Analytics and data linkage
Unlocking the secrets to good health

Kate Lucas

Chief Analytics Officer

VICTORIA State Government | Department of Health

Analytics in the Department of Health

eHealth Victoria

- Analytics (VAHI)
- Digital Health
- Strategy and Assurance
- Enterprise Technology

About the Analytics Branch

Delivering trusted information to inform better decisions that improve health and wellbeing of Victorians

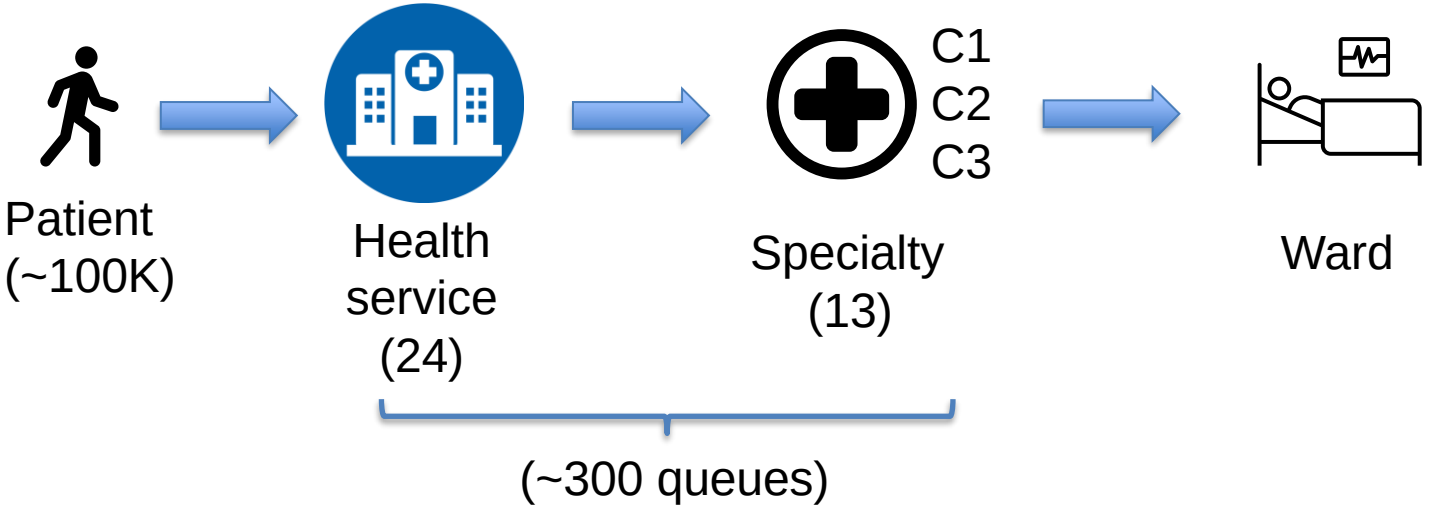
Delivers value to its partners and stakeholders

- Health services
- Clinicians
- Consumers
- Government

Functions

- Quality, Safety & Performance reporting and Population health reporting for Victoria
- Delivers > 1,500 reports p.a.
- Reports delivered via interactive portal
- The most advanced linkage agency in any jurisdiction: Centre for Victorian Data Linkage
- Advanced analytics team

Understanding the elective surgery waiting list

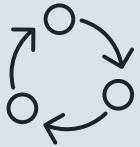


ES process may look simple at a high level, but it is complex on the ground

An agent-based simulation model has been developed

Simulate individual patients moving through the queue and calculating wait time each day

Currently waiting + Expected additions − Expected removals = Expected waiting



Deferral process

Select from queue

Ready for care? → add a wait day

Daily/monthly wait time and bed occupancy statistics

Scenarios

The model has been used to experiment the following scenarios:

- **Covid-impact, increase capacity on key specialties, diversion of urgency categories**

  These are the initial scenarios, giving promising results

- **Treat-in-turn principal**

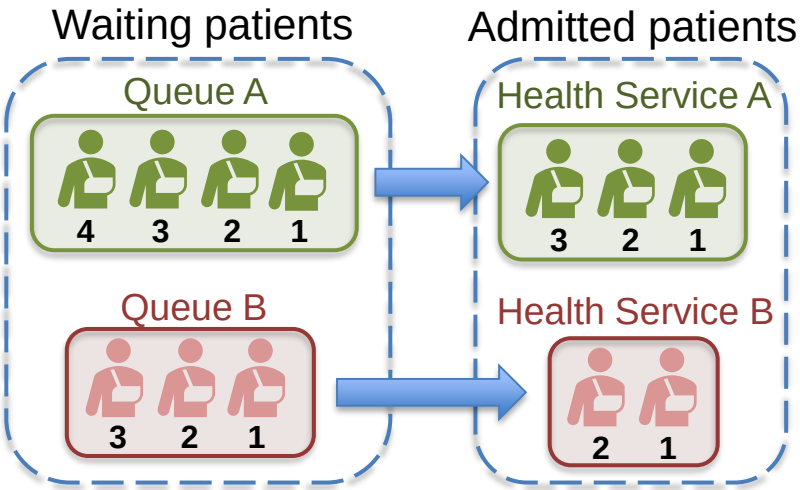
  All the patients are admitted according to the priority score (no queue jumping)

