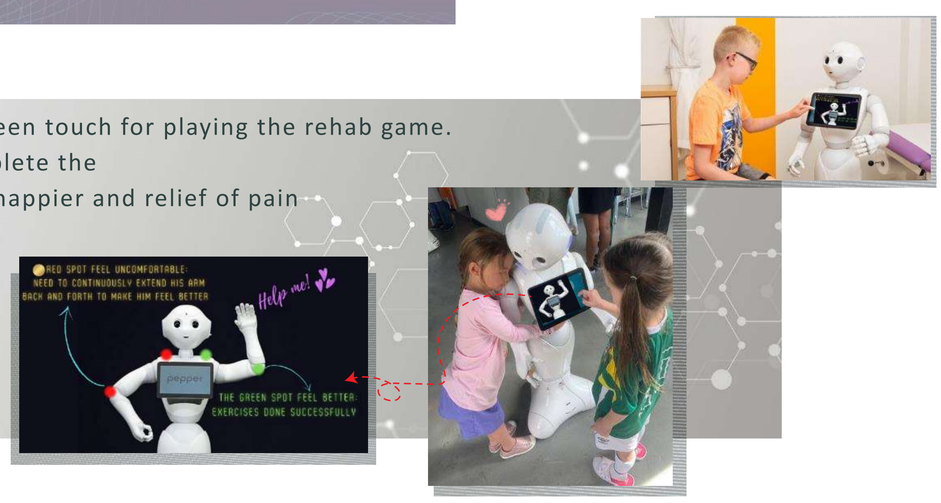
Rehab Game
Three Scenarios

Verbal Only

In this project, we will use the Pepper robot platform to engage with children during routine exercises that are often unpleasant for the child.
we will conduct 3 experiments focusing on empathic scenarios through emotional touch to encourage the children to do their physical rehabilitation exercises. We will assess both the believability of pain (emotion) in pepper robot and children's empathic reactions while doing exercises with robots.

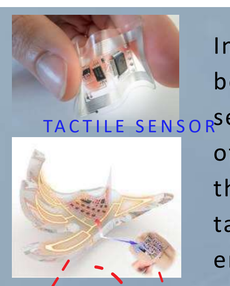
Verbal + Screen Touch

In experiment 2, we will use Pepper robot's screen touch for playing the rehab game. Children collaborate with pepper robot to complete the exercises and through that make pepper robot happier and relief of pain on pepper's joints (hand and shoulder).
The repetition of exercises helps children's recovery and increase their involvement in treatment, so Pepper robot ask children to continue their exercises.

