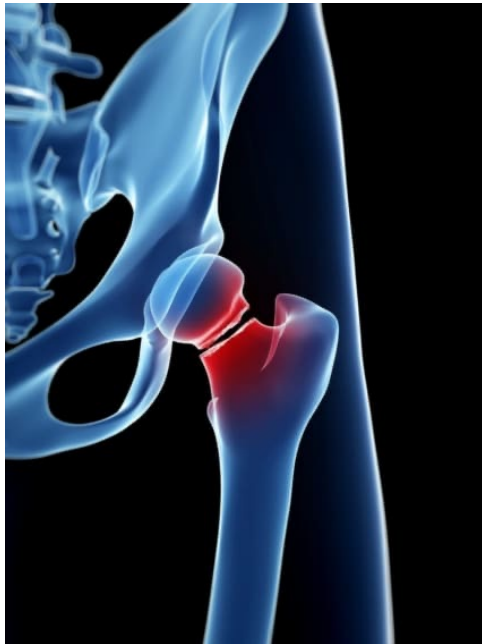# Introduction to the Australian and New Zealand Hip Fracture Registry

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What is a hip fracture?

Source: https://familydoctor.org/condition/hip-fractures/
American Academy of Family Physicians

Why care about hip fracture?

- **Common:** Currently 1 in 5 Australian women, and 1 in 20 Australian men, will experience a hip fracture in their lifetime. (19,000 hip fractures annually)

- **Devastating:** 25% die within 1 year, a further 50% do not regain their previous level of function and for 11%, the fracture heralds the end of independent living

- **Increasing** incidence due to ageing population, although inconsistent trends in age-standardized rates across countries

- Delivery of **evidence-based care** for hip fracture patients reduces mortality, morbidity and health care costs

- **Evidence of variation in mortality worldwide**: mortality in Aus/NZ x4 higher than Asian countries (Harvey et al, 2024)

What is a clinical quality registry?

Registry
- A registry is an *official* list or record, or a place where *official records* are kept (Cambridge Dictionary)
- A registry is a place to store detailed information about people with a specific disease or condition, *who provide it on a voluntary basis* (UK National Institutes of Health)
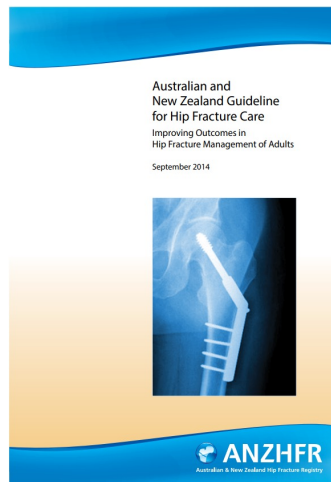
Clinical registry
Clinical registries are *databases* that operate within an overall governance and management structure to *systematically collect health-related information* on individuals who are:
- Diagnosed with a particular illness or condition, e.g. stroke, hip fracture, COVID
- Treated with a particular surgical procedure, device or drug, e.g. joint replacement
- Managed via a specific healthcare resource, e.g. treated in an Intensive Care Unit

 Observational in nature and observe practice in the real world without dictating the care to be given

Clinical Quality Registry (CQR)
CQRs are a specific type of clinical registry that systematically monitors and provides feedback on the appropriateness and effectiveness of health care, within specific clinical domains, *for the purpose of driving ongoing improvements in safety and quality* (ACSQHC, Australian Framework for National Clinical Quality Registries 2024)

