Australian & New Zealand Hip Fracture Registry

User Guide

Data Dictionary v14

January 2022

Introduction

The Australian & New Zealand Hip Fracture Registry (ANZHFR – the Registry) collects facility-level and patient-level data from hospitals in Australia and New Zealand. The collection of patient-level data provides access to real-time self-audit reports comparing hospital data with the state and country averages, using measures from the Australian Commission on Safety and Quality in Health Care (ACSQHC) Hip Fracture Care Clinical Care Standard. The annual facility-level audit commences in February each year and is completed by April. It seeks information about services and processes of care for patients with a hip fracture admitted to hospital. Both levels of data collection allow progress to be mapped over time and should be used to drive change and inform ongoing improvements in the delivery of hip fracture care. At present, only the patient-level audit is on the Registry database but there are plans to include the facility-level audit on the database in the future.

This document has been produced by the ANZHFR as a resource for new and current users of the Registry. It has been informed by feedback from existing users and the UK National Hip Fracture Database User Guide[1]. To gain the best understanding of the processes of data collection and data submission, it is suggested users of the ANZHFR read this guide, together with the current version of the Data Dictionary and the relevant Patient Level Form, which are available at anzhfr.org. These documents provide definitions for the data variables to be collected, and when read together will help to improve the quality and consistency of the data collected and submitted.

Definitions

For the purposes of this Guide, the following interpretation of terms should be used.

ANZ Guideline for Hip Fracture Care in Adults	The Australian and New Zealand Guideline for Hip Fracture Care is designed to help professionals providing care for people with a hip fracture to deliver consistent, effective and efficient care. Every person with a hip fracture should be given the best possible chance of making a meaningful recovery from a significant injury and strategies should be put in place to reduce the occurrence of future falls and fractures. The recommendations reflect the journey of a person with a hip fracture and take into account their perspective, as well as the perspective of their family and carers. A copy of the Guideline can be accessed at: https://anzhfr.org/wp-content/uploads/sites/1164/2021/12/ANZ-Guideline-for-Hip-Fracture-Care.pdf
Database	Refers to the Australian and New Zealand Hip Fracture Registry (ANZHFR)
Hip Fracture Care Clinical Care Standard	The Clinical Care Standard was developed by the Australian Commission on Safety and Quality in Health Care (the Commission) in collaboration with consumers, clinicians, researchers and health organisations. It complements existing efforts to support high quality hip fracture care, such as the Australian and New Zealand Hip Fracture Registry, and state and territory-based initiatives. The Standard can be accessed via: https://www.safetyandquality.gov.au/our-work/clinical-care-standards/hip-fracture-care-clinical-care-standard/
HREC	Human Research Ethics Committee

[1] National Hip Fracture Database User Guide 2016. Healthcare Quality Improvement Partnership 2016. Available at www.nhfd.co.uk

Minimal trauma hip fracture	A minimal trauma hip fracture is defined as a fracture resulting from trauma equal to (or less than) a fall from standing height.
Operating hospital	The hospital that undertakes the definitive management of a person with a hip fracture. Definitive management may be operative or non-operative.
Opt-out	A method used in the recruitment of participants into research where information is provided to the potential participant regarding the research, and their involvement, and where their participation is presumed unless they take action to decline to participate. An opt-out approach makes it possible for people to make an informed choice about their participation, however, this choice can only be made if participants receive and read the information provided.
Registry	A patient registry is an organised system that uses observational study methods to collect uniform data (clinical and other) to evaluate specified outcomes for a population defined by a particular disease, condition, or exposure, and that serves a predetermined scientific, clinical, or policy purpose(s). Clinical quality registries are a specific type of clinical registry. They use the data they collect to identify benchmarks and variation in clinical outcomes. They then feed this information back to clinicians to inform clinical practice and decision making.
Transfer hospital	The hospital at which a person with a hip fracture first presented and was diagnosed with a hip fracture.

Contact Information

New Zealand

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Australia

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Orthopaedic Clinical Lead:	A/Professor Catherine McDougall E: Catherine.McDougall@health.qld.gov.au
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Generic

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Implementation Summary

Local clinical governance

In order to develop an effective and efficient multidisciplinary approach to hip fracture care in a hospital (the site), all relevant disciplines must take an active role in the development, implementation and ongoing oversight of participation in the Registry. This also encourages local initiatives to improve the quality of hip fracture care provided to patients at each site.