- **Health Service Partnership (HSP) load sharing**

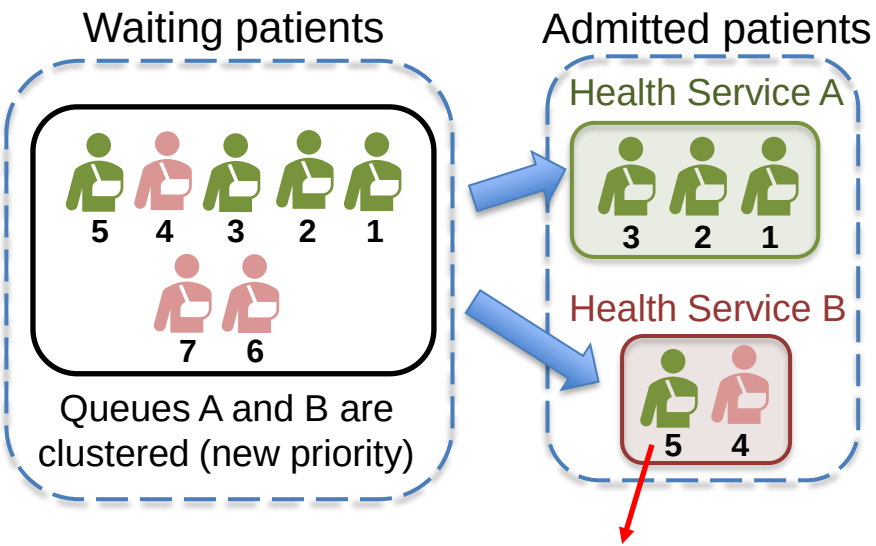
  Sharing patients between health services inside each HSP, i.e. forming one queue per HSP

HSP load sharing

Before HSP load sharing – status quo

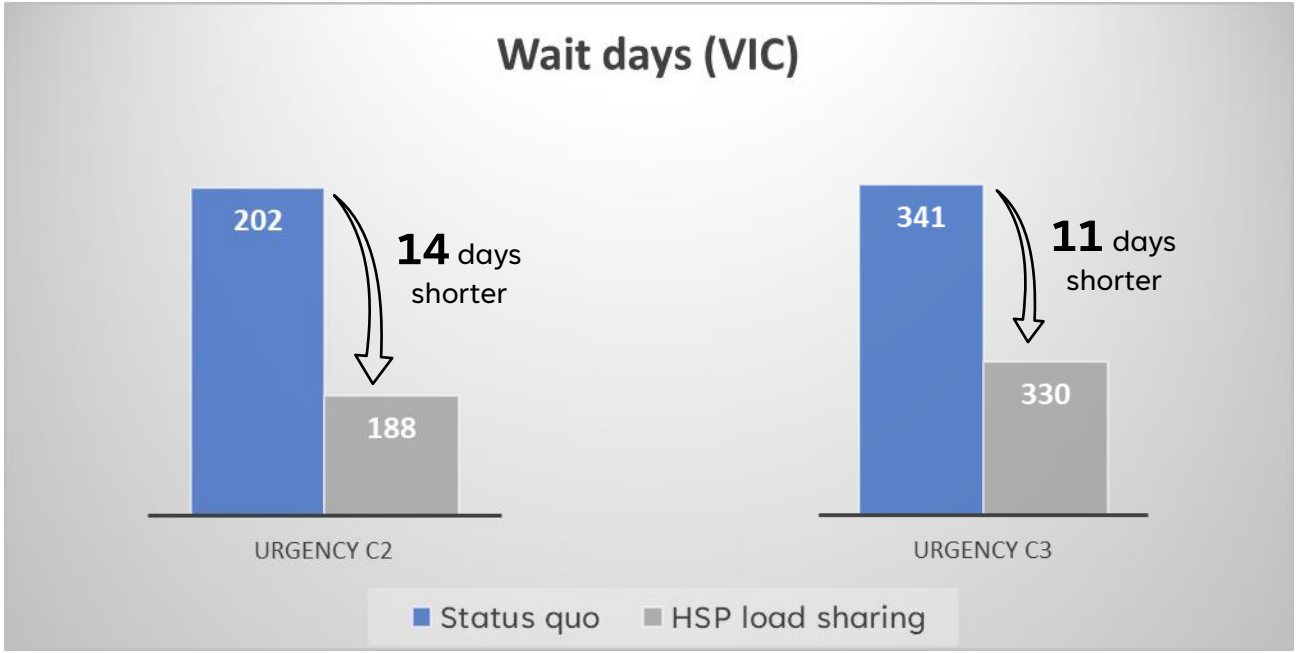


After HSP load sharing



- HSP load sharing leads to the reassignment and earlier admission of patients with higher priority

Simulation results – wait days reduction in VIC



- By HSP load sharing, the average wait days after one year (in Feb 2023) reduces by **14** days and **11** days for the urgency categories 2 and 3, respectively.

