



**Project commissioned by the Agency for Clinical Innovation**

*Formative Evaluation of the Minimum  
standards for the Management of Hip  
Fracture in the Older Person*

**Draft final report**

# Document control

## Revision history

Version	Date	Author	Modifications
0.1	29 April 2015	Deniza Mazevska/Jim Pearse	Initial draft
0.2	7 July 2015	Deniza Mazevska/Jim Pearse	Draft final report
0.3	10 September 2015	Deniza Mazevska/Jim Pearse	Complete executive summary and chapter on project conclusions

## Distribution

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## Suggested citation:

Health Policy Analysis 2015, *Formative Evaluation of the Minimum standards for the management of hip fracture in the older person – Draft final report*. Agency for Clinical Innovation, Sydney.

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# Abbreviations

AAGBI	Association of Anaesthetists of Great Britain and Ireland
AAOS	American Academy of Orthopaedic Surgeons
ACE	Acute care of the elderly (ward)
ACI	Agency for Clinical Innovation
ACSQHC	Australian Commission on Safety and Quality in Healthcare
ADLs	Activities of daily living
ANZHFR	Australian and New Zealand Hip Fracture Registry
AR-DRG	Australian Refined Diagnosis Related Group
BHI	Bureau of Health Information
CAM	Confusion Assessment Method
CEC	Clinical Excellence Commission
DRG	Diagnosis Related Group
ED	Emergency department
FIM	Functional Independence Measure
ICD-10-AM	International Classification of Diseases – 10 <sup>th</sup> Revision – Australian Modification
IGCT	Inpatient Geriatric Consultation Team
IVPCA	Intravenous Patient Controlled Analgesia
LHD	Local Health District
MDT	Multi-disciplinary team
MMSE	Mini-Mental State Examination
MOCA	Montreal Cognitive Assessment
MoHHQO	Canadian Ministry of Health and Health Quality Ontario
NICE	National Institute for Health and Care Excellence (UK)
NRS	Numeric rating scale (for pain)
SIGN	Scottish Intercollegiate Guidelines Network
VRS	Visual rating scale (for pain)

# Executive summary

The Agency for Clinical Innovation (ACI) engaged Health Policy Analysis Pty Ltd (HPA) to conduct a formative evaluation of the *Minimum standards for the management of hip fracture in the older person* (the Minimum standards).

The Minimum standards were developed in early 2013. The ACI had identified significant benefits, to both patients and the health care system, of specific evidenced-based minimum requirements for hip fracture management in the elderly. These benefits included improved morbidity and mortality rates, better functional outcomes, increased rates of discharge to original place of residence, and increased value from health dollars spent.

The Minimum standards are being implemented in a phased approach across NSW public hospitals.

This is the draft final report of the formative evaluation of the Minimum standards, and their implementation in six study sites in NSW. The objectives of the evaluation were to:

- evaluate the Minimum standards (including their soundness given the evidence base and support for them by clinicians, the governance processes supporting the Minimum standards and associated tools and guidelines)
- examine patient outcomes associated with the implementation of the Minimum standards by providing preliminary data to measure the early impacts; and
- articulate barriers and success factors for implementation.

## Approach

HPA developed a program logic and evaluation framework, and data collection instruments, as the basis for the formative evaluation. The evaluation was then undertaken of the program as a whole (which includes the evidence base and support for the Minimum standards, governance of the Minimum standards, and associated tools and guidelines), and of the implementation of the Minimum standards at six selected sites within NSW. The study sites were:

- Concord Hospital
- Gosford Hospital
- Prince of Wales Hospital
- Port Macquarie Hospital
- Royal North Shore Hospital
- Wagga Wagga Base Hospital.

Three sites were ones where the implementation of the Minimum standards is further along the track (Concord, Prince of Wales and Royal North Shore). These are referred to as 'early adopter' hospitals in this report. The other three were where the implementation was in earlier stages (Gosford, Port Macquarie and Wagga Wagga Base). These are referred to as 'late adopter' hospitals.