Guideline, Standard and CQR

NHMRC-endorsed Guideline released 2014
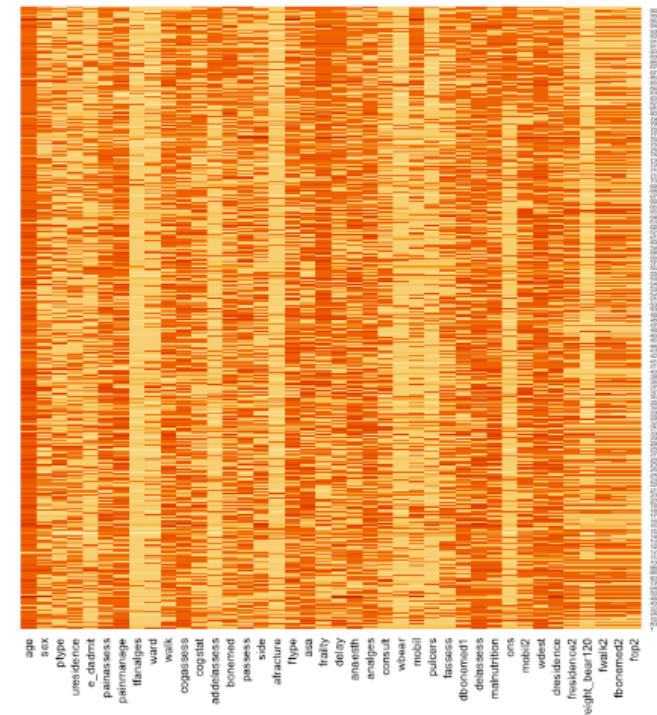
ACSQHC Clinical Care Standard released 2016

ACSQHC Clinical Care Standard updated 2023

Annual reports

https://anzhfr.org/registry-reports/

ANZHFR data

- 97,430 records, 76 variables (csv file)

- Data dictionary and csv file for formats

- **Demographic** characteristics (age, sex, ASA, malnutrition, health insurance status, etc)

- **Care characteristics** (nerve block received, time to surgery, early mobilisation etc)

- **Outcome variables** (LOS, discharge destination. 30-day mortality)

- Synthetic data - dates (days from random day 0) and hospital identifiers are masked.

ANZHFR data

1. **You will not attempt to identify any individual or institution referenced in the Dataset**(s). Should you inadvertently identify any individual or institution from the Dataset(s), you will not disclose the person's or institution's identify, including in any publication, result dissemination or other communication.

2. **You will not divulge or communicate the Dataset**(s), in whole or in part, with anyone else other than approved participants at the Event.

3. **You will not disseminate your results, or any results produced within your pre-allocated team at the Event**, without prior review and written consent of the ANZHFR data custodian.

4. You acknowledge that access to the Dataset is granted only for the period of the Event. At the end of the Event, you will **permanently delete/dispose of the Dataset** (from your devices and accounts, and you will provide your written confirmation of such data disposal to the CBDRH at the end of the Event.

Team challenge (*choose only 1 task)

Task 1a: Data visualisation

Design and develop the code for a front facing **consumer/public dashboard** for the ANZHFR to be displayed on the ANZHFR website.

Consider: what key information would you like to know if you or your loved one (partner, parent, grand parent) has had a hip fracture?

Examples: Slides 9 & 10

Core Requirements:

Visualization: attractive easily understood presentation of key information/graphics including:

> Basic demographics (e.g. median age, sex, cognitive impairment)

> Main steps in the hip fracture care journey (See slides 6 ,7)

> Key outcome measures (e.g. length of stay, % rehabilitation, % requiring new placement in residential care)