Victorian Long COVID Health Survey

Key findings

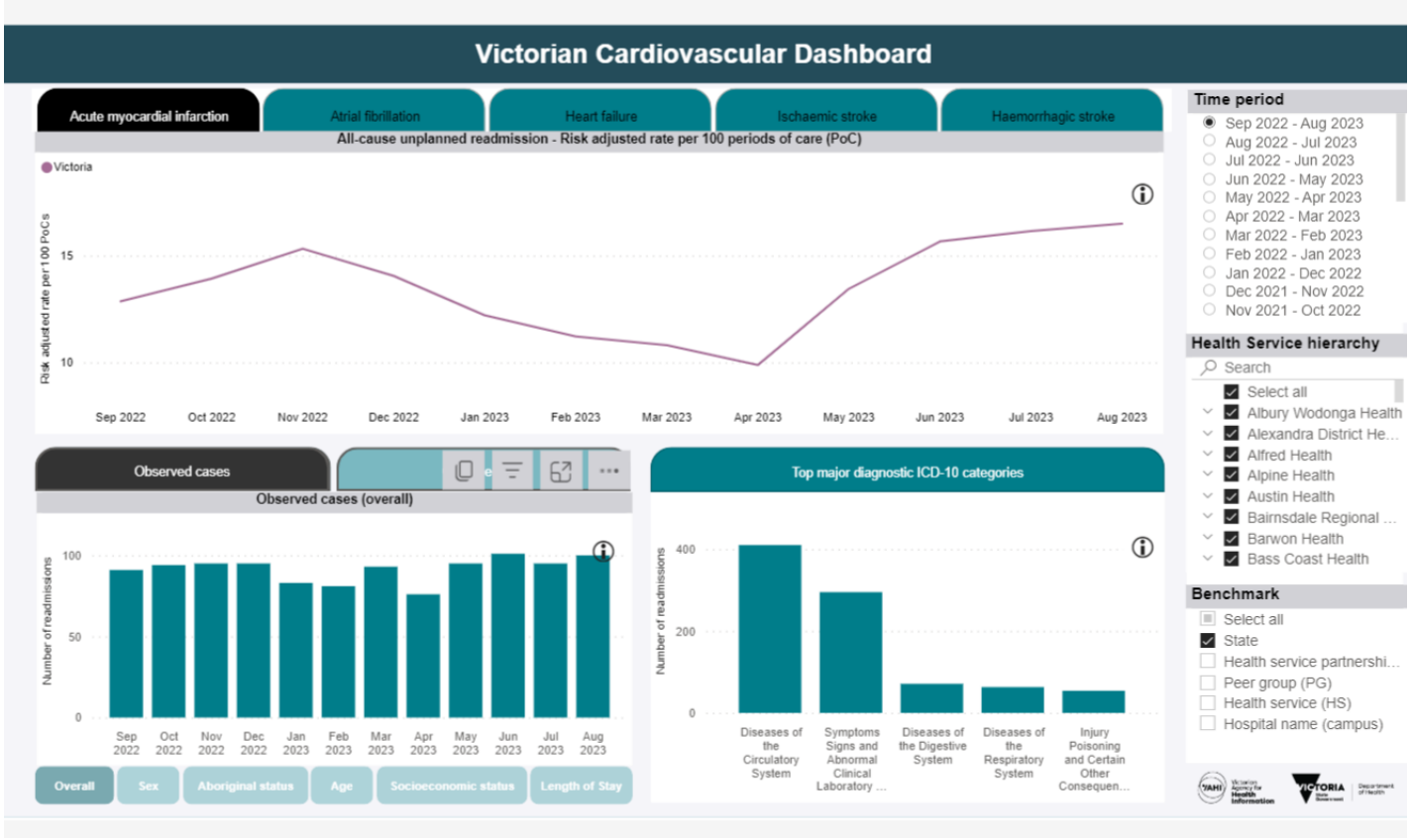
14.2% of COVID+ respondents classified as having long COVID at the time of the survey

General Practitioners or family doctors experienced the **greatest burden** for treating persistent COVID symptoms

Respondents who had COVID **later in the pandemic** generally reported better outcomes

Survey findings are **consistent** with international research

Cardiovascular Dashboard



Safer Care Victoria's Cardiovascular Learning Health Network identified that benchmarking outcome measures was a key priority to assure patient safety and improve care.