Note that this evaluation reflects the situation for the above hospitals up to 2014. It is acknowledged that the situation for these hospitals may have changed since that time.

## Findings and recommendations

This formative evaluation of the *Minimum standards for the management of hip fracture in the older person* has assessed the value of the Minimum standards as an overall program, and also, the implementation of the Minimum standards at six study sites. Selected early impact/outcome measures were compared between hospitals in early stages of implementation of the Minimum standards ('later adopter' hospitals), and those with more advanced implementations ('early adopter' hospitals).

The overall conclusions from this evaluation are that:

- There is strong support within the literature for the range of standards, and individual standards featured in the Minimum standards.
- There is also strong support for the Minimum standards amongst clinicians.
- Analysis of available data in this formative stage of implementation of the Minimum standards is showing positive patient outcomes resulting from their implementation. In particular:
  - The analysis of patient survival showed that the hospitals that had implemented the Minimum standards earlier showed better survival of patients compared with hospitals that had implemented the Minimum standards later.
  - Receiving surgery within 48 hours (Standard 2) is associated with a reduction in the risk of death of 18.6%, controlling for a range of factors.
- The mean length of stay of for the main episode for patients (i.e. the one where surgery for hip fracture was undertaken) was 10.9 days amongst the study hospitals, ranging from 8.1 days (Wagga Wagga Base Hospital) to 13.3 days (Concord Hospital). This compared with 11.6 days for the state.
- When contiguous episodes<sup>1</sup> are considered, the average length of stay for the study hospitals was 29.1 days, ranging from 30.7 days (Gosford Hospital) to 24.2 days (Port Macquarie Hospital). Comparisons with the state level estimates for contiguous episodes are not valid, as the data were not extracted for related episodes for non-study hospitals.
- Hospitals are at varying stages of implementing individual standards. The following standards had been implemented more extensively by hospitals:

3 Timing of surgery

4 Patient's surgery is not cancelled.

The single most important factor leading to these standards being effectively implemented was dedicated theatre sessions for emergency orthopaedic patients.

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<sup>1</sup> The phrase 'contiguous episode' is used to refer to an unbroken episode of care where the patient is transferred between two or more hospitals.

- For other standards, there were instances amongst the study hospitals where implementation of the standard had been effective, but others where the standard was still only partially implemented. These were:

1 Orthogeriatric clinical management  
2 Pain management  
5 Early mobilisation.

- Finally, there were two standards where implementation was slow amongst most of the study sites. These were:

6 Re-fracture prevention  
7 Local ownership of data systems.

The enablers for effective implementation of the Minimum standards that were identified amongst the study sites were:

- Clinical leadership.
- Hospital-wide implementation of the Minimum standards (i.e. not just an initiative of a single clinical department).
- Support by senior executive of the hospital/ Local Health District.
- Having the volumes of activity where change would make a big difference.
- Having a dedicated position(s) to drive the change.
- Having access to information on variation in practice between hospitals.
- Feedback on key indicators, in particular, patient outcome indicators.

The barriers were:

- Availability of follow up/ extended services (e.g. outpatient follow up, rehabilitation/ slow stream care places).
- Where initiatives were person-dependent rather than being integrated into the organisation.
- Limitations of information technology and availability of resources to collect data to feedback to clinicians.
- Competing state-based and local priorities.

Given the positive early impacts of the Minimum standards, the first recommendation arising from this formative evaluation is for all hospitals undertaking hip fracture surgery within NSW to implement the Standards.

Recommendations for refinement of the Minimum standards are as follows:

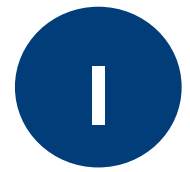
- Standard 2 Pain Management: Greater emphasis on the need to measure pain levels more effectively, especially in patients with cognitive impairment and other patients who cannot adequately communicate their level of pain.
- Standard 4 Patient's surgery is not cancelled: Give more emphasis to nutrition, or separate it out into a separate standard. The latter is more desirable as good nutrition is fundamental to the patient being able to physically cope with their injury, and is important in their recovery.