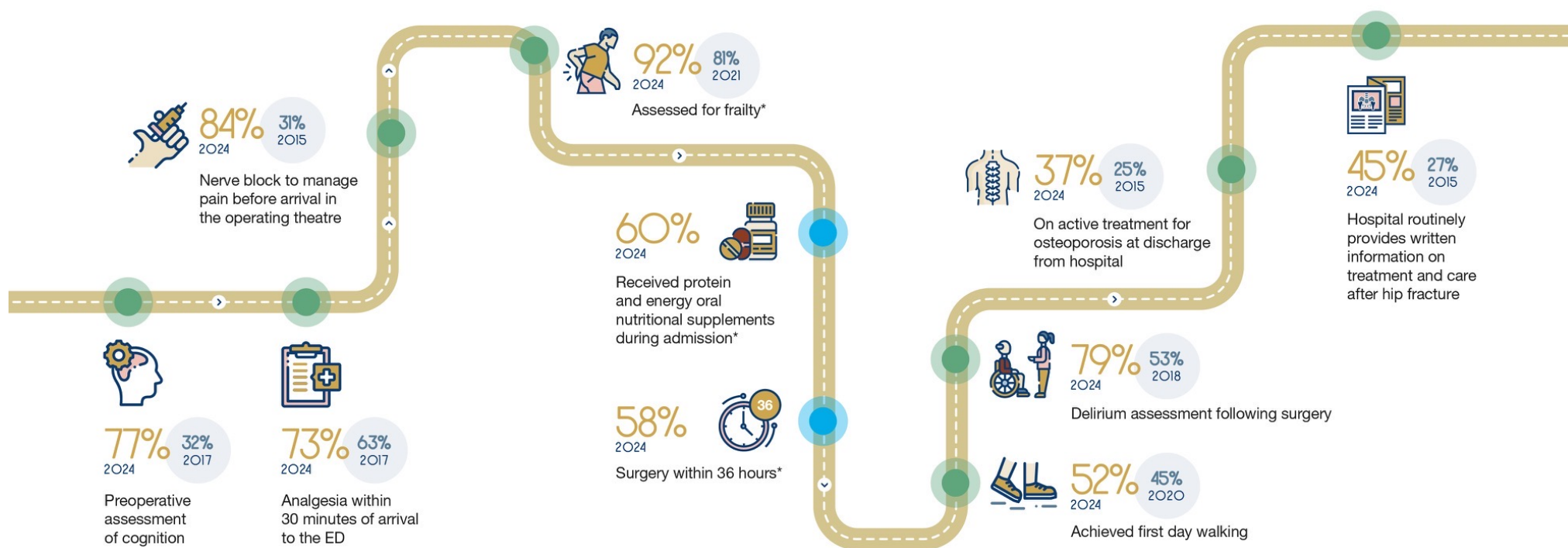**User Experience:** The interface must be intuitive for use by the general public. Most likely accessed by older adults.

OR

2015 TO 2024 SNAPSHOT

PATIENT AND FACILITY LEVEL REPORT

Between 1st Jan 2015 and 31 December 2024, ANZ hospitals have contributed 127,000 hip fracture records to the ANZHFR.

As the ANZHFR minimum dataset has developed over time, the change in adherence to the quality indicators are presented from the first year of data collection. Where an indicator is new in 2024, no comparison is provided.

84% 2024 — **31%** 2015
Nerve block to manage pain before arrival in the operating theatre

92% 2024 — **81%** 2021
Assessed for frailty*

77% 2024 — **32%** 2017
Preoperative assessment of cognition

73% 2024 — **63%** 2017
Analgesia within 30 minutes of arrival to the ED

60% 2024
Received protein and energy oral nutritional supplements during admission*

58% 2024
Surgery within 36 hours*

37% 2024 — **25%** 2015
On active treatment for osteoporosis at discharge from hospital

79% 2024 — **53%** 2018
Delirium assessment following surgery

52% 2024 — **45%** 2020
Achieved first day walking

45% 2024 — **27%** 2015
Hospital routinely provides written information on treatment and care after hip fracture