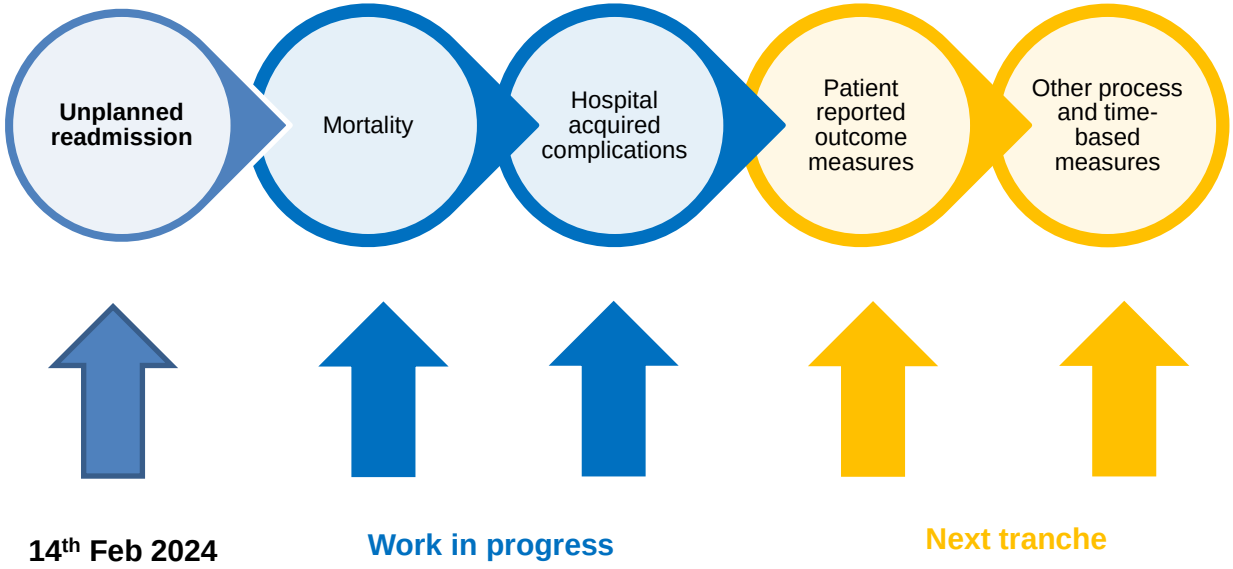
eHealth's Insights and Data Services units are collaborating intensively with SCV and clinicians to design and build the measures, visualisations, and risk-adjustment models that are needed.

Key risk adjusted indicators will be iteratively added

Risk adjustment uses predictive modelling techniques to adjust for variations in patient characteristics and risk factors when comparing health outcomes across different providers or populations

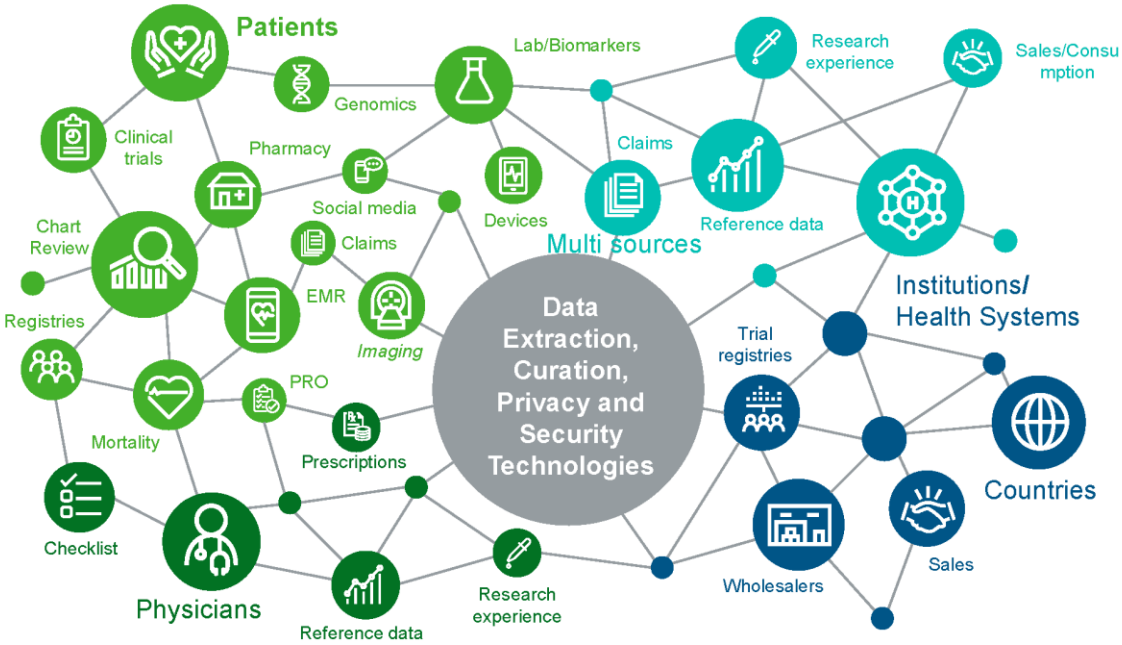
Adjusted factors for these indicators include age, sex, indigenous status, socioeconomic status, and relevant co-morbidities

This is fundamental to enable health services to benchmark and explore outcomes, with the dashboard presenting a fair comparison between health services with different case-mixes.



Localised “Disparate Data Sources”

- The average hospital produces 50 petabytes of data every year.
- 40% pa increase in the amount of data generated in healthcare
- Acute care is part of the picture
- What about the rest of the health system?



National Linkage Initiatives

- PLIDA - Person level integrated data asset from ABS (MADIP)
- Data includes health , education, government payments, income and taxation, employment , population information (including the Census)
- The Person Linkage Spine allows linkage of datasets through a spine of key information, separate from the main body of data.
- This approach improves privacy and security and enables more efficient and higher quality linkage.

- NDDA brings together data from Australian, state and territory government agencies to provide deeper, data driven insights about the needs and outcomes of people with disability
- Overseen by ABS & AIHW
- Being designed in collaboration and consultation with the disability community, the Australian Government and state and territory governments.
- The Australian National Data Integration Infrastructure (ANDII) is the underlying infrastructure to deliver the asset.
- Enabled sharing of linkage keys with states.