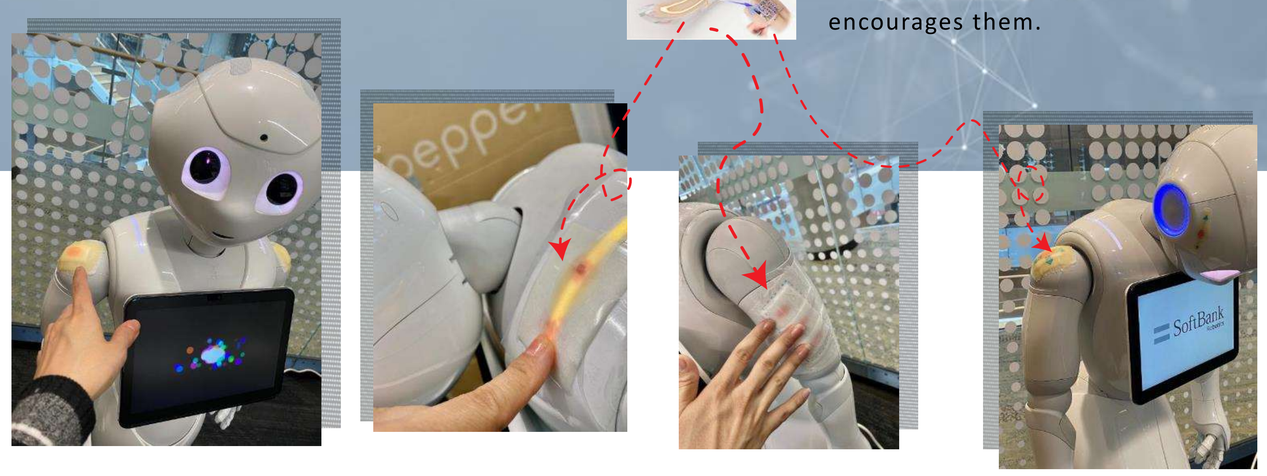


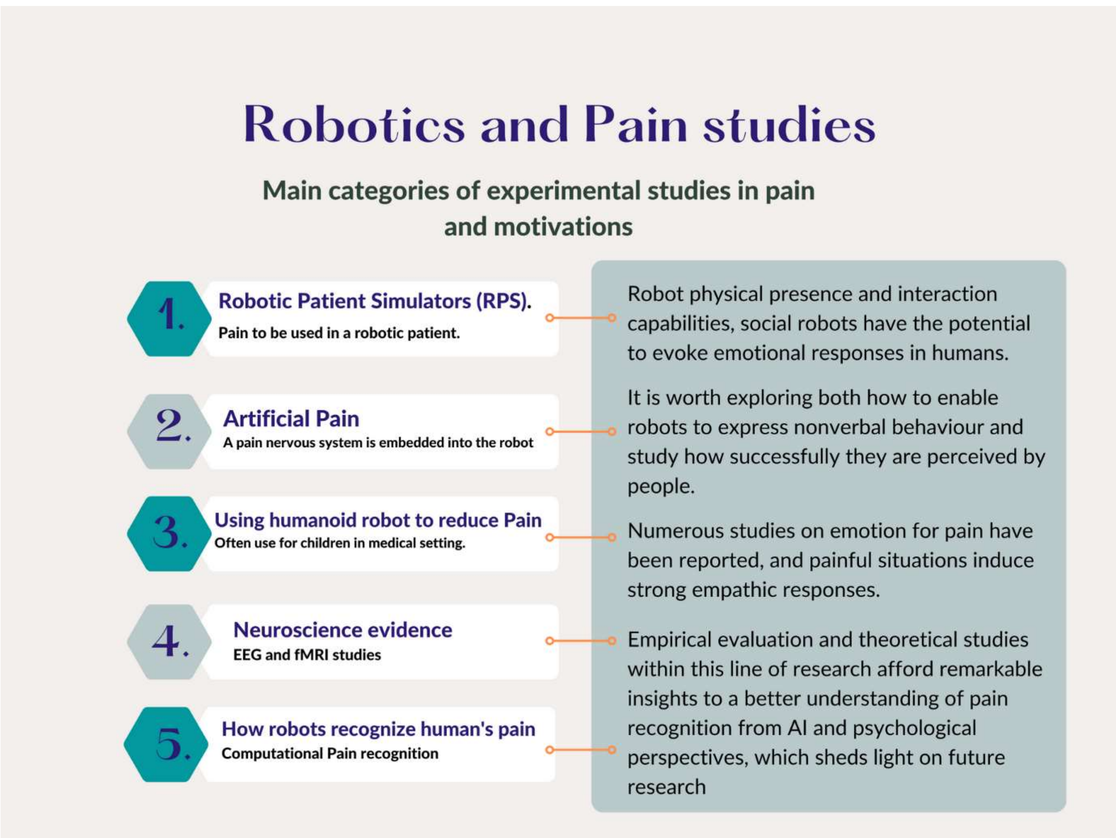
Verbal + Body Touch

In experiment 3 we introduce a new emotional device by using tactile sensors (wireless and programmable) to different parts of Pepper robot's body to make its interaction with children with hemiplegic cerebral palsy more empathic and realistic.



In experiment 3, The Pepper screen design will be linked to the empathic bandage. Children can see the bandages' sensitive spots on the picture of Pepper on the screen also. In that way, by their correct touch and enough pressure on the tactile sensors, pepper reacts positively and encourages them.





Contributions

The participation of children with disabilities is restricted, their fitness levels are lower, and they are more likely to be overweight than their peers without disabilities (Murphy et al., 2008). In paediatric rehabilitation, we will provide design guidelines to improve motivation and engagement through exploring emotional empathy. A child empathic rehabilitation technology will be deployed and evaluated in this study. Furthermore, complying with these requirements can be expensive for both patients and providers (Pulido et al., 2019); the new sensory device can decrease the cost of paediatric rehabilitation also.

CONSUMER PREFERENCES FOR HEALTHCARE APPOINTMENT REMINDERS

Shayma Mohammed Selim[1], Steven M McPhail[1,2], Hannah Carter[1], Sundresan Naicker[1], and Sanjeewa Kularatna[1]

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[2]Digital Health and Informatics Directorate, Metro South Health, Brisbane, Queensland

INTRODUCTION

The Problem

• **Non-attendance** (also known as a no-show, failure to attend (FTA), or did not attend (DNA)) refers to situations where a patient fails to attend scheduled healthcare appointments at the specified time without advanced cancellation or rescheduling. This may result in a vacant appointment slot that cannot be utilised or offered to others.

• Non-attendance is a **significant source of waste**, costing:
- the US healthcare system $150 billion annually
- the UK healthcare system £1 billion annually

• **It also contributes to:** lengthened waiting lists, inefficient use of staff time, and limited appointment availability for other patients.

The Solution

• **Automated appointment reminders** are commonly used to prevent non-attendance. However, the effectiveness of these reminders is variable, and reminders can be influenced by consumer preferences (e.g., patients who receive their preferred reminder might be more likely to attend their scheduled healthcare appointments).

• Within the context of the Australian healthcare system, there is paucity of data on preferences for reminders.

• Our study aims to conduct a discrete choice experiment (DCE), a method to study choice, to elicit consumer preferences for healthcare appointment reminders.

METHODS AND RESULTS

The Discrete Choice Experiment Four-Stage Development Process

1 LITERATURE REVIEW — *COMPLETED*
To identify key attributes of a healthcare appointment reminder

2 EXPERT PANEL — *COMPLETED*
To finalise attributes and levels for use in the pilot test

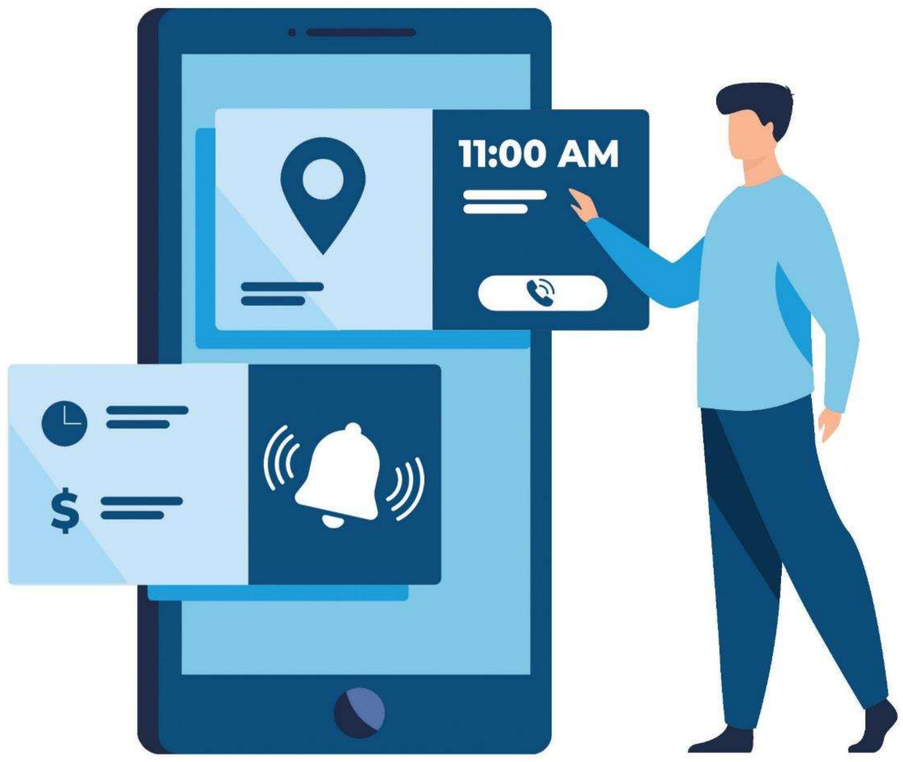
3 PILOT TESTING — *IN PROGRESS*
To ascertain comprehension and functioning of the survey

