

National Centre for Healthy Ageing

**Creating an integrated
electronic health record
data platform for
revolutionising healthcare
improvement**

Associate Professor Nadine Andrew
Research Lead, NCHA Data Platform

A partnership between



Declaration of Interests



Australian Government

The National Centre for Healthy Ageing acknowledges the financial support of the Australian Government Department of Health to support the Centre establishment

Presentation Overview

Despite a proliferation in electronic health data, information remains siloed, poorly integrated and underutilized

- Introduce the National Centre for Healthy Ageing (NCHA) and the Data Platform crafted by our diverse multidisciplinary team
- Describe how we have broken down these silos unlocking the power within these data for healthcare improvement
- Present real-world use cases to showcase the transformative impact of our model
- Showcase the capacity of our model to scale both nationally and globally

Addressing failures to optimally use EHR data for healthcare improvement



The National Centre for Healthy Ageing

**Established by foundation partners
Monash University and Peninsula Health,
with investment from the Federal
Government**

- Our **mission** is to transform health related to ageing for all Australians utilizing a life course approach
- We engage with the community to design, test, and implement meaningful solutions that have a positive impact on healthy ageing
- We work with local, state, and national partners for the greatest impact, while creating opportunities for global reach



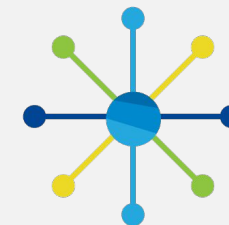
>200

Research members
and affiliates



25+

Major research
programs



>120

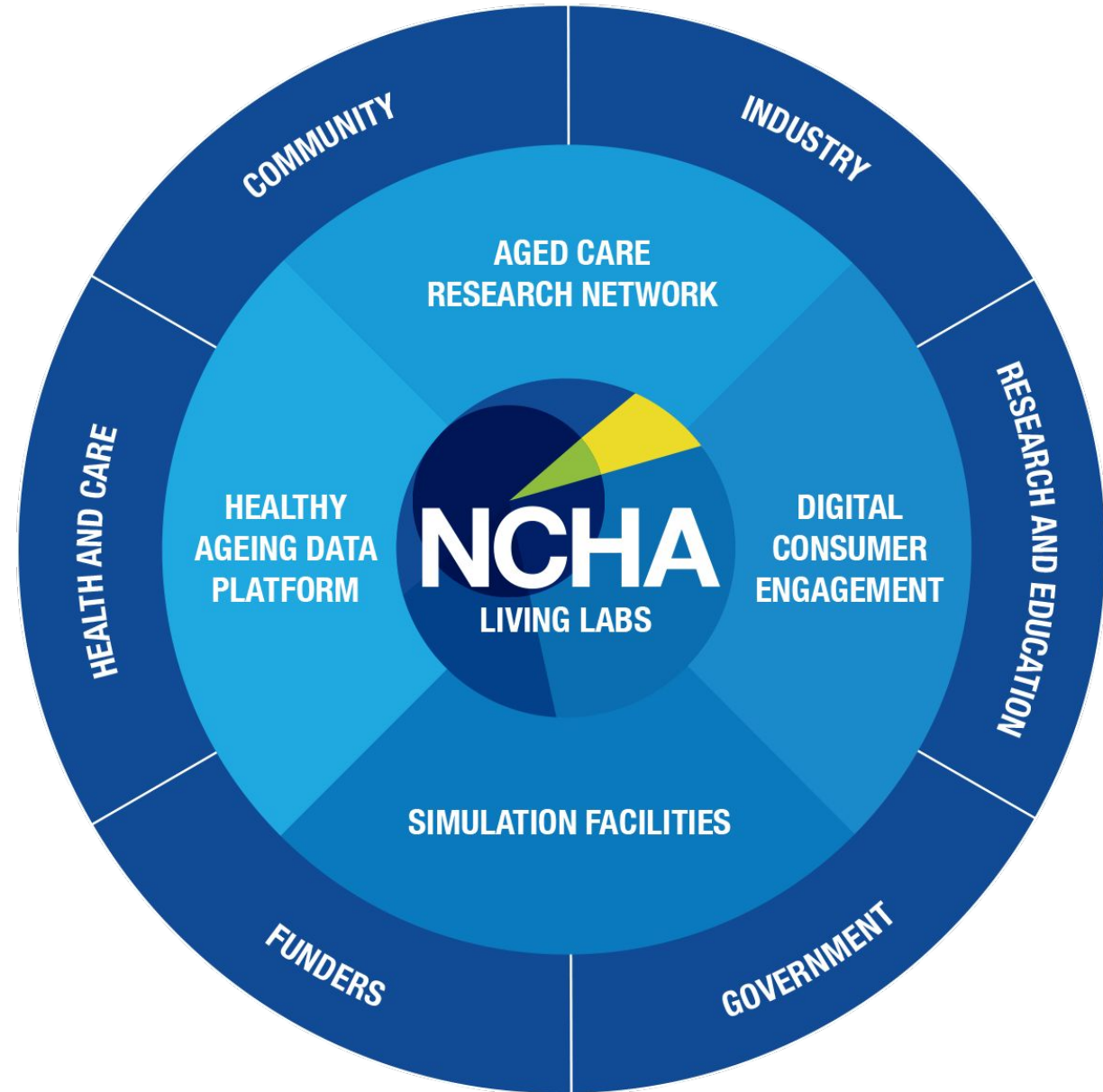
National and
international
collaborators

Research and Infrastructure

Our Living Labs Research Program

25+

Major research
programs



“The NCHA is unique. No other centre for healthy ageing has our combination of talent, research programs and technology-enabled platforms – all designed with blue sky thinking to future-proof efforts in healthy ageing research.”