National Primary and Acute Care Data Linkage Project

- Building on the success of NSW's Lumos
- Will bring together practice, PHN, jurisdictional and health department level
- National hub and spoke
- Privacy preserving linkage methodology
- System planning, improvement, population health and research use cases
- NOT a clinical tool
- Reciprocal tool between States and Commonwealth

The Centre for Victorian Data Linkage (CVDL)

- Linkage undertaken for Government, researchers & clinicians:
    - informing service design
    - outcomes research
    - understanding service pathways for patients
    - investment analytics and demand modelling.
- Victorian Linkage Map (VLM) – combines personal identifiers across 35 data sets – with up to 25 years of records.
- One of the most advanced data linkage agencies in Australia:
    - Accredited as a National Integrating Authority – the only state data linkage agency to access Commonwealth data (MBS & PBS).
    - Uses an enduring asset, based on a population spine: provides more stable and more efficient/quicker linkage.

Datasets routinely linked by the CVDL

Human Services

- Child protection
- Family Services
- Family violence
- Sexual assault services
- Disability services
- Public housing
- Homelessness
- The Orange Door family violence

Health

- Admitted episodes
- Emergency Department
- Non-admitted episodes
- Elective Surgery Waiting List
- Hospital Cost Data Collection
- Clinical public mental health
- Mental Health
- Alcohol and drug services
- Cancer diagnosis
- Radiotherapy
- Community Health
- Home and Community Care
- Notifiable infectious diseases
- COVID positive notifications
- Perinatal
- Clinical registries (Intensive Care Cardiac Thoracic Surgery, Trauma, Stroke, Cardiac outcomes)

Other

- Births and Deaths
- NAPLAN
- School enrolments
- School Entry Heath questionnaire
- Australian Early Development Census
- Victoria Police
- Adult Corrections
- Youth Justice

Recent arrivals

- Immunisation
- Medicare Benefits Scheme
- Pharmaceutical Benefits Scheme
- General Practice clinical data

Working towards

- National Disability Insurance Scheme
- Pathology clinical data
- Kindergarten data
- Ambulance clinical data

Project examples: VicSIM simulation model enable early intervention reforms and their implementation

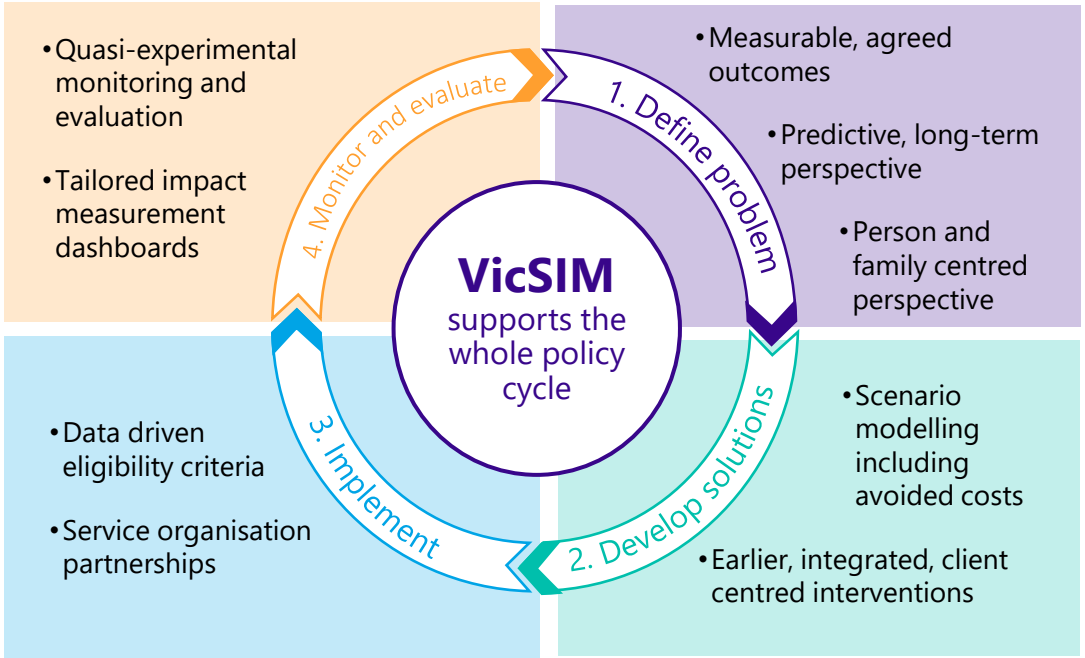
The Victorian Social Investment Model (VicSIM) simulates Victorian's future trajectories so we can:

Predict what will happen to people under current policies

Target interventions to people who will have poor future outcomes

Test scenarios to assess the impact of new proposals on people

Monitor the impact on people by comparing what happens to what was predicted

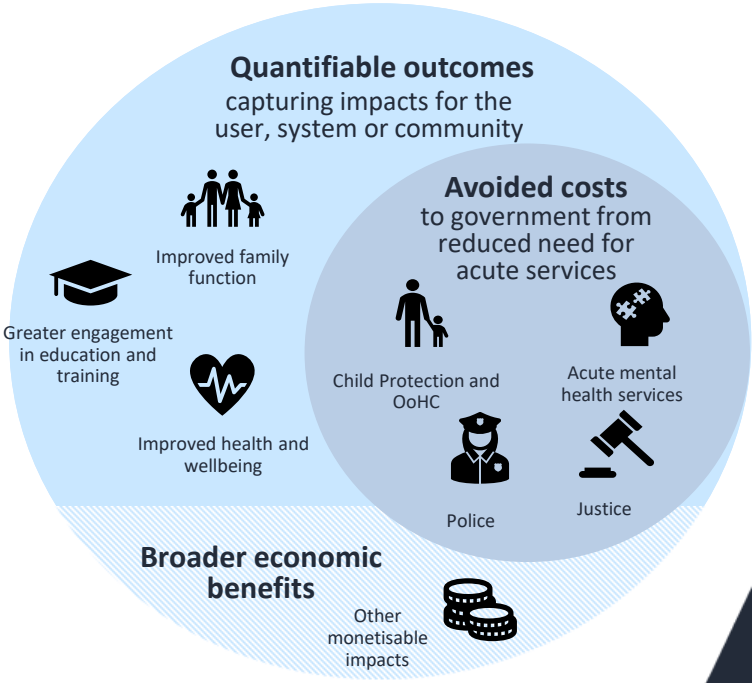


Early Intervention Investment Framework

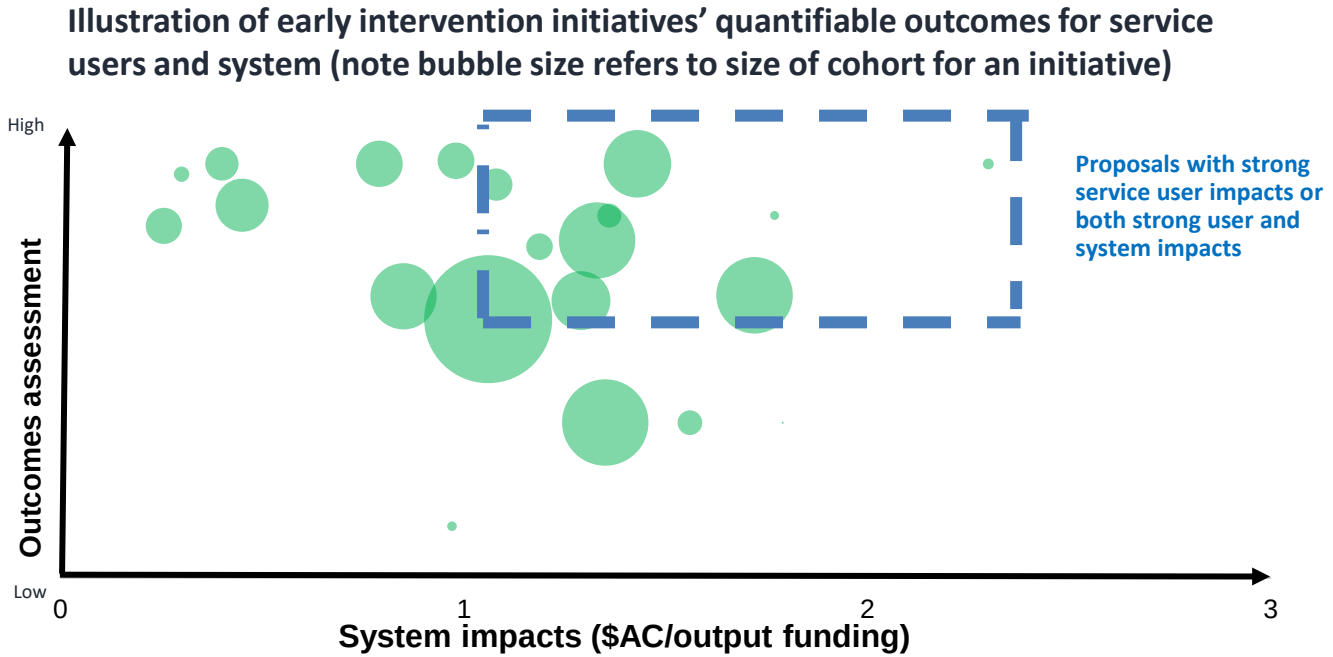
Departments can lodge proposals for consideration as 'EIIF' as part of the State budget process.