Based on experience from other countries, establishing a multidisciplinary, hospital stakeholder group at the outset helps achieve successful implementation of the ANZHFR at a hospital. The stakeholder group may include representatives from medicine (geriatrician or general physician), surgery (orthopaedics), nursing and allied health, the executive team and representatives from other areas of the hip fracture care journey may also be included: anaesthetists, emergency physicians, rehabilitation specialists and fracture liaison coordinators. Include those involved in the day to day collection of registry data. It is possible a group will already exist as part of local efforts to create a whole of system approach to falls and fracture management.

At a site, a Local Clinical Lead (Principal Investigator) and Site co-ordinator need to be identified. These two people will be central to the implementation of the ANZHFR at the hospital and for data quality and governance. Additional Associate Investigators may be included, and these people may represent supporting departments within the hospital.

Local Clinical Lead / Principal Investigator

The Local Clinical Lead / Principal Investigator takes overall responsibility for the ANZHFR at each site. They will be from a clinical area involved in the care of people who have fractured their hip: geriatric medicine, orthopaedics or anaesthetics are the most common. They may be supported in this role by Associate Investigators from other clinical areas.

The responsibilities of the Principal Investigator include:

- Being a first point of contact for the ANZHFR, the hospital executive and other clinical departments;
- Data governance, ensuring the data is securely stored and only accessed by appropriate people, and de-identified before analysis and use;
- Checking the data is being collected and submitted on a regular basis;
- Checking the quality of the data submitted to the ANZHFR from their site;
- Ensuring the data is used for feedback to improve the standard of care for patients with hip fractures.

Site Coordinator

The Site Coordinator is involved in the day-to-day activities of patient identification, provision of information sheets to patients and/or their families, data collection and data submission to the ANZHFR. They may be nurses, allied health clinicians, fracture liaison coordinators, or other doctors.

The responsibilities of the Site Coordinator include:

- Being a point of contact for the ANZHFR;
- Being a point of contact for patients with a hip fracture and their families;
- With the Principal Investigator ensuring the data is securely stored and only appropriate people have access to the data;
- Overseeing data collection and submission of data to the ANZHFR.

If an Investigator steps down from the role or moves to another hospital, they need to advise the ANZHFR and provide details of the new investigator.

Gaining the necessary approvals

To contribute patient-level data to the ANZHFR, hospitals need to have both ethics and governance/locality approval. Data collection is ongoing from the date of governance/locality approval. To commence the approval process, contact the relevant National Coordinator: there are slightly different processes for each country.

In Australia, the National Coordinator will undertake the majority of the administration required to get ethics approval for sites to contribute patient-level data. They will need the following information to start the approval process:

- A local clinical lead (Principal Investigator), associate investigators and site co-ordinator; and
- A short CV for each of these people.

In New Zealand, the National Coordinator will provide the site Principal Investigator with all the information required for them to seek locality approval for their hospital.

Familiarisation with the demonstration website

To get an idea of the mechanics of data entry and the data fields required to be collected, requesting access to the demo database via the ANZHFR website www.anzhfr.org is recommended. Log on via the website. This is a good way to become familiar with the database while waiting for the approvals to come through.

Accessing the database

There are no charges for any hospital to access or use the database. Once a hospital has both ethics and local site approval, the ANZHFR will organise:

- For the hospital to be added to the live website;
- Access to the ANZHFR for the Local Clinical Lead/Principal Investigator, Associate Investigator(s) and Site Coordinator; and
- Log-ins to the ANZHFR for other staff that will be involved.

Local investigators can request additional users by emailing the relevant country co-ordinator (see contact information on page 3). The new user must be copied into the email using their hospital email address. The hospital email address will be used to provide log-in details to the user. This will usually be done within 48 hours of receiving the request.

Each log-in is unique – please do not share it with others!

Levels of database access

Different levels of access to the ANZHFR allow sites to collect, submit, view and use data to improve hip fracture care, whilst maintaining the confidentiality and privacy of data.

Currently, there are three levels of access to the ANZHFR for approved sites:

1. **Hospital Reporter access** – this allows access to the aggregated data held in the Registry. One generic hospital account will be created, which will only allow a user to view aggregated data. The user will not have access to any individual, record-level data. The listed investigators will be able to provide the Hospital Reporter log-in to clinicians and executive staff on request.