—Professor Velandai Srikanth,
Director, NCHA



Using cutting-edge techniques, our integrated EHR data environment will support the highest quality research to generate insights into solutions

Digitalization of health data has created unique opportunities

Provides:

- granular clinical data
- regular updates within systems
- potential to view the full patient journey

Designed for clinical documentation and reporting

Leading to a lack of:

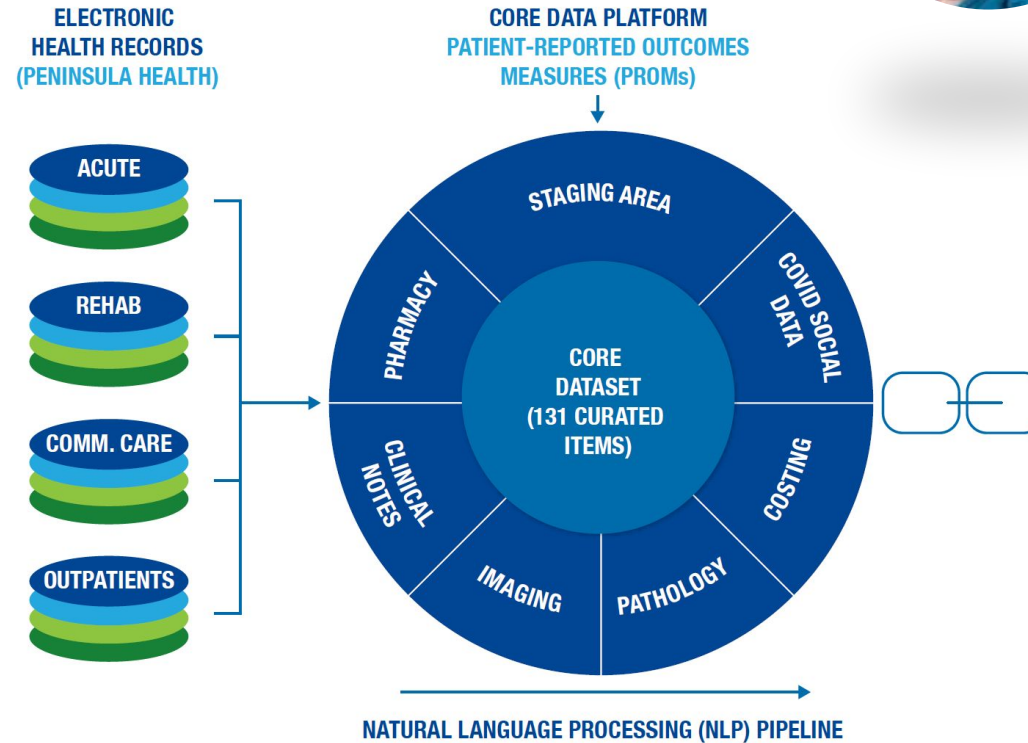
- interoperability between systems
- standardisation of data models
- large amounts of unstructured data



-
- A map of Australia with a red dot in the south-east corner. An arrow points from this dot to a larger, detailed map of the state of Victoria, which is shown in green. The detailed map includes labels for various locations: Portland, Serravallo, Blairgowrie, Rye, Roadbud, Cape Spanok, Flinders, Main Ridge, Shoreham, Merriks North, Merriks, Red Hill, Balnarring, Morrong, Mount Martha, Tuorong, Hastings, Tyabb, Moorooduc, Somerville, and Mount Eliza.