The EIIF requires proposals to provide evidence of an initiative's impact through:

- **Improved outcomes** – quantified impacts on the lives of service users and their families, the broader community, and the service system
- **Avoided costs** – the expected reduction in future expenditure on Victorian government services, compared to a BAU trajectory



EIIF is a decision-making tool that prioritises proposals with strong evidence of impact



$1.5 billion invested through the EIIF, anticipated to generate at least $1.8 billion of benefits

2021-22 Budget

10 Initiatives **$324m**

EIIF initiatives:

- DE: Giving vulnerable and disadvantaged kids the best
- DFFH: Intensive Family Preservation and Reunification
- DH: 100,000 lives
- DJCS: Crime Prevention Initiatives

2022-23 Budget

16 Initiatives **$504m**

EIIF initiatives:

- DE: Enhanced Navigator Program
- DFFH: Investing to make homelessness rare, brief and non recurring
- DH: Mobile Stroke Unit
- DJCS: Reducing future justice demand and keeping the community safe

2023-24 Budget

22 Initiatives **$677m**

EIIF initiatives:

- DE: Engaging students to remain in learning
- DFFH: Housing First for young people leaving residential care
- DH: Specialist forensic mental health services
- DJCS: Women's custodial health services

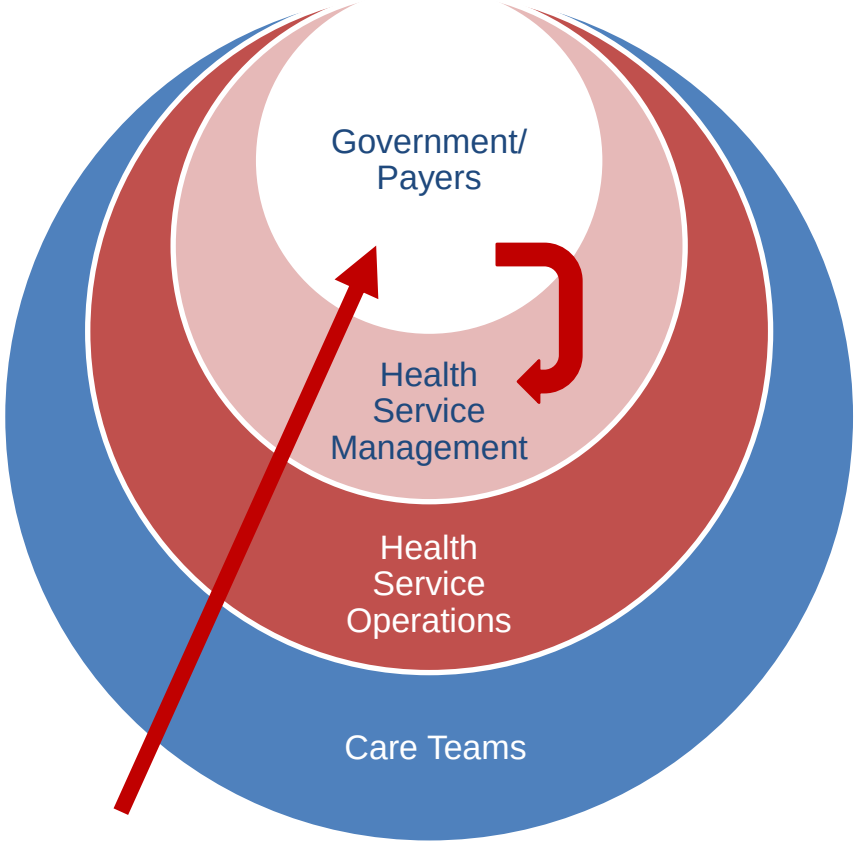
Where to from here?