4 ONLINE DCE SURVEY — *IN PROGRESS*
To elicit consumer preferences for an appointment reminder

WHAT ARE YOUR REMINDER PREFERENCES?		
	MODALITY	What type of reminder do you prefer?
	TIMING	When do you want to receive your reminder?
	CONTENT	What do you want the reminder to say?
	INTERACTIVITY	How interactive do you want the reminder to be?

RESEARCH IMPLICATIONS

CONSUMER-CENTRED SOLUTION



Translation and Impact

• The findings can be used to help inform the design of future appointment reminder systems that are co-designed with consumers and that more aligned with consumer preferences.

Conclusion

• Having a better understanding of consumer preferences for an appointment reminder may lead to improved attendance at scheduled healthcare appointments.

• Preference elicitation can provide insight into what appointment reminder characteristics consumers value most (e.g., do consumers value one reminder type over the other?)

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Contact: Shayma Mohammed Selim **Email:** shayma.mohammedselim@hdr.qut.edu.au **Linkedin/Twitter:** @shayma.mselim

CONSUMER VIEWS ON CLINICIANS USING HEALTH DATA FOR LEARNING

Anna Janssen, Kavisha Shah, Melanie Keep, Tim Shaw

WHY WE DID THE RESEARCH

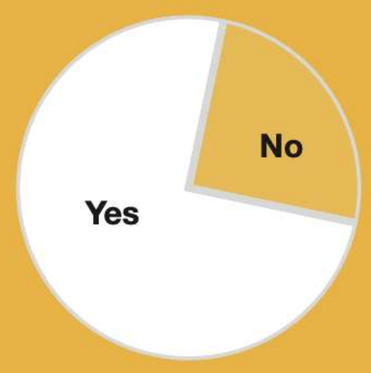
The health system collects large quantities of health data from the Australian public.

Despite this, we don't know what data people think is being collected about their health or how they would like it used.

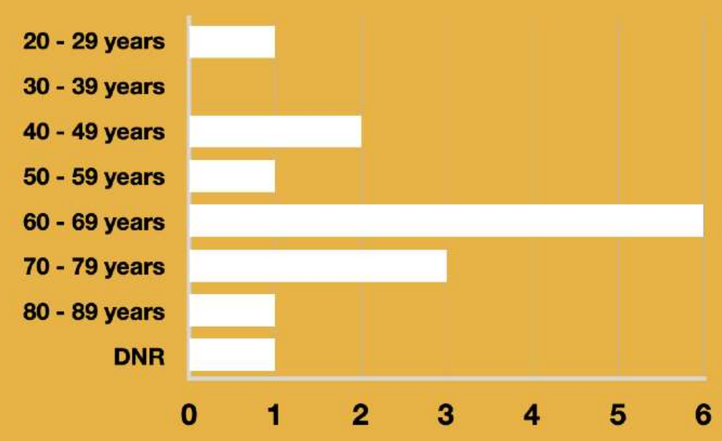
We asked Australians about collection and use of health data, particularly in the context of health professional using it for learning and reflection.