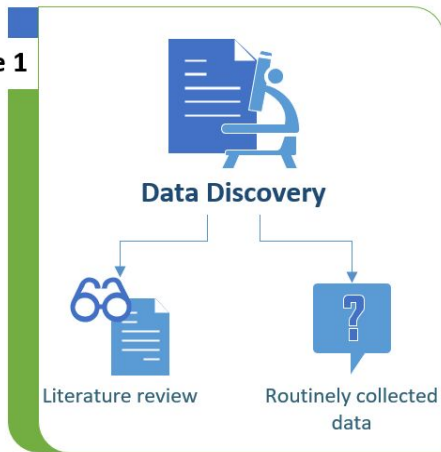


~ 1 million individuals' records over 11 years

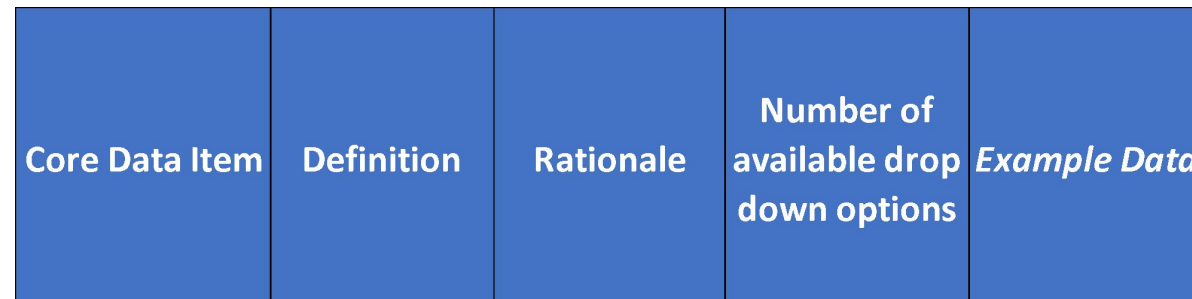
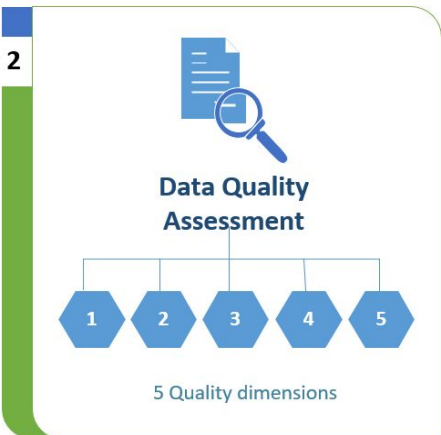


Determining the content

Phase 1



Phase 2



DELPHI Process

Data Access Request

Delphi process

End user group participation

Peninsula Health

16 Clinicians
12 Clinical Areas

e.g. Mental Health, Emergency,
Pharmacy, Gastroenterology,
Respiratory, Cardiology, Intensive
Care, Allied Health,
Geriatrics

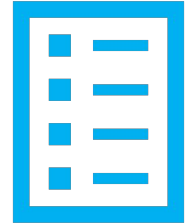


Monash University

14 Researchers
9 Departments

e.g. Monash Addiction Research
Centre, Rehabilitation, Ageing and
Independent Living, Primary and
Allied Health, Physiotherapy, Nursing
and Midwifery

Creating a core dataset



Determine
core data
items

Extract into
warehouse
staging area

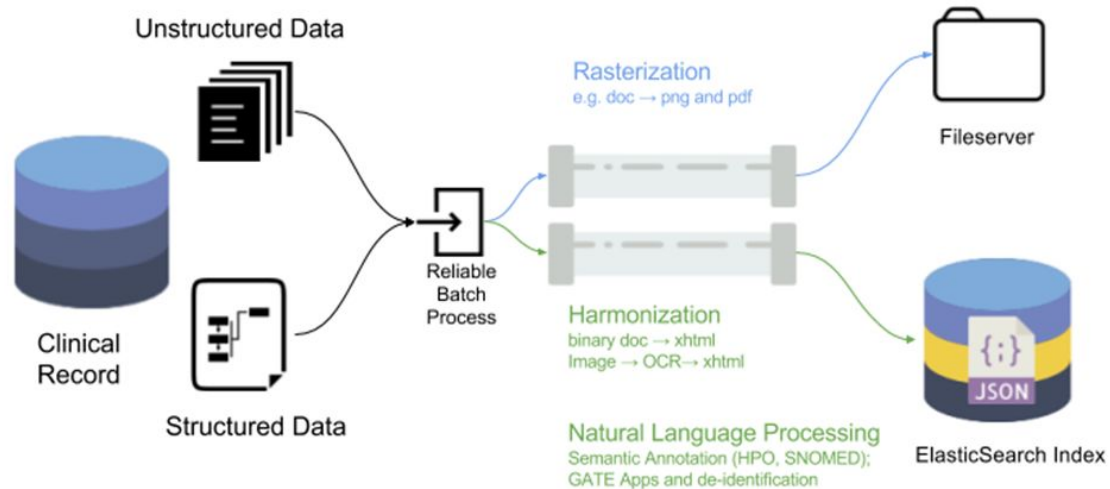
Harmonise
and link

Maximise
quality

Generate
data
dictionaries

Occurs inside the data warehouse

Implementing Natural Language Processing



Apps Platform

Enterprise Search
e.g. cohort selection

Semantic Search
SemEHR

Business Intelligence and Analytics

Live Alerting

Patient Timeline

De-Identified Research Dataset

Enables us to find relevant clinical information from free-text records when we want information that isn't already coded:

- provide new insights into health and ageing
- enhance data quality
- generate new variables
- develop sophisticated predictive analytical tools to solve important health system problems

Curated electronic health data from
~ 1 Million people over 10 years
Updated monthly



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131 Core data items

2 acute hospitals, 2 rehabilitation hospitals and >10 community and outpatient centres

Linked data for All residents aged ≥ 60 years

Dataset	Start	End	Episodes (incl dups)	Individuals
EHR Admissions	02 Jan 2010	17 May 2021	111,116	28,977
EHR Emergency	02 Jan 2010	17 May 2021	88,980	36,263
EHR Outpatient	04 Jan 2010	17 May 2021	121,615	21,093
EHR Community	05 Jan 2010	17 May 2021	193,186	13,254
Medicare	01 Jan 2010	31 Aug 2021	54,130,816	177,509
Pharmaceutical	01 Jan 2010	31 Aug 2021	57,559,786	177,197
National Death Index	01 Jan 2010	31 Aug 2021	41,312	41,312
State Admissions	01 Jan 2010	30 Nov 2020	1,558,731	144,121
State Emergency	01 Jan 2010	30 Nov 2020	516,671	122,217
State Outpatient	01 Jan 2010	18 Sept 2019	1,720,300	88,661