eHealth Victoria

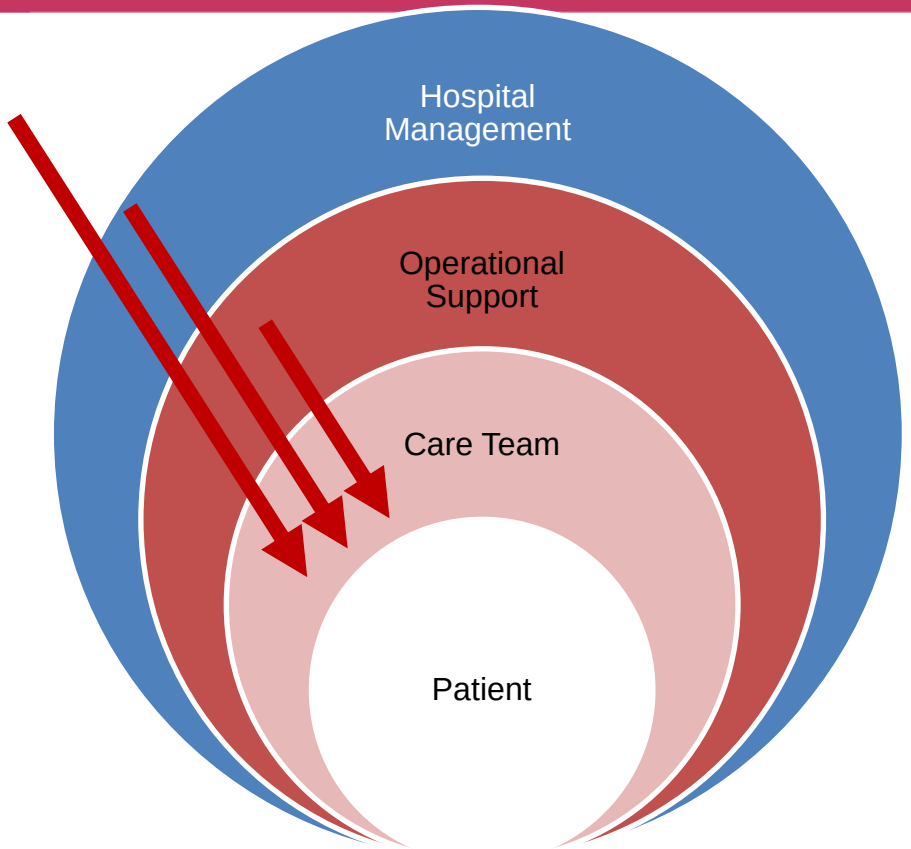

Centre for
Health Analytics

Data Democratisation

Common Analytic Support Model

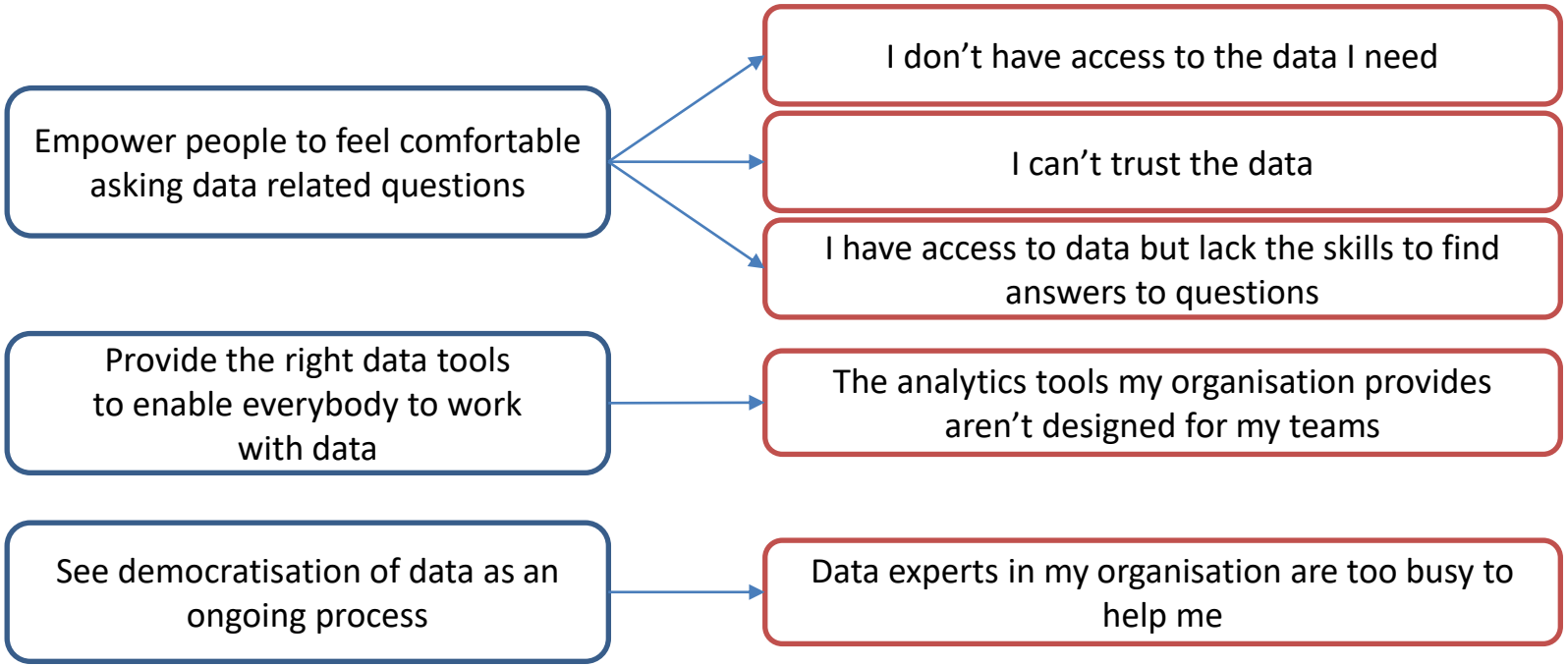


Data democratisation enables patient centred care



Democratisation principles

Democratisation challenges



https://amplitude.com/blog/data-democratization

Early diagnosis saves kidneys

- Alport Syndrome - 1 in 5000 people
- Genetic, degenerative, kidney failure in third or fourth decade
- Genetic testing now funded
- Early symptom is persistent microhaematuria
- ACEi can delay kidney failure by a decade
- Dialysis leads to reduced life expectancy and a high healthcare burden on the individual
- Dialysis and transplants are expensive and resource intensive

Dr Gráinne Butler
MB BCh BaO MRCPCH, CHIA
PhD Student
Honorary Fellow, Department of Nephrology, RCH

Alport syndrome (at mid-2023)

- Mined EMR data for microhaematuria that hadn't been followed up
- Over **4000** patients met criteria
- **1297** patients have been contacted for additional testing
- **15/248** have persistent microhaematuria
- **2 patients have been diagnosed with Alport Syndrome**
- 7 waiting on genomic results
- Over 60% of the initial cohort still to receive additional testing.

Analytics Branch

- Make validated, curated and documented data and metrics broadly available
- Modernise and consolidate our data technologies
- Better use the data that we already hold
- Better engage with our customers to deliver meaningful insights
- Support and grow analytics across the sector


VICTORIA
State
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