2. **Data Collector access** - this allows the user to create and update individual records for their hospital. They can also import data, run the self-audit reports and add transfer hospitals. This level of access does not allow a user to export data.

3. **Hospital Administrator access** - each hospital will be assigned up to two Hospital Administrator accounts. One will be allocated to the Local Clinical Lead/Principal Investigator for the hospital. This level of access will have Data Collector access, as well as being able to export data. An additional Hospital Administrator account can be requested by contacting the relevant country co-ordinator (see contact information on page 3).

When a user no longer requires access, local investigators should email the ANZHFR to advise the retirement of the user's access to the ANZHFR. If you have forgotten your username or need your password reset, email technical@anzhfr.org with a request for it to be reset.

Familiarisation with data dictionary and patient-level form

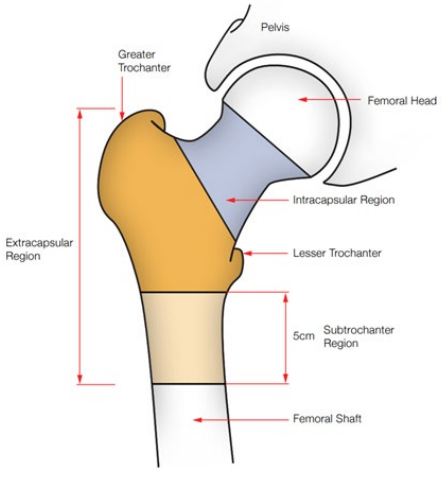
. The current version of the Data Dictionary and Patient-level form is available on the ANZHFR website. Please check with the National Coordinator if you are unsure which version to use. Please note that the Australian Commission on Safety and Quality in Health Care's *Hip Fracture Care Clinical Care Standard* has been formally adopted by both Australia and New Zealand. The ANZHFR has been designed to allow reporting against that Clinical Care Standard and its associated quality indicators.

Patient inclusion criteria

Every patient aged 50 years and older admitted to a participating hospital with a minimal trauma hip fracture is eligible to have his or her data entered to the ANZHFR. A minimal trauma fracture is defined as "a fracture resulting from trauma equal to (or less than) a fall from standing height". The person may undergo surgical or non-surgical management of their fracture. Zones of hip fracture relevant for inclusion in the ANZHFR are in Diagram 1 below: intracapsular; intertrochanteric; subtrochanteric. See Appendix 1 for types of fracture and types of operation.

The ANZHFR only collects data for the primary fracture for each hip, therefore a person can have two entries to the ANZHFR – one for the right hip and one for the left hip. The hospital carrying out the definitive treatment (surgery or decision to treat conservatively) creates and enters the patient and relevant information in the database.

Diagram 1: Zones of fracture



The scenarios below are provided to assist with correct patient inclusion:

1. A patient attends the Emergency Department, but is transferred to another hospital for treatment. The hospital providing the patient their definitive treatment creates the record, but will include that the person was transferred from the first hospital. The time and date of admission to both the transferring hospital and the operating hospital will be recorded.
2. A patient is admitted to a hospital that does operate on a hip fracture but the patient is transferred to another treating hospital for surgery (for example, transferred to a private hospital); the operating hospital is responsible for creating and recording the patient.
3. A patient attends the Emergency Department and an old hip fracture is diagnosed. If it is determined that the hip was fractured more than 14 days earlier, a patient is not included in the database.
4. Peri-prosthetic fractures are not included unless they occur within 120 days of the patient's primary hip fracture surgery. Then, the reoperation is recorded in the relevant follow-up section for this patient. The ANZHFR does not collect data if the reoperation occurs outside the 120-day follow-up period. A peri-prosthetic fracture is never registered as a new hip fracture in the Registry.
5. A patient is admitted with a fractured proximal femur but the fracture is more than 5cm below the lesser trochanter. This fracture is not in the designated zone of fracture (see diagram 1) and is therefore not included in the Registry.
6. A patient is admitted with an undisplaced stress fracture of the proximal femur. The patient is included if the fracture is within a designated zone.