LEGEND: ● Improvement ● New indicator ● Decline in performance

*New CCS quality indicator in 2024

FIGURE 15

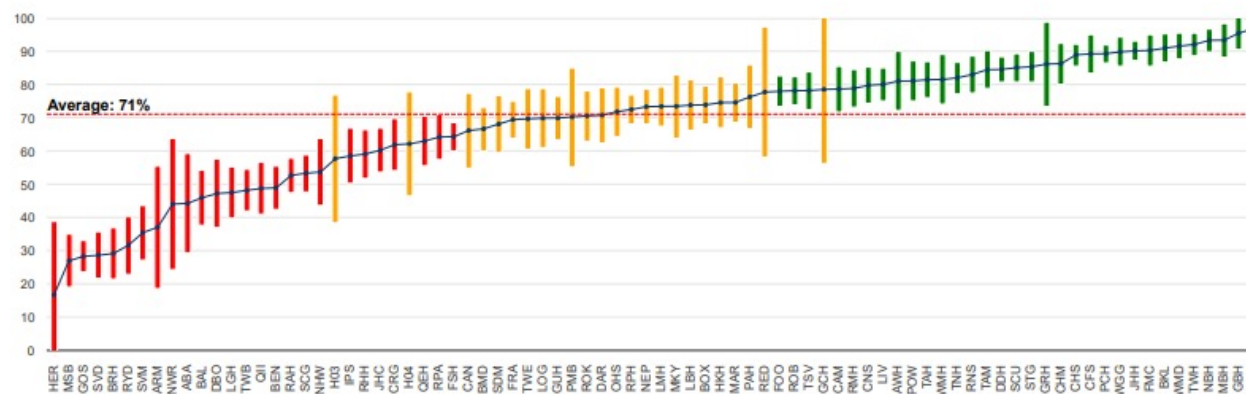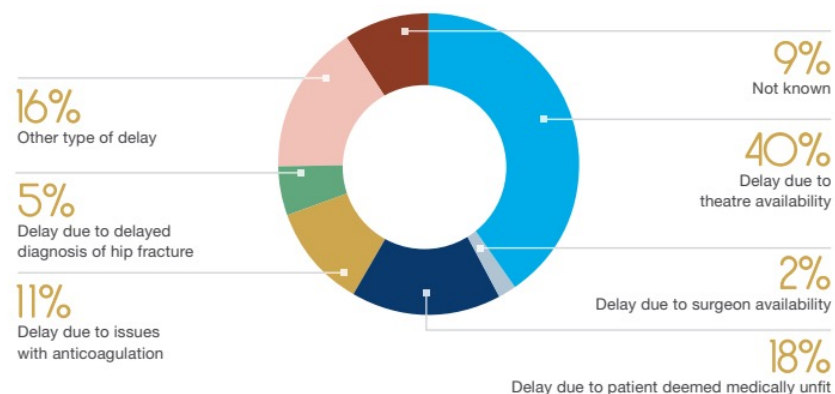**Pain management in the ED: Australia**

Average: 71%

FIGURE 29

Reason for delay longer than 36 hours: Australia

Figures 28 and 29 provide useful information for health services wishing to improve the proportion of patients treated within 36 hours as it highlights causes for surgical delay. The primary modifiable reason for delay remains as access to theatres.

There has been a reduction in the proportion of patients deemed medically unfit, compared to the previous five years.

16%
Other type of delay

5%
Delay due to delayed diagnosis of hip fracture

11%
Delay due to issues with anticoagulation

9%
Not known

40%
Delay due to theatre availability

2%
Delay due to surgeon availability

18%
Delay due to patient deemed medically unfit

Team challenge (*choose only 1 task)

Task 1b: Data visualisation

Design and develop the code for an update of the **clinician-facing dashboard** (near to real-time data) to be accessed by clinical teams within the participating hospitals, that **benchmarks hospital performance** against the ACSQHC clinical quality indicators.

Example: slides 12 & 13

Consider: What key clinically relevant information should be reported?