EHR derived
sub cohort

n = 50,253
individuals

n = 49,300
linked
(98.1%)

Medicare spine

n = 179,089 individuals

State hospital data (all
residents aged ≥ 60)

n = 151,686 individuals



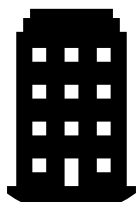
People

Researcher experience assessed
Statistical support provided



Projects

Reviewed by NCHA committee including consumers
Approval by HREC



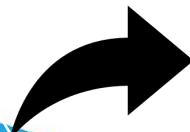
Data

Deidentified release,
Separation principle



Settings

Secure e-research environment (SeRP)

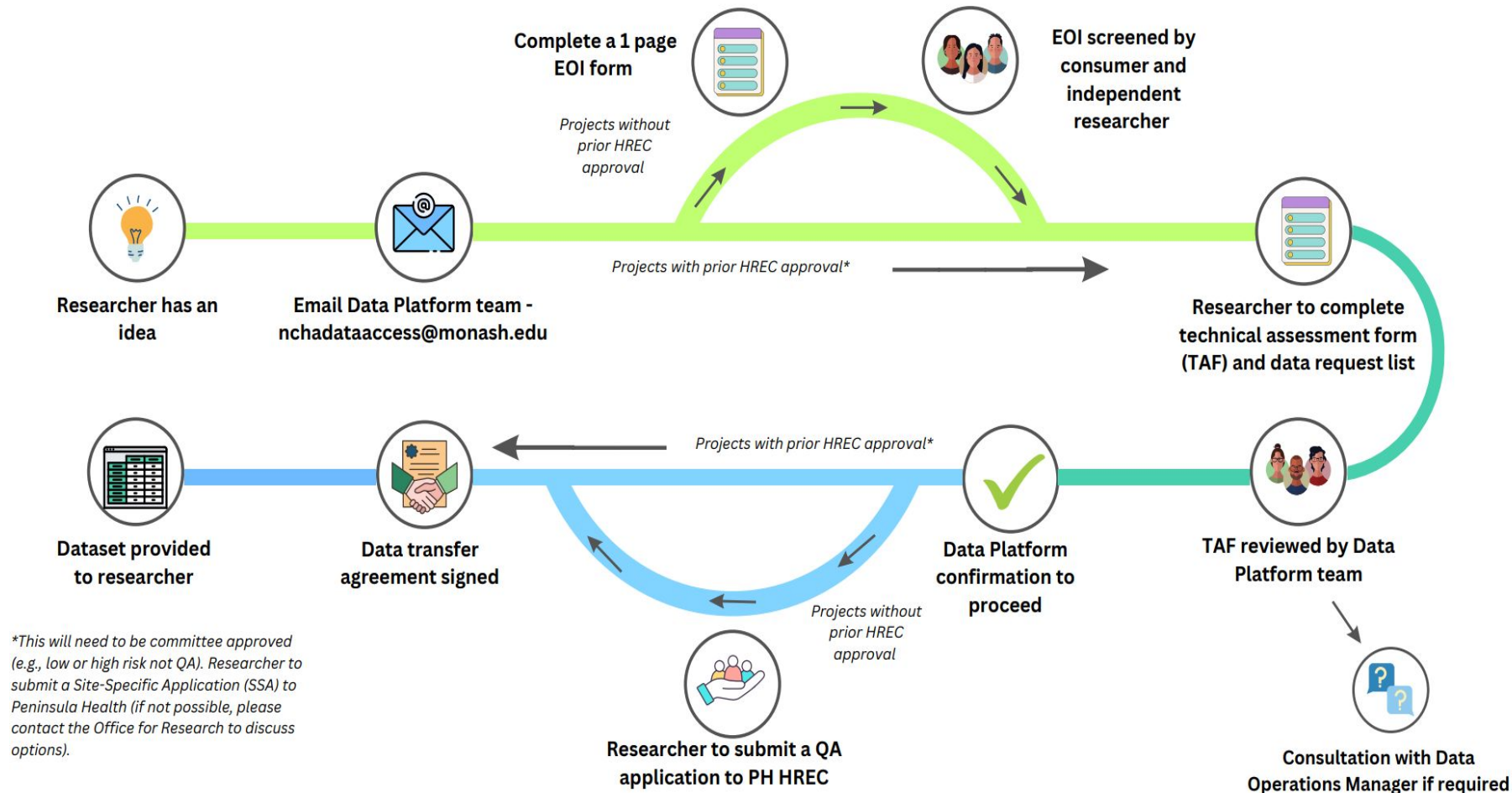


Output

Reporting guidelines
Pre-publication review

Application of the Five Safes Framework

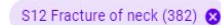
Data Access



We have developed a streamlined process with consumer review

[Research - National Centre for Healthy Ageing \(NCHA\) \(\[monash.edu\]\(http://monash.edu\)\)](mailto:nchadataaccess@monash.edu)
nchadataaccess@monash.edu