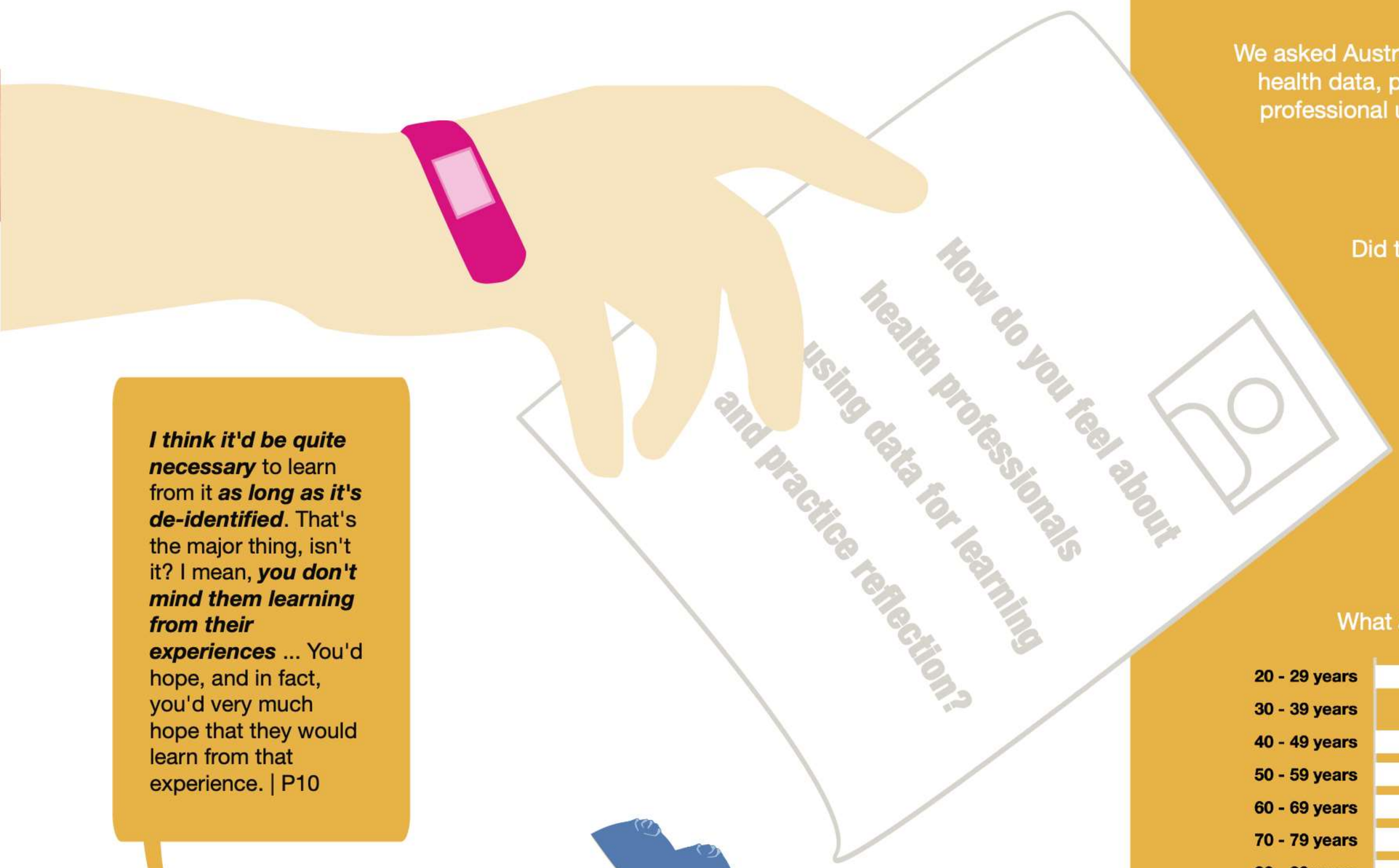
WHO WE INTERVIEWED

Did the fifteen participants ***frequently*** interact with the ***health system***?

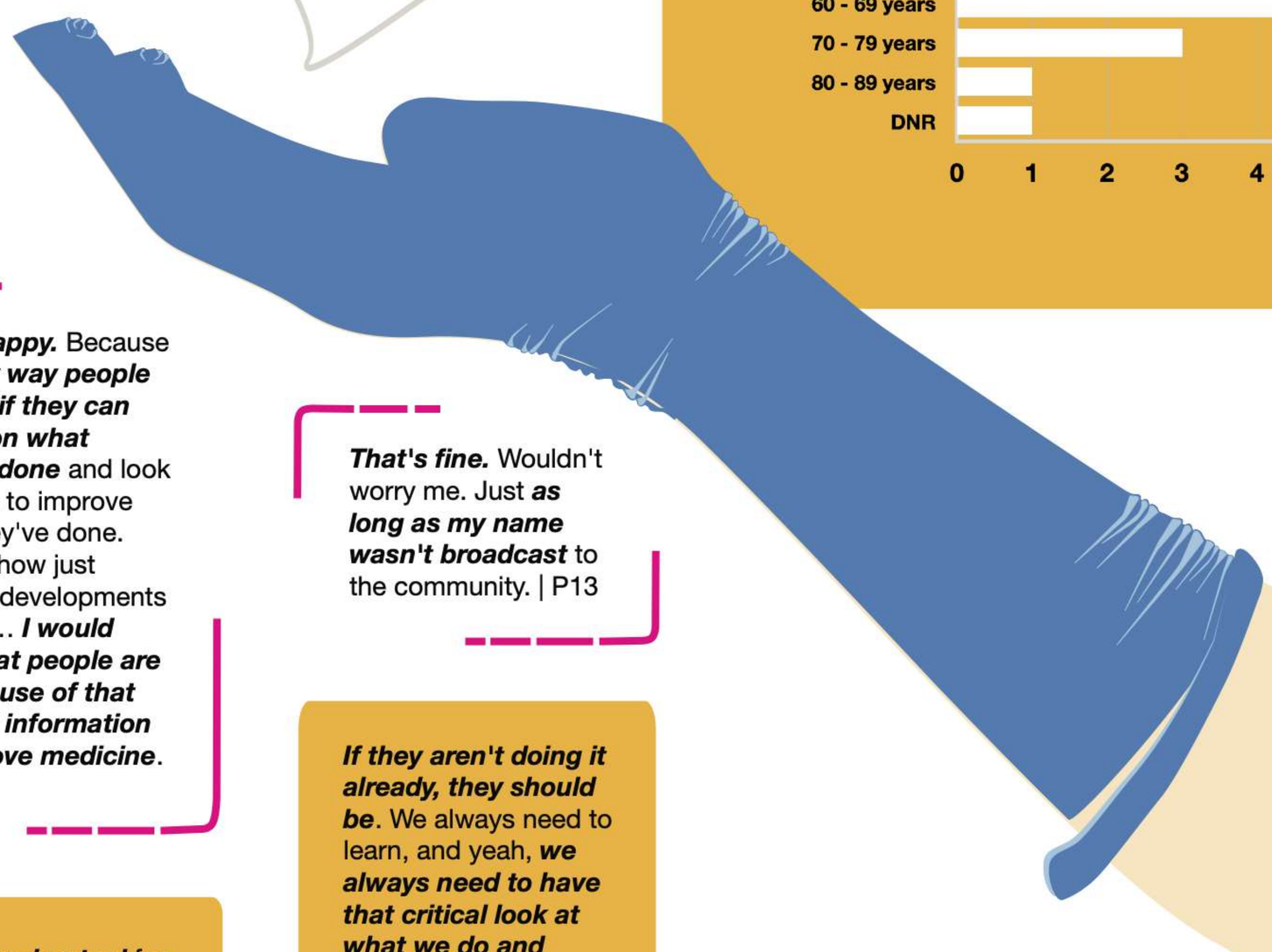


What ***age*** were the fifteen participants?