Core Requirements:

Visualization:

   Real-time visualisation

   Include metrics to allow benchmarking (Hospital, state and national levels)

   2023 ACSQHC performance indicators

   Select acute care outcome measures (e.g. length of stay, median time to surgery, time in ED)

User Experience: The interface must be intuitive for use by clinicians working in the participating hospitals and hospital administrators.
      Include: Summary statistics   - counts and proportion of patients, medians IQR
               Longitudinal data (Temporal trends)

Hospital dashboard

Welcome to the Australian Hip Fracture Registry for Prince of Wales Hospital

? Hover over ⓘ for help

Hospital Snapshot

Active Patients	Last Modified
153	27 Sep 2022

2022 Records	All Records
104	1312

Patient Type: ☑ Admitted Via ED ☑ Transferred In ☑ Inpatient Fall ☑ Other/Unknown
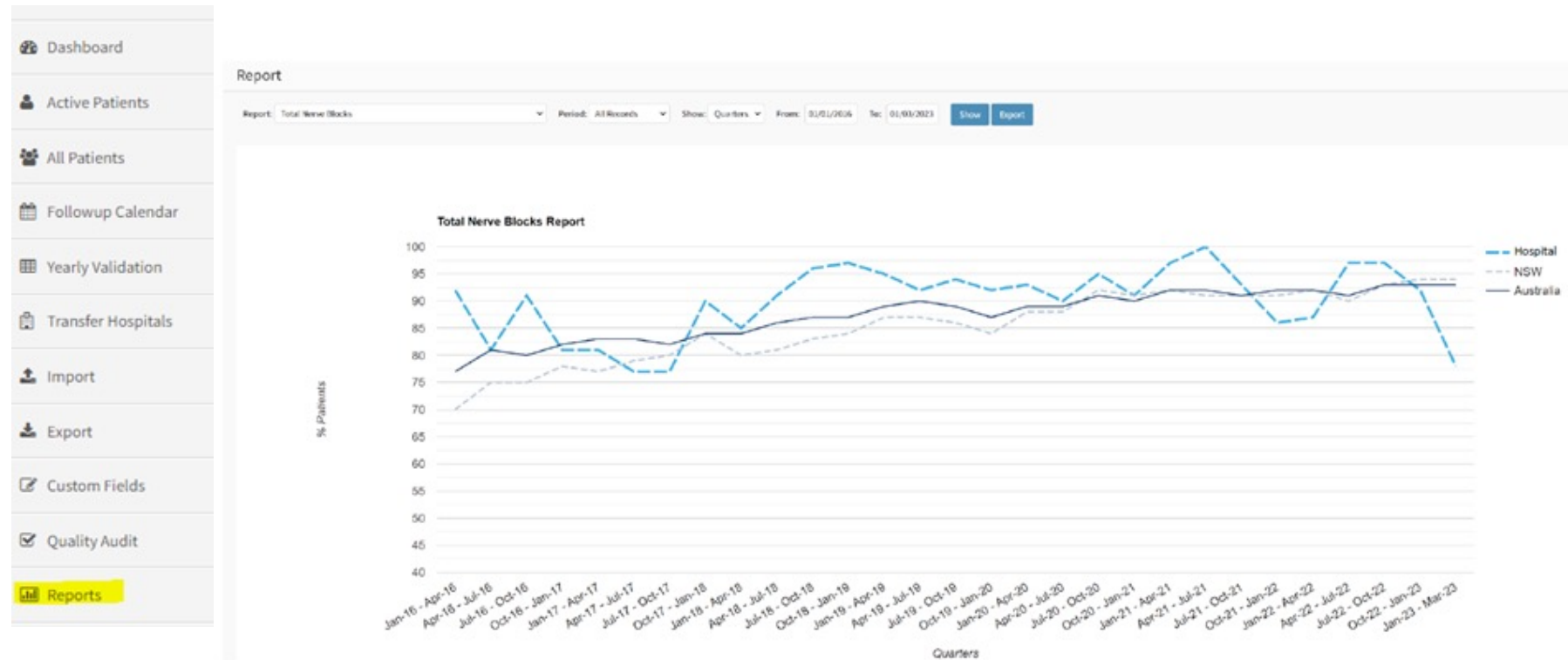
Period: This Year
From: 01/01/2022   To: 27/09/2022

104 records	Time in ED (hrs) [100]	Time to Surgery (hrs) [103]	Acute Length of Stay (days) [95]	Hospital Length of Stay (days) [84]
Average	6.35	26.02	10.02	21.23
Median	5.98	22.05	7.63	12.53
Shortest	0.00	3.58	1.84	1.84
Longest	32.02	75.07	40.67	68.53