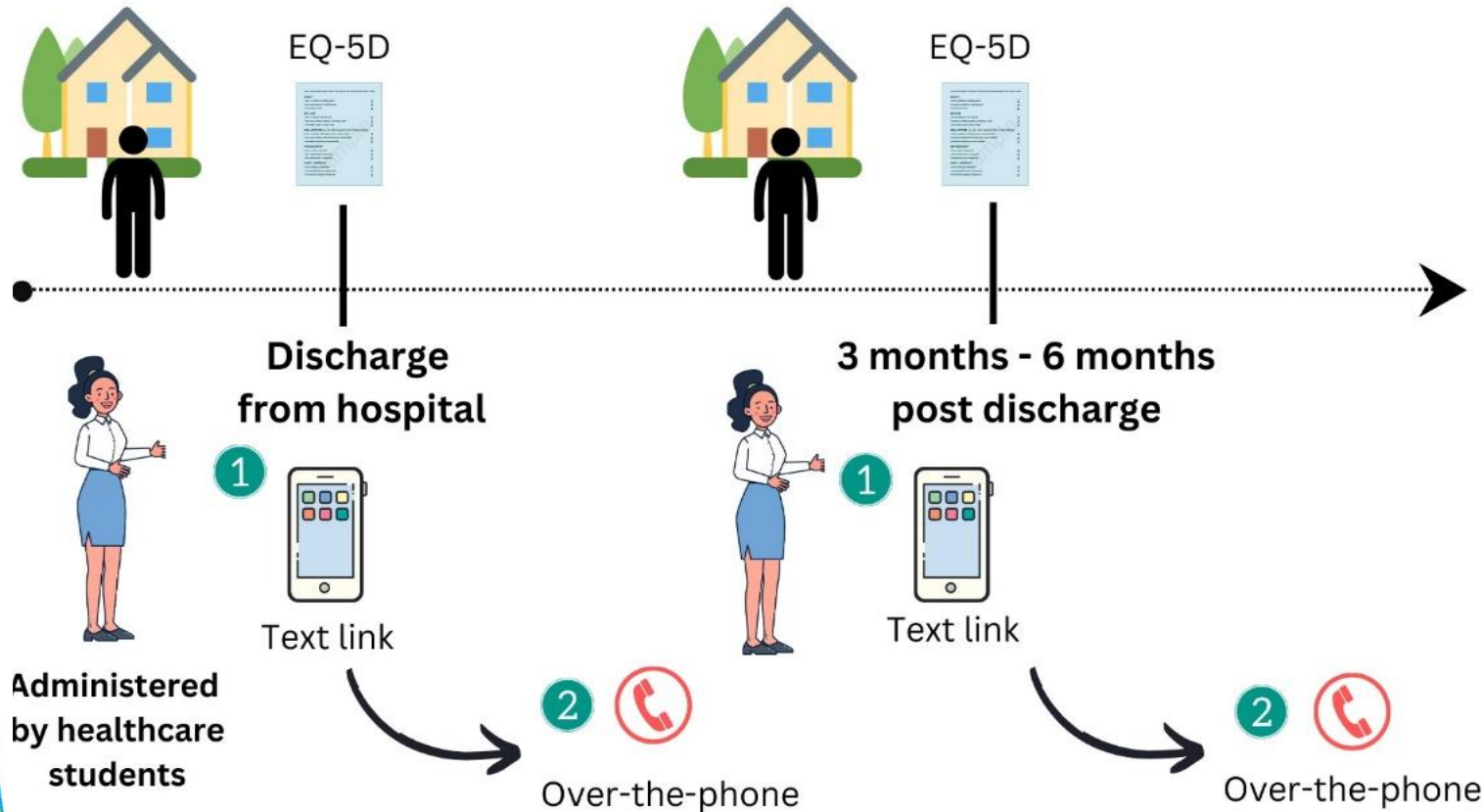
female (44337) male (40731)



**A tool to help
researchers
efficiently
access,
navigate, and
understand
their data
needs**

Patient Reported Outcome Measures **collection strategy**

Feasibility trial results following testing in one acute and one sub acute ward in people aged >60 years



PROM completion rate excl deaths ^a ,	Discharge (n=131)	Follow-up (n=131)
n (%)	110(84)	90(72)
Mode, n(%)		
Tablet	63(57)	-
Phone	38(35)	74(82)
SMS	9(8)	16(8)

Codesigning a consumer engagement strategy



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Two workshops (n=16) to explore attitudes on sharing personal data for research and codesign our strategy

ATTITUDES

- Consumers can see the benefits of sharing data for research and healthcare improvement but it is influenced by 'low trust' in the broader society
- Concerns around data security and quality
- Desire for greater transparency in how their health data are used

STRATEGY

- Print media using consumer friendly language
- Outreach to community groups and events



Digitally-enabled Consumer Engagement

Beginning 2024, we host the Australian chapter of the Voice Consumer Engagement Platform, providing uniquely enhanced capability to harness the insights, needs and aspirations of our community.