Dataset review

The ANZHFR Steering Group reviews the dataset annually to ensure that the data collected is the minimum required to inform practice and help improve patient care. This review is undertaken in the middle of the calendar year. Any changes agreed by the Steering Group "go live" on the 1 January each year. In December each year, the revised versions of the data dictionary and the patient-level data collection form are emailed to local investigators and made available on the website www.anzhfr.org

Data dictionary

- This is a large document that details the definition and purpose of each of the data items.
- After first scanning the data dictionary to see what it contains, it should then be used as a resource to help with extraction and entry of data in the correct format.
- If the data dictionary is unclear, contact the relevant country coordinator (see contact information on page 3).

Data collection form (patient-level form)

- The main data collection fits on both sides of a single A4 sheet of paper (see "setting up to collect data"). Most of the data items are straight forward to understand, but it is worth going through each item one by one with the data dictionary to ensure interpretation of each item is understood at the start.
- See the next section "where to find the data" for a hierarchy of sources for each variable.
- The 120-day post-surgery follow-up is straight forward. The date follow-up is due is calculated from the date of admission.
- The Registry has a built-in calendar feature that alerts you to the timing of follow up of individual patients.
- The data collection process is explained in more detail later in this user guide.

Patient elects to opt-out

If a patient elects to opt-out:

1. create a record in the database by completing the following fields: patient's name; MRN; side of fracture; date of birth
2. Then tick the "patient has opted out" check box. The patient's record will then be "hidden" and will not show in follow-up lists.

Data collection

The data required for each patient is specified on the patient-level form and there is no one correct method for sustainable data collection.

A team approach to data collection is recommended reflecting both Orthopaedic and Geriatric Medicine interests. Also consider Emergency Department, Anaesthetics, and operating theatre staff, although a small group is likely to be more effective. This team can also review the results on a quarterly basis (see below).

Feedback from the National Hip Fracture Database (NHFD) in the UK has the following suggestions:

- The key is having interested and committed person(s);
- It works better if these persons are involved in the delivery of care;
- Nursing roles tend to be the most reliable although don't forget others involved in the care of people who have fractured their hip;
- Sustainability for data entry needs to be considered, for example, holiday and sickness cover etc.;
- Clerical staff can enter data into the database, saving on clinical time;
- One person has overall responsibility for data accuracy and completeness and this person can check it by randomly checking say 10% of entries. This person can chair the quarterly "team" review meetings.

Where to find the data

The table below lists a hierarchy of the places to find the information for each of the variables. If the information is not found in the first option, move to the next option until the information has been reliably and accurately sourced.

Data Variables	Where to find the information	Comments
Patient Information: Variables 1.03 to 1.15		
First name Surname Hospital MRN/URN/event no. Contact telephone no. DOB Sex Patient post code Medicare no. Public/private type	1. Hospital medical record: electronic 2. Hospital medical record: paper 3. Hospital cover sheet: paper 4. Patient label/hospital notes	
Usual place of residence	1. Hospital medical record: electronic 2. Hospital medical record: paper 3. Documents from RACF 4. Family collateral history 5. ED triage form: electronic 6. ED triage form: paper	Social history obtained from medical review or ED aged care assessment team

Admission: Variables 2.02 to 2.14		
Admission via ED of operating hospital	1. Hospital medical record: electronic 2. Hospital medical record: paper 3. ED triage form: electronic 4. ED triage form: paper	
If transferred from another hospital, transfer hospital	1. Hospital medical record: electronic 2. Hospital medical record: paper 3. Ambulance transfer report: paper	
ED/Hospital arrival and departure date and time (transfer hospital)	1. Hospital medical record: electronic 2. Ambulance transfer report: paper	
ED/Hospital arrival and departure date and time (operating hospital)	**Admission** 1. Hospital medical record: electronic 2. Hospital medical record: paper 3. ED triage **Discharge** 4. Run ED data report for departure date and time 5. Nursing entry of time admitted on inpatient ward for departure date and time	Preferred ED admission time is ED triage time. Departure time from ED reported as time consuming to find if an ED report not available. Read thoroughly through medical record.
If an inpatient fracture	1. Radiology: date and time of diagnostic x-ray 2. Hospital medical record: electronic or paper	
Pain assessment	1. Hospital medical record: electronic 2. Hospital medical record: paper 3. ED triage form: electronic 4. ED triage form: paper	Any qualitative or quantitative assessment of pain recorded in the notes performed within 30 minutes of ED presentation. Found in nursing entry or medical entry.
Pain management	1. Ambulance report: paper 2. Hospital medical record: electronic 3. Hospital medical record: paper 4. Medication chart: electronic 5. ED triage form: electronic 6. ED triage form: paper	
Type of ward admitted to	1. Hospital medical record: electronic 2. Hospital medical record: paper 3. Initial nursing notes regarding new ward admission	
Assessment: Variables 3.01 to 3.13		
Walking ability preadmission	1. Hospital medical record: electronic 2. Hospital medical record: paper 3. ED aged care assessment team, initial physiotherapy assessment, initial medical review 4. Documents from RACF 5. Family collateral history	
Preadmission cognitive status	1. Hospital medical record: electronic 2. Hospital medical record: paper 3. Medical review or ED aged care assessment team 4. GP correspondence 5. Family collateral history	