QS1 Care at Presentation	QS2 Pain Management	QS3 Orthogeriatric Model of Care	QS4 Timing of Surgery	QS5 Mobilisation & Weight Bearing	QS6 Minimising Risk of Another Fracture	QS7 Transition from Hospital Care
Cognitive Assessment prior to surgery (104) 93%	Pain Assessment within 30 minutes (101) 76%	Assessed by geriatric medicine (104) 100%	Surgery Within 48 hours (103) 91%	First Day Walking (103) 66%	Bone Medication on Discharge (103) 47%	Patients returning to Private Residence @ 120 Days (27) 77%
	Nerve Block before or at surgery (104) 94%			Unrestricted Weight Bearing (103) 98% New Pressure Injuries (104) 3%	Specialist Falls Assessment (104) 95%	

Hospital dashboard

Team challenge (*choose only 1 task)

Task 2: Cohort builder prototype

Design and build an interactive, web-based tool that allows users (clinician researchers and hospital administrators) to filter, visualize, and define specific subsets of hip fracture patients based on the ANZHFR dataset.

GDC (Genomic Data Commons) Cohort Builder: https://docs.gdc.cancer.gov/Data_Portal/Users_Guide/cohort_builder/
All of Us Researcher Program Cohort Builder: https://support.researchallofus.org/hc/en-us/articles/360039585591-Selecting-Participants-Using-the-Cohort-Builder.
UK BioBank Cohort Browser (on DNAnexus): https://documentation.dnanexus.com/user/cohort-browser

Core Requirements:
Dynamic Filtering (Inclusion/Exclusion):
Users can select participants based on key ANZHFR variables (e.g., *Age, Gender, Fracture Type, Surgery Type, Hospital Code, etc*).
Support for complex Boolean logic (e.g., "Patients aged 80+ **AND** who had a Total Hip Replacement Surgery **BUT NOT** Geriatric Assessment").
Real-Time Visualization:
As filters are applied, the dashboard should instantly update key metrics:
Total Count: Number of patients in the current cohort.
Demographics: Visual breakdown (e.g., Gender pie chart, Age distribution histogram).
Clinical Outcomes: Simple stats on time-to-surgery or length of stay for the selected group.
User Experience:
The interface must be intuitive for users with no coding experience. Avoid SQL queries; use dropdowns, sliders, or drag-and-drop facets similar to the examples.
Cohort Profiling and Comparison:
Users can define and save the cohort profile to allow direct comparison between cohorts (e.g., "Comparison on time-to-surgery between patients in remote areas vs patients in metropolitan regions").

Team challenge (*choose only 1 task)

Task 3: Development of causal models for patient outcomes

Example research questions:

Does the use of a nerve block for the management of acute pain decrease the risk of post-operative delirium? Adjusting for key patient-level and care characteristics.

Does early mobilization reduce the risk of new residential aged care placement? Adjusting for key patient-level and care characteristics.

Other 'hot' research topics in hip fracture care:
   a. Impact of early mobilization on other outcomes (LOS, pressure injuries or mortality)

   b. Impact of malnutrition on outcomes (new residential aged care placement or mortality)

   c. Impact of private health insurance on provision of rehabilitation

   d. Impact of hospital volume on outcomes (LOS, provision of rehabilitation, mortality)

Team challenge (*choose only 1 task)

Task 4: Development of predictive models for patient outcomes

Can we predict if a patient will experience post-operative delirium, based on person and pre-operative characteristics?

Can we predict if a patient will access rehabilitation post acute care, based on person and acute-care characteristics?

Can we predict if a patient will require a new residential aged care placement, based on person and care characteristics?

Can we predict if a patient will return to their pre-fracture walking status at 120 days post discharge, based on personal-level and acute care characteristics?

Team challenge

Our team