- Partnership with the UK's National Innovation Centre for Ageing (NICA)
- Provides access to a global network of >8,000 citizen views on healthy ageing topics
- Allows co-developing and testing in real-world, real-time settings



National Innovation
Centre **Ageing**

oice



Our data are supporting
>45 use case projects

Processes have
been tested
through
project-based
use-cases in
areas including:
dementia,
residential aged
care, medication
use,
homelessness
and health
service redesign

Better @ Homes Program - Interim Evaluation	HIS Quality Audits
Building Capacity to optimise pressure injury prevention and surveillance across Monash healthcare services	Using data to improve interactions between health services and residential aged care facilities
<i>A retrospective cohort study to evaluate the risk factors for Clostridioides difficile infection and clinical outcomes of treatment by severity stage for inpatients at Peninsula Health</i>	<i>A retrospective assessment of adherence to prescribing guidelines for antiviral agents in the treatment of mild to moderate COVID-19 disease in a Victorian outer metropolitan hospital</i>
Living Labs - Mapping the Alcohol and Other Drug Treatment patient journey (AOD-PJ)	Determining the impact of opioid policy on intended and unintended harms: a data linkage study
<i>Evaluation of the impact of an extended clinical pharmacy service on optimisation of patient medications following a ST-elevation myocardial infarction</i>	Point prevalence survey of psychotropic medications use in hospitalised patients discharging to a residential aged care facility
Provision of a community care program and readmissions	Building capacity to optimize pressure injury prevention and surveillance
Living Labs - Mental health problems and emergency department presentations for older people	Leveraging electronic medical records and routine administrative data for monitoring Dementia
Deep End Living Lab - Homelessness in Healthcare, Data Stream	Optimising health information exchange during aged care transfers
<i>Medication therapy and Parkinson's disease: The incidence of medication errors in a Metropolitan Australian Health Service</i>	<i>Evaluation of hip fracture patients who receive timely and effective pain management in an Australian metropolitan hospital</i>
<i>A study of bone protective medication prescribing for hip fracture patients prior to separation from a metropolitan Australian Hospital</i>	<i>A study of opioid prescribing for patients in Hospital in the Home of a major Australian public hospital</i>
<i>A study of the accuracy of allergy alerts for sulfa drugs in the Electronic Medical Record in a Metropolitan Hospital</i>	Development of a readmission risk algorithm

Blue text = led by a Peninsula Health clinician

Black text = led by a Monash University researcher



Impact of COVID-19 lockdowns on hospital presentations and admissions in the context of low community transmission: evidence from time series analysis in Melbourne, Australia

Taya A Collyer ^{1,2} George Athanasopoulos, ³ Velandai Srikanth, ^{1,2,4} Ravindranath Tiruvoipati, ^{1,4} Chris Matthews, ⁴ Nicholas Mcinnes, ⁴ Shyaman Menon, ⁴ Jonathan Dowling, ⁴ Gary Braun, ⁴ Timur A Krivitsky, ⁴ Helen Cooper, ⁴ Nadine E Andrew ^{1,2}

- Substantial departures from forecasted presentation levels were observed during both waves
- Reductions were most marked among those aged >80 and <18 years
- Presentations persisted at expected levels for urgent conditions, and ED triage categories 1 and 5, with clear reductions in categories 2–4

Change in (A) emergency department (ED) presentations and (B) acute admissions

Protocol

Determining the Impact of Opioid Policy on Substance Use and Mental Health–Related Harms: Protocol for a Data Linkage Study

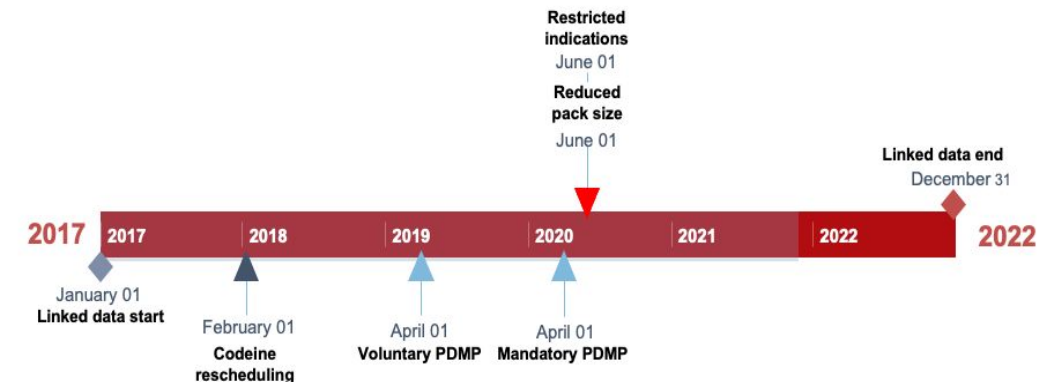
Ting Xia¹, PhD; Louisa Picco¹, PhD; Samanta Lalic^{2,3}, PhD; Rachelle Buchbinder⁴, PhD; J Simon Bell², PhD; Nadine E Andrew⁵, PhD; Dan I Lubman⁶, PhD; Christopher Pearce⁷, PhD; Suzanne Nielsen¹, PhD



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Understand the effect of opioid policy and opioid-prescribing changes on:

- The number and rates of ED presentations and hospital admissions attributed to substance use or mental ill-health
- The association between differing opioid dose trajectories and the likelihood of ED presentations and hospital admissions in these groups
- Whether changes in an individual's opioid prescribing change the risk related to ED presentations and hospital admissions in these groups