I think it'd be quite necessary to learn from it ***as long as it's de-identified***. That's the major thing, isn't it? I mean, ***you don't mind them learning from their experiences*** ... You'd hope, and in fact, you'd very much hope that they would learn from that experience. | P10



That would be fine. Because it will lead to a better outcome for an old patient. ***It's part and parcel of a learning process***… I mean, if you're going to learn, ***they've got to be able to go through that data***. They've got be able to. | P14

I***'d be happy.*** Because ***the only way people learn is if they can reflect on what they've done*** and look for ways to improve what they've done. And it's how just medical developments happen… ***I would hope that people are making use of that medical information to improve medicine***. | P9

That's fine. Wouldn't worry me. Just ***as long as my name wasn't broadcast*** to the community. | P13

I think it's essential and great…but de-identify information discussed and ***as long as it is constructive and objective***. Perhaps it should be noted on the system that a patients information has been extracted by whom for what purpose. | P12

It's a learning tool for the health practitioner… I don't have a problem with that. ***The issue for me is around informed consent***. | P5

If they aren't doing it already, they should be. We always need to learn, and yeah, ***we always need to have that critical look at what we do and always constantly try and learn***, and learn from our mistakes, so that's something they should absolutely do. | P1

Absolutely fantastic, because I'm going to benefit from it when other people do it. If they're doing it for another person, I'm going to benefit... ***If they do it to my data, another person is going to benefit*** from it, and ***that makes me feel good***. You know, warm fuzzies. | P11

I think it ***could help them consider the mix of illnesses and conditions they are seeing***, and that may mean that the ones they're not seeing as much of they need to work harder to keep themselves up to date. | P6

I think it's great. Like for them to look at that and take that seriously I think it's fantastic because ***it means they're really interested in what has happened*** if you're actually reviewing it. | P6

SUPPORTED BY

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Shakedown to Sustained Use of Clinical Decision Support Systems

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2. Australian Centre for Health Services Innovation and Centre for Healthcare Transformation, Queensland University of Technology, Brisbane, Australia.

BACKGROUND

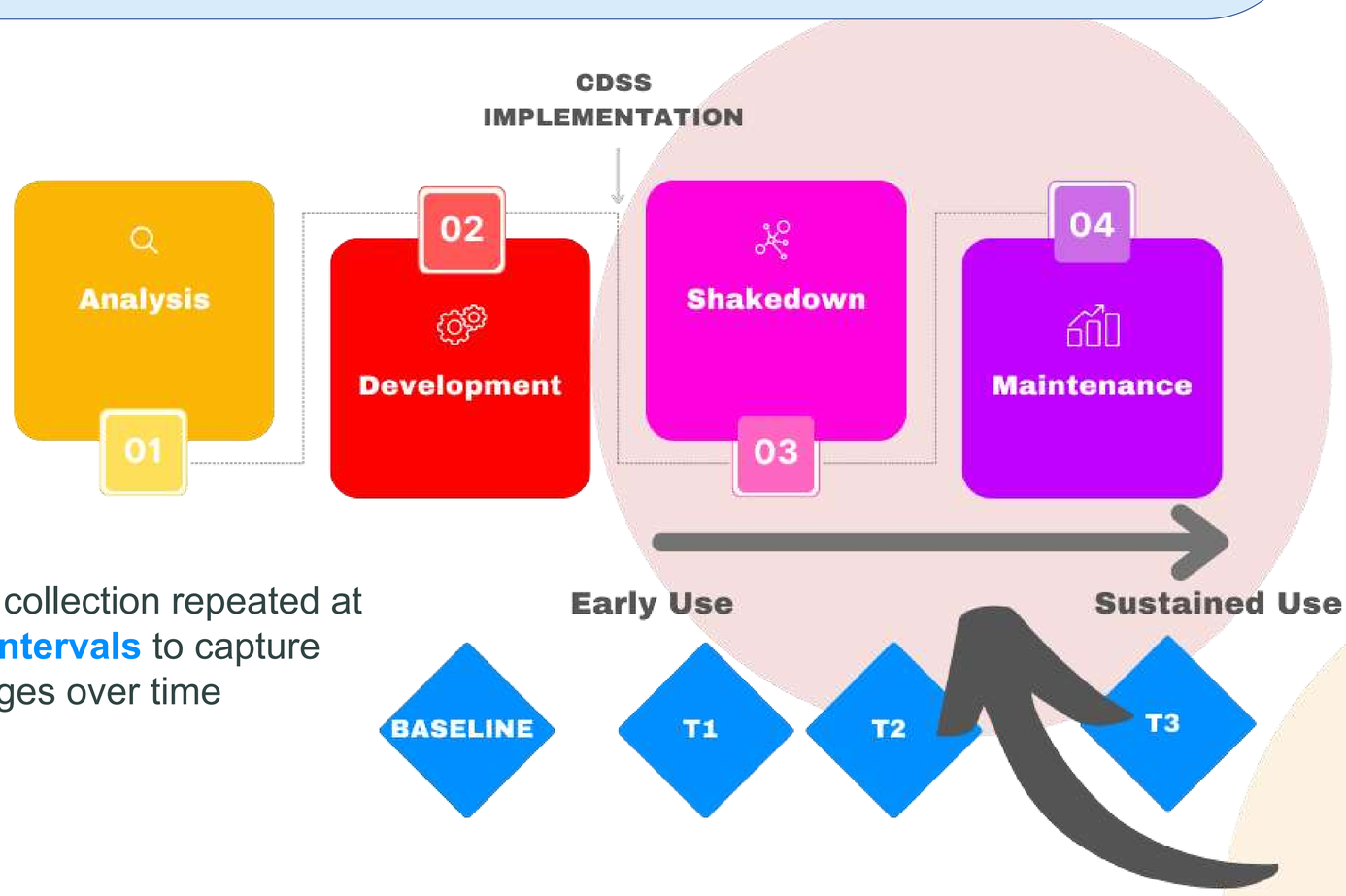
- Clinical Decision Support Systems (CDSS) aim to improve patient outcomes by providing clinicians with targeted information at the point of care, but their potential is rarely fulfilled
- CDSS impact is dependent on **clinicians' acceptance and use** of the technology as intended over time – even when initial uptake is promising, long-term benefits are dependent on surviving the shakedown phase and achieving sustained use
- Current research is limited by its static nature, but real-world implementation is a **dynamic process** and acceptance and use of technology varies at different times