Most of the work for the next stages of implementing the Minimum standards is with individual hospitals. The ACI can assist hospitals by:



- Achieving roll-out of the *Osteoporotic Re-fracture Prevention Model of Care* (Agency for Clinical Innovation, 2011) across all hospitals.
- More effectively managing the implementation of various (state level) priority initiatives, and coordinating initiatives with the CEC and other agencies.
- Together with the Reducing Unwarranted Clinical Variation Taskforce, further investigating variation in practice amongst hospitals in the management of older people with hip fracture (i.e. an extension to the work undertaken within this formative evaluation) to identify the potential to streamline aspects of care.
- Providing clarity on how the Minimum standards fit into other similar national initiatives, and the implications for practice.
- Collaborating with the NSW Ambulance Service to discuss strategies for more effective pain management for hip fracture patients, including when transferring patients between hospitals to receive hip fracture surgery.
- Build on the tools and processes that have already commenced (e.g. STARS and data linkage processes) to provide information on how hospitals are performing using key indicators related to the Minimum standards (e.g. achievement of surgery within 48 hours, 30 day mortality), and relevant contextual information to assist in interpreting the results. The ACI is planning a summative evaluation of the implementation of the Minimum standards amongst all NSW hospitals undertaking hip fracture surgery, which will provide a comprehensive state-wide assessment of the performance against key indicators.
- Continue to facilitate forums (face to face meetings and online) where hospitals can share information and tools with each other.

# Introduction



The Agency for Clinical innovation (ACI) commissioned a project to undertake a formative evaluation of the *Minimum standards for the management of hip fracture in the older person* (the Minimum standards). Health Policy Analysis undertook this project for the ACI.

The objectives of the project were to examine patient outcomes associated with the implementation of the Minimum standards, by providing preliminary data to measure the early impacts; and to articulate barriers and success factors for implementation. These will be used to guide further implementation of the Minimum standards across the State.

## **Overview of the *Minimum standards for the management of hip fracture in the older person***

The *Minimum standards for the management of hip fracture in the older person* aim to improve the outcomes of patients with hip fractures requiring surgery and management in NSW. They have been developed in response to:

- Deficiencies in optimising care for patients with hip fracture along the continuum
- Variation across the state in 30 day mortality following hip fracture
- Analysis of other data exploring the impact of comorbidities of patients with hip fracture on length of stay.

They were developed collaboratively by the Surgery, Anaesthesia and Critical Care Portfolio and the Primary Care and Chronic Services portfolios in ACI.

## **Implementation**

The Minimum standards are being implemented in a phased approach across NSW. To assist implementation, the ACI has developed a suite of resources, including:

- Implementation guide
- Agenda template
- Communication and stakeholder management template
- Diagnostic template
- Factsheet template
- Gantt chart template
- Minutes template
- Project management plan guidelines
- Risks and issues template
- Solutions statement template
- Walk-around tool.

## **Objectives of the formative evaluation**

The formative evaluation of the *Minimum standards for the management of hip fracture in the older person* aimed to:

- examine patient outcomes associated with the implementation of the Minimum

- standards by providing preliminary data to measure the early impacts; and
- articulate barriers and success factors for implementation.

In addition, formative evaluations have a role in strengthening or improving the program or initiative being evaluated. Therefore, an additional aim was to identify any gaps in the Minimum standards themselves, or in the tools/documentation guiding the implementation (i.e. through reviewing the evidence base and seeking clinical opinion).