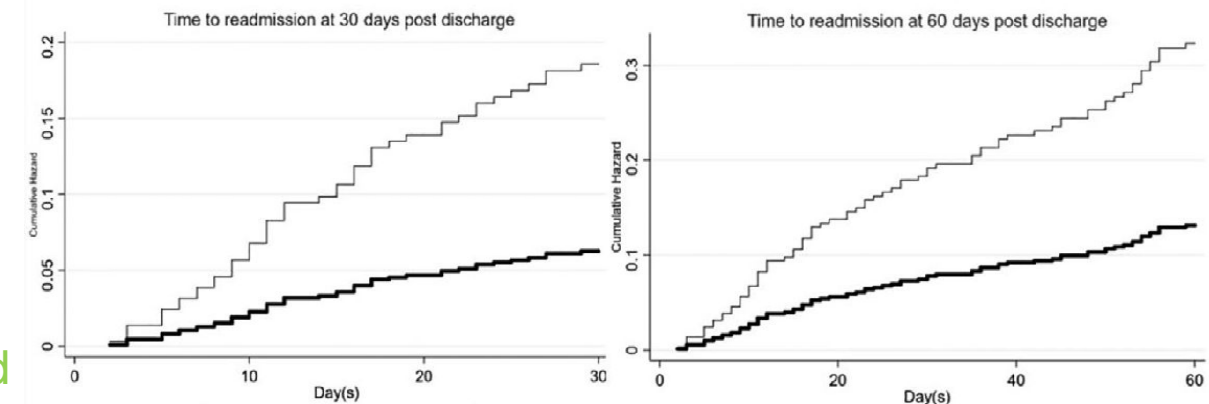
ORIGINAL ARTICLE

Targeted care navigation to reduce hospital readmissions in 'at-risk' patients

Rebecca K. Pang ^{1,2}, Velandai Srikanth,^{1,3} David A. Snowdon,^{1,3} Carolina D. Weller,⁴ Belinda Berry,^{2,5} Gary Braun,⁶ Iain Edwards,⁵ Fergus McGee,^{2,5} Ruth Azzopardi⁷ and Nadine E. Andrew^{1,3}

¹Peninsula Clinical School, Central Clinical School, and ⁴School of Nursing and Midwifery, Monash University, ²Community Care, Community Health, Peninsula Health, ³Professorial Academic Unit, Frankston Hospital, Peninsula Health, ⁵Community Health, Peninsula Health, ⁶Department of Medicine, Frankston hospital, Peninsula Health, and ⁷Rehabilitation, Ageing, Pain and Palliative Care services, Peninsula Health, Melbourne, Victoria, Australia

- Patients at risk of readmission were identified by an algorithm developed by the Victorian Department of Health and implemented into Peninsula Health's electronic health record system
- At risk patients were assisted over the phone by a qualified nurse in the first month of being discharged from hospital
- The 30-day re-admission rate was cut by 66 per cent for patients who received the model of care compared to matched controls



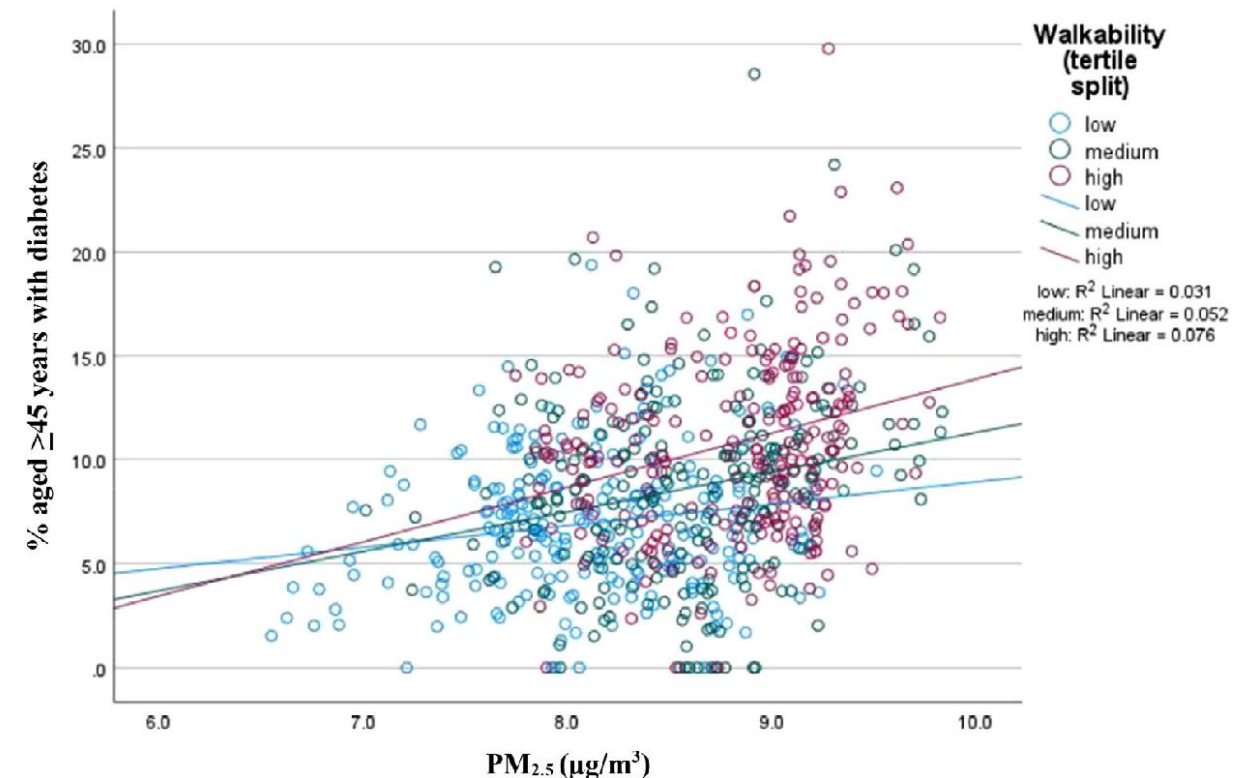
Exploring associations of greenery, air pollution and walkability with cardiometabolic health in people at midlife and beyond