OBJECTIVE

To explore factors influencing clinicians' acceptance and use of CDSS in hospital settings over time

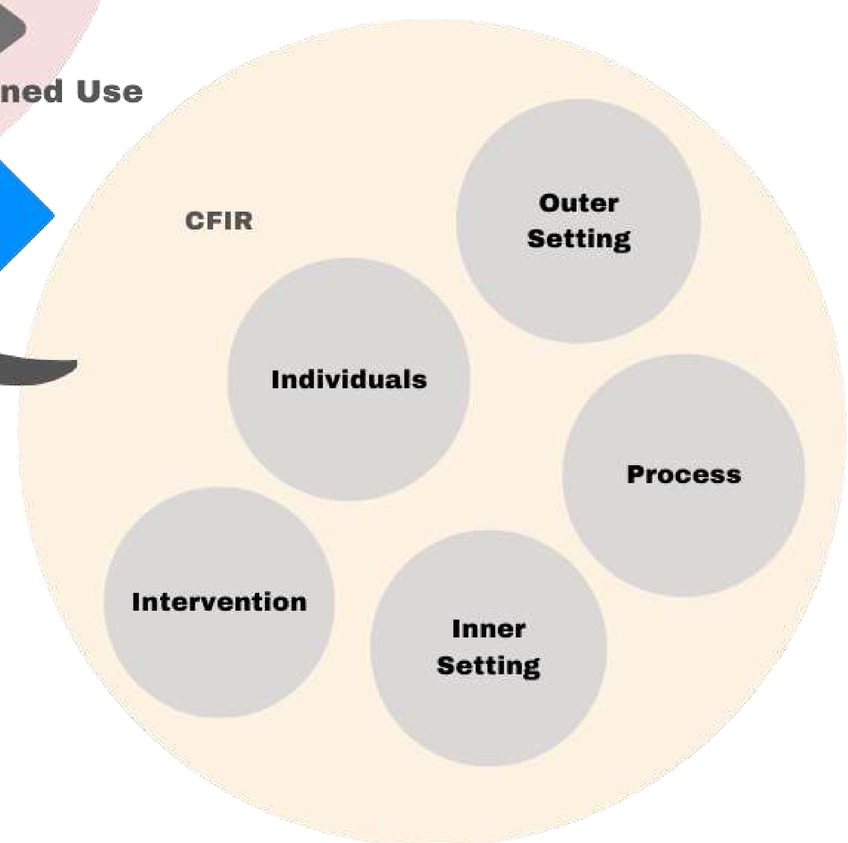
METHODOLOGY

1. **Systematic review** of clinicians' perceptions of and interactions with CDSS at different time points following implementation
2. **Interviews, observations and user log analysis** across Sydney Local Health District and Murrumbidgee Local Health District, where CDSS are being implemented



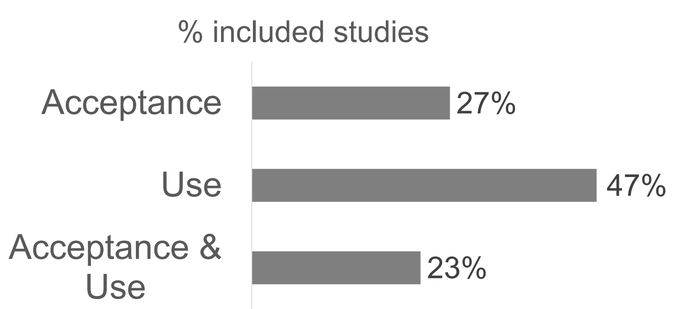
Data collection repeated at **key intervals** to capture changes over time

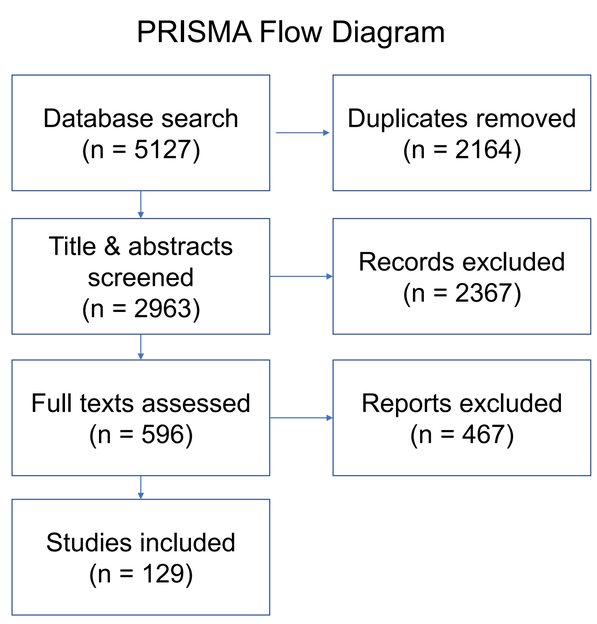
Factors clustered using the **Consolidated Framework for Implementation Research (CFIR)**[1] at the point in time they occurred