## How the evaluation was undertaken

An evaluation framework was developed as a guide for the conduct of the evaluation. The framework:

- Detailed the program logic, which links the problems that the program is trying to address with inputs, processes, and outputs, and ultimately the outcomes expected.
- Specified the objectives of the evaluation, and formulated these as key evaluation questions.
- Identified the means by which these questions were answered through the evaluation (i.e. the methods).
- Specified the approach to collecting, analysing and interpreting qualitative and quantitative data used to answer the key evaluation questions.

The framework was validated and approved by the Steering Committee for the project. Instruments were then developed for the collection of data. These included specifications for extracts of data from secondary sources (i.e. data routinely collected for purposes other than specifically for this evaluation).

The evaluation was undertaken of the program as a whole, as well as of the implementation of the Minimum standards at six study sites. The program evaluation involved interviews with key stakeholder involved with the ACI in the development and/or implementation of the Minimum standards. The six case study sites were as follows:

- Concord Hospital
- Prince of Wales Hospital
- Royal North Shore Hospital
- Gosford Hospital
- Port Macquarie Base Hospital
- Wagga Wagga Base Hospital.

The first three sites are ones where implementation of the Minimum standards is more advanced. In this report these are known as 'early adopter' hospitals. The latter three are ones where the implementation is in earlier stages. These are being referred to in this report as 'late adopter' hospitals.

# Findings from the literature

## 2

A literature scan was conducted to inform the evaluation. Relevant journal articles, reports and guidelines were retrieved and reviewed. The emphasis in the search was for support or lack of support for specific Standards, or other areas that are important clinically for hip fracture patients that are not covered by the Minimum standards. Also, other Australian and international standards and guidelines were reviewed to look at similarities and differences with the Minimum standards for the purposes of potentially improving them.

### Comparison with other standards and guidelines

Guidelines on hip fracture management from other Australian and international organisations were identified in the search and reviewed to see how they aligned with the Minimum standards. These included the following:

- *Australian and New Zealand Guideline for Hip Fracture Care: Improving Outcomes in Hip Fracture Management of Adults* (Australian and New Zealand Hip Fracture Registry Steering Group, 2014)
- *Consultation Draft Hip Fracture Care Clinical Care Standard* (Australian Commission on Safety and Quality in Health Care, 2014). Note that these standards are still draft; they have not as yet been finalised.
- *The Management of Hip Fracture in Adults: NICE Clinical Guideline 124* (National Institute for Health and Care Excellence, 2014)
- *AAGBI Safety Guideline: Management of Proximal Femoral Fractures* (Association of Anaesthetists of Great Britain and Ireland, 2011)
- *Management of Hip Fracture in Older People: A National Guideline* (Scottish Intercollegiate Guidelines Network (SIGN), 2009)
- *Management of Hip Fractures in the Elderly: Evidence- Based Clinical Practice Guideline* (American Academy of Orthopaedic Surgeons, 2014)
- *Quality-based Procedures: Clinical Handbook for Hip Fractures* (Health Quality Ontario; Ministry of Health and Long-Term Care, 2013)

A comparison of these standards/guidelines was undertaken, an overview of which is represented in Table 1. Note that different standards/guidelines represent issues at different levels of detail, and are not necessarily delineated in the way that the Minimum standards are in terms of the areas of focus. For example, cancellation of surgery was usually dealt with under timing of surgery rather than as a separate area.

**Table 1 - Comparison of individual standards featured in the ACI Minimum standards and other Australian and international hip fracture standards and guidelines**

ACI Minimum standards	ANZHR	ACSQHC*	NICE	AAGBI	SIGN	AAOS	MOH HQO
1 Orthogeriatric clinical management	✓	✓	✓	✓	✓	x	✓
2 Pain management	✓	✓	✓	✓	✓	✓	✓
3 Timing of surgery	✓	✓	✓	✓	✓	✓	✓
4 Patient's surgery is not cancelled	x	x	x	x	x	x	x
5 Early mobilisation	✓	✓	✓	✓	✓		✓
6 Re-fracture prevention	✓	✓	✓	✓	✓	✓	✓
7 Local ownership of data systems	x	x	x	x	x	x	✓

\* Note that these standards are draft; they have not as yet been finalised.