Preoperative cognitive assessment	1. Hospital medical record: electronic 2. Hospital medical record: paper 3. Medical review or ED aged care assessment team	Must be completed using a validated tool and must be documented.
Bone protection at admission	1. Hospital medical record: electronic 2. Hospital medical record: paper 3. Medication chart: electronic 4. Medication chart: paper 5. Pharmacy list 6. Nursing home drug charts	This information can usually be found in the initial medical review or the medication chart
Preoperative medical assessment	1. Hospital medical record: electronic 2. Hospital medical record: paper	If more than one review record first geriatric/medical review
Side of Fracture	1. Review x-ray 2. Hospital medical record: electronic 3. Hospital medical record: paper	Documentation in the medical record of (L) and (R) can be unreliable. Physically seeing the patient or cross referencing the x-ray/medical record with the initial orthopaedic entry, the initial medical entry, and the operation report may be required.
Atypical fracture	1. Review x-ray and x-ray report 2. Hospital medical record: electronic 3. Hospital medical record: paper	Review the medical history e.g. histopathology result to indicate cancer, or a bisphosphonate pattern of fracture
Type of fracture	1. Review x-ray 2. Hospital medical record: electronic 3. Hospital medical record: paper	Check Orthopaedic consult in the notes and/or with the orthopaedic team. Often different terminology is used e.g. Subcapital # which does not correspond to intracapsular on the database
Surgical repair	1. Hospital medical record: electronic 2. Hospital medical record: paper	Check that there is an operation report
ASA	1. Anaesthetic Chart from surgery 2. Hospital medical record: electronic 3. Hospital medical record: paper	This can be difficult to find
Clinical Frailty Scale	1. 1. Hospital medical record: electronic 2. Hospital medical record: paper 3. Medical review or ED aged care assessment team	
Treatment: Variable 4.01 to 4.19		
Date and time of primary surgery	1. Hospital medical record: electronic 2. Hospital medical record: paper 3. Anaesthetic record 4. Intraop. Report (NZ only)	Time of surgery is taken from the start of the anaesthetic process. The procedure case report includes anaesthetic start time.
Reason if delayed	1. Hospital medical record: electronic 2. Hospital medical record: paper 3. Liaise with Orthopaedic team/registrar	Not usually obvious. Seek verbal clarification with nurses/registrar if unknown. If there is more than one delay choose the reason for the first delay
Anaesthesia	1. Hospital medical record: electronic 2. Hospital medical record: paper 3. Anaesthetic record 4. Pre-anaesthetic consultation	The procedure case report includes type of anaesthetic administered.