Alison Carver, Richard Beare, Luke D Knibbs, Suzanne Mavoa, Kaya Grocott, Amanda J Wheeler, Velandai Srikanth, Nadine E Andrew

First published: 19 December 2023

<https://doi.org/10.1111/ggi.14743>

- A cross-sectional, ecological study design
- Greenery and air pollutants were associated with lower and higher prevalence, respectively, of self-reported diabetes and, to a lesser extent, stroke.
- These ecological findings are being confirmed using patient level data from the NCHA Data Platform



Clinical Research

Improving Dementia Data and Methods
NHMRC:1171966, \$617,335

The right to rehabilitation for people with dementia
MRFF:2015947, \$1,016,006

Point prevalence survey of psychotropic medications use in hospitalised patients discharging to a aged care
Commonwealth Department of Health, \$30,999

Enabling evidence-informed policy to address Australia's opioid crisis
NHMRC:2002193, \$607,538

Creating a world-standard enriched older-adult cohort to inform mental health and substance use disorder prevention
Ian Potter Foundation, \$600,000

Building capacity to optimize pressure injury prevention and surveillance across Monash Partners healthcare services
Monash Partners MRFF RART scheme, \$220,430

Research infrastructure

Towards a National Data Management Platform and Learning Health System (COGSTACK)
MRFF:RRDHI000088, \$1,922,584

Optimising health information exchange during aged care transfers
MRFF:PHRDI000008, \$1,949,557

National integrated stroke data: advancing learning health systems (registry infrastructure)
MRFF:RDII000059, \$3,036,429

State-wide approach to planning for the implementation of an electronic Consumer Healthcare Passport
VIC Department of Health, \$80,000

Digital healthcare training for disadvantaged consumers
Telematics Trust, \$50,000

TOTAL \$10,130,879 over 2 years

Optimising health information exchange during aged care transfers

AIM

To develop and test a digital health solution for summarising and sharing an agreed set of data considered critical during the medical transfer of people living in aged care homes

SCOPE

- Focus on items considered critical by all stakeholders
- Content must be able to be understood by all users
- System integration across sectors (residential aged care, hospital, primary care, ambulance)

FINAL PRODUCT

An integrated system that is operational and acceptable to end users with capability for national scale up

Funded by the Australian Medical Research Futures Fund

The image displays two screenshots of a web application for aged care residents. The top screenshot shows the 'Resident Lookup' form on the 'Residentportal.com.au' website. It includes a 'Go Back' link, a user profile icon, and a form with fields for 'Enter Last Name' (filled with 'Hai'), 'Enter Date of Birth (dd/mm/yy)' (filled with '10 Nov 1936'), and 'Enter User Registration Code (7 digits)' (filled with '8525469'). A 'Search Resident' button is at the bottom. To the left of the form is a photograph of an elderly couple in a home setting. The bottom screenshot shows the 'Resident Information' summary page. It features a sidebar with navigation links: Resident Information, Advance Care Plan/Directive, Emergency Contact, Precautions, Usual Health Status, Medications, Current Medical Conditions, and Post Discharge Information. The main content area displays the resident's details: Surname 'Van Hai', Given Name 'Nguyen', Gender 'Male', and Date of Birth '10 Nov 1936'. It also lists 'Communication Support Required' (Preferred Language: Vietnamese, Interpreter support required, Visually impaired, Hearing aid, Dentures) and 'Resident Transfer Status' with a progress bar showing 'RAC' (Residential Aged Care) as the current status, followed by 'Ambulance', 'Hospital', and 'RAC'. A red banner at the bottom states 'Confidential, please do not disclose'.

Future directions

Provide a national and international exemplar for better use of EHR data and the role that healthcare access and utilization plays, within a defined geographic cohort

A blue print for scale up to other health services

Leverage our team's expertise to enable future data sharing between health services through direct data linkage or standardised data models

Best practice in EHR data governance

Lead the creation of a unified EHR governance framework and release standards for implementation in Australia and internationally

Drive innovation by advancing technical solutions for integrating data and extracting clinically significant insights from patient notes

Advanced technical capabilities

Expand consumer engagement in the use of their own data for research and healthcare advancement

Consumer and community involvement

National Centre for Healthy Ageing



@NCHealthyAgeing



/company/ncha



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International Journal of Population Data Science (2023) 8:1:13

International Journal of
Population Data Science

Journal Website: www.ijpds.org



Developing a linked electronic health record derived data platform to support research into healthy ageing

Nadine E. Andrew^{1,2,*}, Richard Beare^{1,2}, Tanya Ravipati², Emily Parker², David Snowdon^{1,2}, Kim Naude², and Velandai Srikanth^{1,2,3}

<https://doi.org/10.23889/ijpds.v8i1.2129>

A partnership between