The analysis showed that there was a large degree of alignment between the ACI Minimum standards and other standards/guidelines. Similarly to the literature in general, Standard 4 was not identified as a separate standard in any of the other standards/guidelines reviewed, and Standard 7 only featured in one other guideline.

There was strong support for the Minimum standards in terms of an orthogeriatric care model, pain management, avoidance of delay to surgery, early mobilisation and re-fracture prevention programmes.

Further comments on alignment of these other Australian and international standards and guidelines with the ACI Minimum standards are provided under each Standard below.

### Standard 1: Orthogeriatric clinical management

The involvement of geriatric medicine in the management of hip fracture patients was strongly supported in the literature. Orthogeriatric management has been shown to lead to reductions in morbidity, mortality, and in the number of post-operative medical complications (Fisher et al., 2006). It is also associated with reduced time to surgery, which is thought to be due to the early diagnosis and management of concurrent medical problems (Leung et al., 2011).

The Minimum standards identify a three-tiered orthogeriatric clinical management model, with Tier 1 being the gold standard. This is shown in the Box below.

#### Box 1 - The three-tier orthogeriatric clinical management model

##### Tier 1: Orthogeriatric liaison/collaborative care

- Admission under the orthopaedic surgeon, and a geriatrician is integrated into the orthopaedic team.
- Care is managed collaboratively on a daily basis, including participation in case conferencing, weekly multidisciplinary ward rounds and daily ward rounds.
- Collaborative care begins at admission, continues peri-operatively, through rehabilitation, secondary fracture prevention and discharge planning.

**Tier 2: Shared orthogeriatric care**

- Patient is admitted under both the orthopaedic surgeon and geriatrician.
- Both services take responsibility for pre- and post-operative multidisciplinary care.

**Tier 3: Consultative orthogeriatric care**

- Patient is admitted under the orthopaedic team.
- When issues arise, timely input should be provided by geriatrician, or a general physician when a geriatric service is unavailable.
- This model does not allow for pre-emptive assessment and management.

*Source: Agency for Clinical Innovation, 2013a*

Reviews by Kammerlander et al. (2010) and Della Rocca and Crist (2013) compared different models of orthogeriatric care. Both papers categorised models into the four-model classification originally suggested by Pioli, Giusti, and Barone (2008). The models are described in the Box below.

**Box 2 – Four model types****Model 1: Orthopaedic ward and geriatric consultant service**

- The first model, considered the simplest, is standard orthopaedic management with consultation by geriatric medicine only as desired by the orthopaedic team, and often only post-operatively.
- The patient is treated in the orthopaedic ward until transferred to a rehabilitation centre.
- The geriatric consultative service is on request (note there is an agreement between orthopaedic surgeon and geriatrician regarding patient treatment but no daily regular exchange).
- Della Rocca and Crist (2013) concluded that the conflicting results from studies into this model of care were difficult to reconcile, further evaluation of this model is therefore required.

**Model 2: Orthopaedic ward and daily consultative service**

- This model involves orthopaedic admission with daily geriatric consultation from admission through to discharge.
- This was the most frequently reported model in the Kammerlander et al. (2010) review.
- Della Rocca and Crist (2013) concluded that they were unable to make conclusions regarding the efficacy of this model due to conflicting results of the studies included

**Model 3: Geriatric and rehabilitation ward and orthopaedic consultant service**

- This model involves geriatric admission (i.e. patient is on the geriatric ward) with orthopaedic consultation from admission through to discharge.
- The orthopaedic surgeon is consultative.
- Della Rocca and Crist (2013) concluded that despite limited published studies into this model, results showed inconsistent improvements after implementation compared with pre-model standards of care.

**Model 4: Orthopaedic ward and integrated care**

- This is the most sophisticated model.
- The orthopaedic surgeon and the geriatrician manage the patient together from admission until discharge; it is fully integrated co-management.
- The patient is on an orthopaedic ward, and the geriatrician is integrated into the orthopaedic team.