Analgesia (nerve block)	1. Hospital medical record: electronic 2. Hospital medical record: paper 3. Anaesthetic report 4. Intraop. Report (NZ only)	Often poorly documented. Check ED notes especially the nursing entries and medication chart. May also be found on the procedure case report.
Consultant orthopaedic surgeon present during surgery	1. Hospital medical record: electronic 2. Hospital medical record: paper 3. Intraop. Report (NZ only)	Can usually be found in the operation report or the procedure case report. Check also the list of the medical staff involved in the procedure (proceduralist)
Operation performed	1. Review post op x-ray 2. Hospital medical record: electronic 3. Hospital medical record: paper 4. Intraop. Report (NZ only)	Can be found in the operation report or the procedure case report. Ensure the operation performed is recorded in the database rather than what was initially planned.
Post-operative weight bearing status	1. Hospital medical record: electronic 2. Hospital medical record: paper	Ensure the status on the operation report is cross referenced with the immediate post op orthopaedic consult for any alteration to WB status
First day mobilisation	1. Hospital medical record: electronic 2. Hospital medical record: paper	Physiotherapy entry or nursing entry. Day 1 post-surgery means the next calendar day following the date of the patient's primary surgery.
New pressure injuries of the skin	1. Hospital medical record: electronic 2. Hospital medical record: paper	Often reported as an incident/ risk. Check the Nursing entries for documentation or an incident report number relating to a pressure injury.
Assessed by a geriatrician and date initially assessed	1. Hospital medical record: electronic 2. Hospital medical record: paper	Often assessed preoperatively
Specialist falls assessment	1. Hospital medical record: electronic 2. Hospital medical record: paper	
Bone protection medication at discharge from operating hospital	1. Hospital medical record: electronic 2. Hospital medical record: paper	Medication chart Discharge letter Discharge prescription
Delirium assessment	1. Hospital medical record: electronic 2. Hospital medical record: paper	Requires the use of a validated tool and needs to be documented.
Clinical malnutrition assessment	1. Hospital medical record: electronic 2. Hospital medical record: paper	A clinical nutritional assessment is required. This will use screening tools and clinician input as negotiated with local dietitians and geriatricians/physicians.
First day walking	1. Hospital medical record: electronic 2. Hospital medical record: paper	Physiotherapy entry or nursing entry. Day 1 post-surgery means the next calendar day following the date of the patient's primary surgery.
Discharge: Variables 5.01 to 5.06		
Date and discharge destination from acute/orthopaedic ward	1. Hospital medical record: electronic 2. Hospital medical record: paper	Check the nursing entries.

Date of final discharge from hospital if known/ discharge destination from hospital if known	1. Hospital medical record: electronic 2. Hospital medical record: paper 3. Telephone call to patient or informant	This may be difficult to find. Date of final discharge from inpatient care if known. Discharge letter from hospital/rehab facility. Date of final discharge from inpatient care if known. May need to ring public or private rehab facility. NZ only - public rehab facilities.
120 Day follow up: Variables 7.01 to 7.08		
All items	For death or readmissions, first check: 1. Hospital medical record: electronic 2. Hospital medical record: paper To follow up: 3. Clinic follow up appointment with patient or informant 4. Telephone call to patient or informant	Please note restricted weight bearing status refers to a patient where there are specific instructions from the orthopaedic surgeon that prevents the patient being fully weight bearing on the affected leg. It does not relate to the patient's perception of whether they are able to fully weight bear.

Setting up to collect data

It may be easiest to print the patient-level form and collect patient data on paper during the admission in order to achieve the highest level of data completeness and accuracy. The data can then be transferred to the online database.

Remember to store the paper forms securely – a locked draw in a locked office is ideal. Once the data has been transferred to the online database and saved, the paper form can be securely destroyed using local protocols for the destruction of health information.

Completing the data sheet

- Sitting at a clinical workstation and with the patient notes/medical record it will take 10-15 minutes.
- On a ward round, it should not add any time to the ward round as the majority of items required are part of clinical care.

Entering the data on to the web-site

- Will take about 10 minutes per patient.
- The website is optimised for mobile devices so a desktop computer is not necessary
- Most fields have an "information" button beside them to provide additional information relevant to that field.
- Administrative staff can enter the data and save on clinical time.
- Always save new data that has been entered before changing pages.

Follow up phone calls

- These take 5-10 minutes once the patient has been contacted.
- The information required is simple.
- All patients should have received an ANZHFR Project Pamphlet on admission to hospital for their hip fracture. This advises patients of the telephone follow up. In some Australian states, a patient information statement is also provided.
- It is an advantage to have met the patient and/or their family during their hospital admission and identified the correct person to phone. Alerting the patient and family during admission to hospital that they will receive follow-up phone calls is an advantage at the time of calling.

- As many patients will be in residential aged care, it is helpful to use your local networks to raise awareness about the ANZHFR within the Residential Aged Care sector. It may also help if they realise they may be contacted as part of the follow-up.