RESULTS (PHASE 1)

- Limited qualitative research conducted during the early phases of implementation ('shakedown')
- Use is typically aggregated over months or years





IMPACT

- ☑ Nuanced understanding of the factors that influence clinicians' acceptance and use of CDSS over time
- ☑ Optimise resource allocation and inform adaptive strategies that support clinicians' dynamic needs at each step of implementation
- ☑ Inform when impact of CDSS on process of care and patient outcomes should be measured

CONCLUSION

- Targeting factors that influence use as they arise can improve implementation success and enhance impact on patient outcomes
- Further research is needed to understand user needs during the shakedown period and changes in use over time

ACKNOWLEDGEMENTS

Financial support provided by the Digital Health CRC
Grant number DHCRC-0085

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Accelerating Aged Care Quality

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digital health crc

PROJECT PARTNERS digital health crc | The University of Queensland | Australian Government Department of Health | Bupa Foundation

With CSIRO, Residential Aged Care Providers and Technology Partners

Australian Government Department of Industry, Science and Resources | AusIndustry Cooperative Research Centres Program

INDUSTRY PROBLEM

- Residential aged care providers need reliable and accurate psychosocial, functional and clinical data to guide clinical, resource and quality management decisions.
- Today, instruments for assessment vary, and data is commonly fragmented within providers, and not interoperable with external care partners.
- Government reporting plays a role in quality assurance, but often burdensome for providers, a minimum dataset at a given point in time, and lacking reliable comparability.
- Adoption of data standards that support "create once, use many times", ensure accurate resident data is available to those delivering care and for comparable quality benchmarking, are key to ensuring quality care for long-term care populations.

INDUSTRY-PARTNERED SOLUTION

Aged Care Data Compare (ACDC)

- ***Is the first technical data solution to address the problem holistically***
- ***Targets improved efficiency, experience, health and quality outcomes, learning and innovation***

Includes implementation resources

Value components

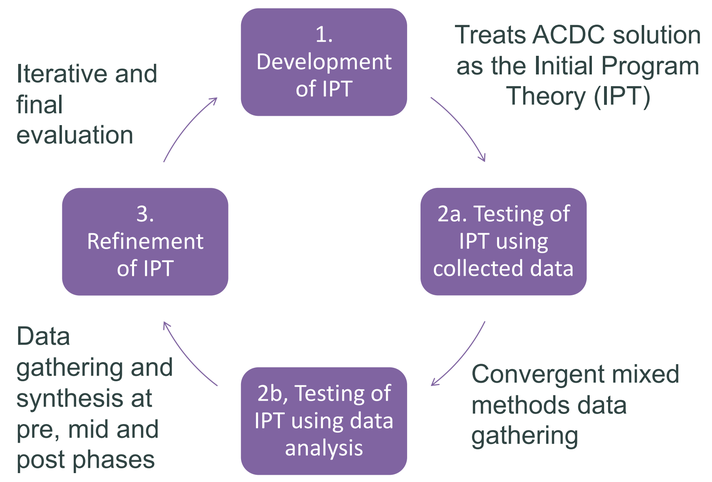
- Draws on two international standards – the InterRAI Long-Term Care resident assessment instrument, and Fast Healthcare Interoperability Resources (FHIR)
- Makes available comprehensive resident data for routine care, and accurate and comparable cross-facility benchmarking of a broad set of provider-agreed quality indicators including those mandated

AIMS OF THE RESEARCH

- A sub-project of the ACDC initiative, undertaken as a PhD, looks at the problem and ACDC solution through a Realist Evaluation methodology that enables deep understanding to support stakeholder decisions on ACDC adoption.
- Realist Evaluation is well-suited to health and social system innovation programs that involve organisation and policy change where context, experience and outcomes at multiple system levels matter and impact adoption.
- The research focuses on data, organisation, and policy considerations of implementation and adoption.

METHODOLOGY

Realist Evaluation *gets under-the-hood to gain understanding in multi-stakeholder, multi-context projects, focusing on* ***"What work for whom and under what circumstances?"*** *rather than* ***"Did it work?***



FOUR-STEP PROCESS

- International Literature Review
- National Case Studies
- Pilot Implementation Evaluation
- Insights for Scaled Adoption