- A multi-professional group with nurses, social workers, physiotherapists, and others is formed, and standardised treatment paths are implemented.
- Regarding the main outcome parameters, the studies with integrated care could show the lowest mean values regarding in-hospital mortality rate (1.14%), the lowest length of stay (7.39 days), and the lowest mean time to surgery (1.43 days)
- Della Rocca and Crist (2013) noted the true co-management of this model required extensive coordination and therefore could be the most difficult to implement. The review recommended that hospitals considering clinical hip fracture pathways perhaps begin with implementation of model 2 or 3, and as caregivers become more accustomed to co-management, a transition toward model 4 may be achieved.

Source: Kammerlander et al., 2010 based on those developed by Pioli et al., 2008, and also used in the review by Della Rocca & Crist, 2013

A summary of the four models presented by Della Rocca and Crist (2013) is shown in the Table below.

**Table 2 - Characteristics of orthogeriatric models of care**

Model	Admitting service	Consultation type <sup>a</sup>	Automatic consultation
1	Orthopaedic	Medical/geriatric	No
2	Orthopaedic	Medical/geriatric	Yes
3	Medical/geriatric	Orthopaedic	Yes
4	Geriatric and orthopaedic	Not applicable	Not applicable

<sup>a</sup> Either medical/geriatric or orthopaedic. Other consultations obtained on a case-by-case basis.

Source: Della Rocca and Crist (2013)

Although Kammerlander et al. (2010) concluded that it was unclear which model leads to the best outcome, the four-model classification is a useful aid in distinguishing the type of, and extent to which an orthogeriatric model is implemented in a hospital.

A suggested alignment of the three-tier classification of orthogeriatric care described in the Minimum standards' with the Pioli et al. (2008) four models is shown in Table 2.

**Table 3 - Characteristics of orthogeriatric models of care**

Pioli et al. (2008) models	Key features of the model	Tier in ACI's Minimum standards
Model 1: Orthopaedic ward and geriatric consultant service	Orthopaedic (ward) care with geriatric input on request, often post-operative only, and no daily regular exchange	Tier 3: Consultative orthogeriatric care
Model 2: Orthopaedic ward and daily consultative service	Orthopaedic (ward) care and daily geriatric consultative service, from admission through to discharge	Tier 2: Shared orthogeriatric care
Model 3: Geriatric and rehabilitation ward and orthopaedic consultant service	Geriatric and rehabilitation (ward) care with orthopaedic consultant service, from admission through to discharge	
Model 4: Orthopaedic ward and integrated care	Orthopaedic (ward) care with integrated geriatric care, fully integrated co-management from admission to discharge, with MDT support	Tier 1: Orthogeriatric liaison/collaborative care

Some studies investigated more specific issues about the models, such as when and how they are delivered. For example, Deschodt et al. (2011) evaluated the implementation of an inpatient geriatric consultation team (IGCT). The IGCT managed hip fracture patients admitted in non-geriatric wards; this was evaluated against usual care, which was admission

in an acute care of the elderly (ACE) ward. The study concluded that despite finding no functional patient benefit, the IGCT team intervention did offer benefits such as flexibility, implementation within a short period of time, the IGCT could reach a large number of individuals, and formation of the team was less expensive than increasing ACE ward capacity.

Regarding the timing of geriatric input, Leung et al. (2011) found that both pre- and post-operative geriatric involvement were important to ensure faster optimisation of patients prior to surgery, and prompt and accurate diagnosis and treatment of medical complications after surgery. In addition to pre-and post-operatively, another study suggested that a comprehensive geriatric assessment should be undertaken prior to discharge; this final stage of assessment allowed development of a tailored discharge program for the patient to assist with functional recovery, quality of life, and secondary prevention of fragility fractures by improving bone quality and reducing the risk of falls (De Rui, Veronese, Manzato, & Sergi, 2013).