Data checking

There are inbuilt validation checks for many of the fields to minimise data entry error (eg a date of birth that shows the patient is aged less than 50). The yearly validation tab in the menu shows fields that have unlikely or unusual data. It does not mean the data is incorrect. It allows users to quickly screen for data that may need to be checked for accuracy and should be used monthly or quarterly.

Each year, a random sample of data (10% of records) should be checked to assess data accuracy.

Continuous quality improvement

It is recommended the Local Clinical Lead / Principal Investigator and the Site Coordinator put in place a regular process to access and use the Registry data to review clinical care at their hospital. Feeding back data to the local hip fracture steering group allows assessment of areas to be reviewed to improve hip fracture care. Benefits of contributing data to the ANZHFR includes:

a. Providing access to a series of self-audit feedback reports on a number of measures (e.g. time to surgery) that have been developed to provide timely access to hospital performance;
b. Use of the self-audit reports to monitor their hospitals hip fracture care against the performance of all other contributing hospitals.
c. Ability to analyse own hospital data for local meetings and feedback to the quarterly team review meetings and/or hospital executive.

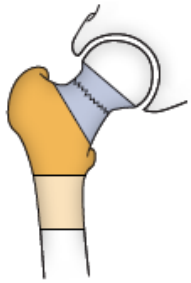
A range of quality improvement methodologies have been applied to hip fracture care, including Plan-Do-Study-Act Cycles[2] in accordance with the Institute for Healthcare Improvement (IHI) methodology and the value stream model known as 'Lean thinking'[3]. The multidisciplinary stakeholder group should consider utilisation of such an approach.

[2] Dodson I. Improving the journey for hip fracture patients. http://koawatea.co.nz/improving-the-journey-for-hip-fracture-patients/.
[3] Yousri TA, Khan Z, Chakrabarti D, Fernandes R, Wahab K. Lean thinking: can it improve the outcome of fracture neck of femur patients in a district general hospital? *Injury.* Nov 2011;42(11):1234-1237.

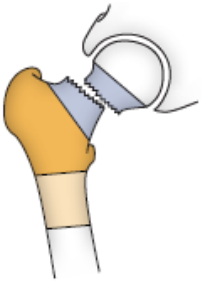
Appendix 1: Types of hip fracture and hip operations

Hip fractures

- Intracapsular

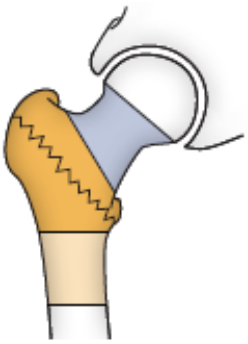


Undisplaced intracapsular fracture

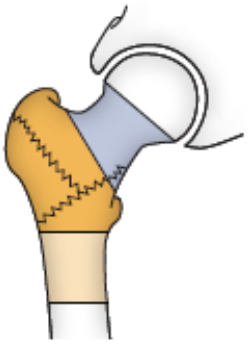


Displaced intracapsular fracture

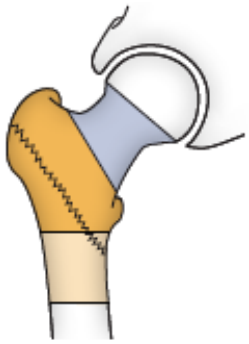
- Extracapsular



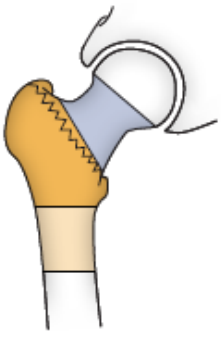
Pertrochanteric fracture



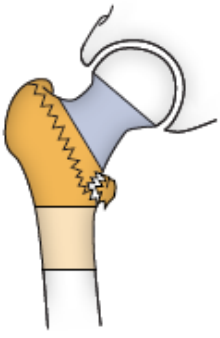
Reverse oblique fracture



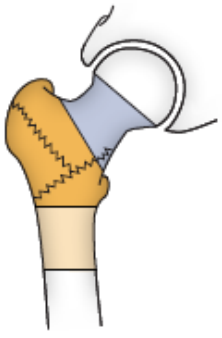
Subtrochanteric fracture



AO/OTA A1



AO/OTA A2



AO/OTA A3

Operation performed