INTERNATIONAL INSIGHTS AND CASE STUDIES

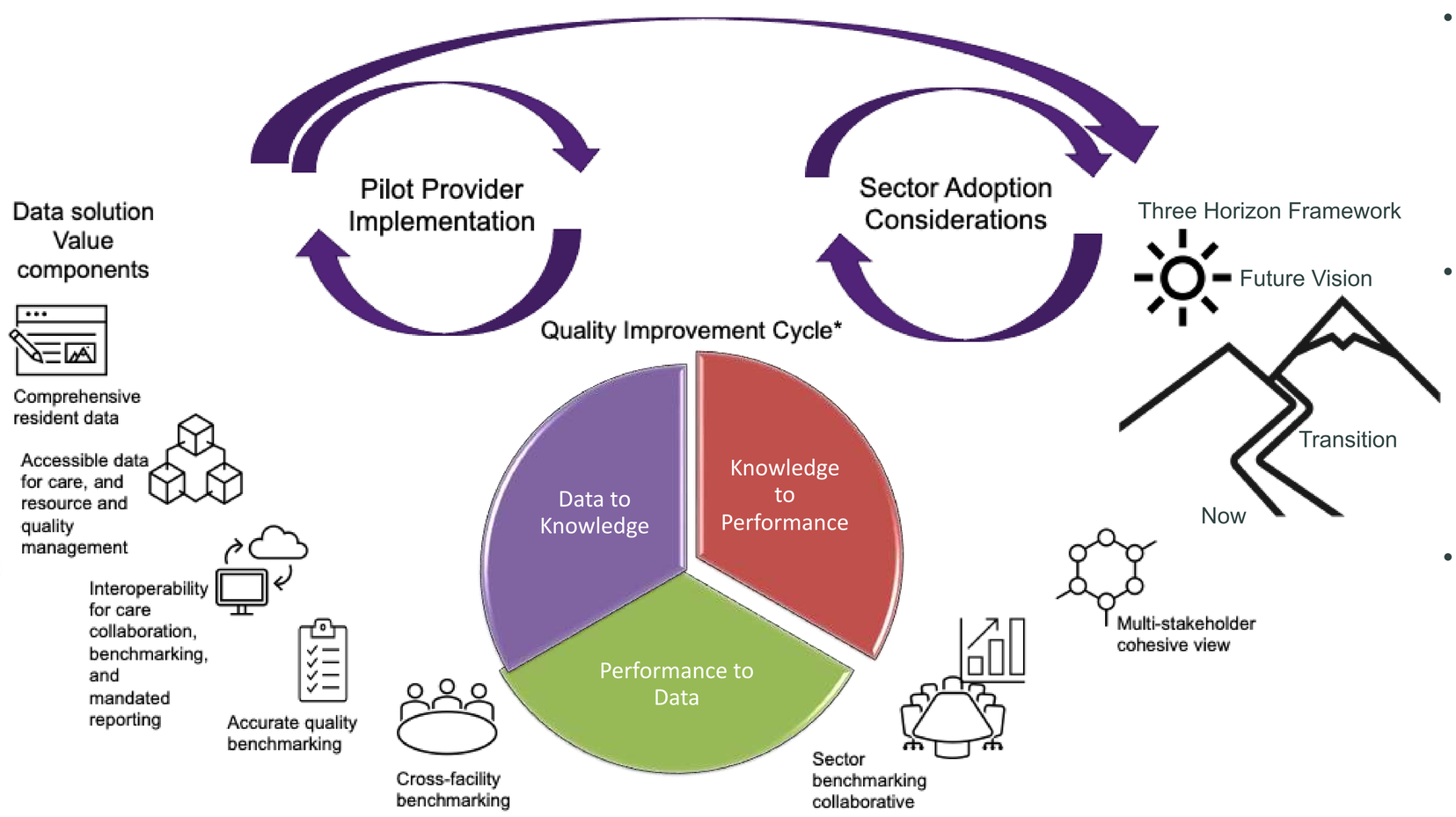
Initial insights from a global review of data-supported quality aged care systems shows

- *Digital maturity in long-term care providers improves performance*
- *Many countries are building national aged care data systems, often based on InterRAI instruments*
- *More support needed building provider digital and quality performance capabilities*

Next – Case studies of national aged care quality systems in Canada, Finland, New Zealand and the United States

ACDC IMPLEMENTATION EVALUATION

- Realist evaluation of "as is" to "with ACDC" across the data, care delivery and sustained performance cycle* within one Australian residential aged care organisation.
- Assessing pilot data, workflow, experience and outcomes at pre, middle and post phases of implementation.
- Assessing the impact and value of each data solution component, and synthesising insights on ACDC workflow impacts, experience and outcomes.



INSIGHTS FOR SCALED ADOPTION SUCCESS

- Data gathering with Australian stakeholders to gain viewpoints and create a cohesive industry perspective on ACDC adoption.
- Translating evidence and insights, from a data, organisation and policy perspective, related to impact and value of ACDC if adopted at scale in Australia.
- Defining transformation alternatives and considerations related to ACDC adoption and achieving the future goal of high-quality care for our growing long-term care population.

Want to learn more or contact us?

Adopting CDSS in healthcare: combining theory with practice

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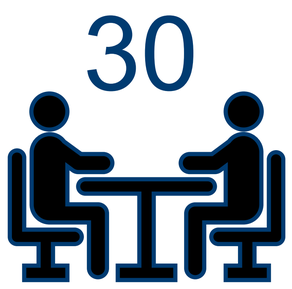
BACKGROUND

- Clinical decision support systems (CDSS) are increasingly indispensable to the high-quality, safe and efficient healthcare delivery in Australia, particularly within acute care settings like hospitals
- Inappropriate use and sub-optimal uptake of these tools can and do waste valuable healthcare resources, investment and intellectual labour [2]
- The implementation process and the mechanisms for success or failure of CDSS uptake are multi-factorial; given the complex organization of health services and systems [3,4]

> **"Knowledge of theories, models and frameworks (TMF) from the field of implementation science may assist in providing translational guidance for CDSS implementation."**

- This international study explores how implementation science TMFs are applied across a range of digital health settings to identify active translation factors to promote the uptake of digital innovations in healthcare

METHOD



Semi-structured Interviews

were conducted with healthcare workers, health services researchers, and implementation scientists to investigate the use of TMFs when implementing or evaluating CDSS interventions in healthcare settings

RESULTS

Interviews conducted thus far have identified the following key factors:

Co-design

"For implementation…when it comes to digital health is that if it's codesigned, it makes -the implementation is just so much easier"

Use a systems approach

"Implementation… involves looking at what's being done in the system, the problems to implementation and the solutions for implementation"

Context matters

"The solution must fit into the systems current values, fits or trends"

Healthcare workers

Health services researchers

Implementation scientists

TRANSLATION & IMPACT

- Interview data will inform a series of workshops to identify the most important translational factors influencing the implementation and evaluation of CDSS use in healthcare settings
- Study's findings may be used to extend the application of current TMFs or provide stand alone guidance to healthcare and related stakeholders to facilitate effective and sustainable CDSS adoption

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ACKNOWLEDGEMENTS

digital health crc

Metro South Health
Queensland Government

AusHSI Australian Centre for Health Services Innovation

QUT the university for the real world