One paper we reviewed stated that input from an orthogeriatrician failed to show a significant impact on major outcomes. However, medical comorbidities were more readily diagnosed. The study concluded that it was unlikely that the introduction of a lone orthogeriatrician (without a dedicated orthopaedic rehabilitation ward and the necessary multidisciplinary support) would significantly affect outcomes (Marsland & Chadwick, 2010).

### **Comparison of Standard 1 with other standards/guidelines**

The ANZHFR Guideline states that “*From admission, offer patients a formal, acute orthogeriatric service...*”. ‘Regular orthogeriatric assessment’ and ‘continued, coordinated orthogeriatric and multidisciplinary review’ are identified as components of this. This is very similar to the NICE guidelines (on which the ANZHFR guidelines are based), which state: “*offer patients a formal, acute orthogeriatric or orthopaedic ward-based Hip Fracture Programme that includes...orthogeriatric assessment*”. The ACSQHC Standards, and the Canadian MoHHQO, the AAGBI and the SIGN guidelines all recommend orthogeriatric input. Only one – the AAOS guidelines – did not explicitly recommend orthogeriatric management; the guidelines did recommend an interdisciplinary care program, but a geriatric component was not stipulated.

#### **Implications for the Minimum standards**

- No change required.

### **Standard 2: Pain management**

Standard 2 describes best practice guidelines for analgesia. It focuses on the timing of administration of analgesia (immediately upon presentation, regularly throughout the pre- and post-operative phases, and a post-discharge plan), and use of specific analgesic agents, including paracetamol, opioids and femoral nerve blocks. This is based on evidence from two papers in particular (Mak, Wong, & Cameron, 2011, Kunz, Mylius, Scharmann, Schepelman, & Lautenbacher, 2009, and NICE guidelines National Institute for Health and Care Excellence, 2014), but immediate and regular pain management is strongly supported in the literature in general.



In terms of analgesics, the Minimum standards suggest use of paracetamol six-hourly, with additional opioids and femoral nerve blocks if required. However an Australian study into hip fracture analgesia in 2010 found that morphine was the most frequently used analgesic, with less commonly used agents including codeine, oxycodone, paracetamol, and non-steroidal anti-inflammatory drugs (NSAIDs). Femoral nerve blocks were given to fewer than 7% of patients in the study, and age was significantly associated with their use – nerve blocks being more commonly received by younger patients (under 65 years) (Holdgate, Shepherd, & Huckson, 2010).

Multimodal pain management involves the use of "*multiple agents that act on different regions of the pain pathway and provide appropriate pain relief with less reliance on opioids*" (Kang et al., 2013, p. 292). It is recommended in Standard 2 as opioids are not always tolerated well by older people and can result in adverse effects such as sedation and opioid-induced respiratory depression (Deane & Smith, 2008). Multimodal pain management has been shown to reduce post-operative narcotic consumption after hip fracture, and improves patient satisfaction at discharge (Kang et al., 2013).

The Minimum standards also mention that barriers to effective pain management may include patient reluctance or inability to request analgesia, medical staff's reluctance to prescribe analgesia in older patients, and cognitive impairment in patients. Other barriers to analgesia include: confusion/ dementia, comorbidities, refusal/pain denial, language/ communication, and allergy (Holdgate et al., 2010).

The Minimum standards suggest that patient self-report is the gold standard in the assessment of the nature and intensity of pain. The quality measure for this Standard involves '*measurement of patient pain levels using pain scoring systems, taking into consideration visual and hearing impairments*'. However a specific pain scoring system is not suggested. The numeric rating scale (NRS) or the visual descriptor scale (VDS) have been shown to be appropriate tools to represent pain intensity in older adults (Herr, Spratt, Mobily, & Richardson, 2004). In cognitively impaired patients, which are estimated to be between 30% to 60% of hip fracture patients (Bitsch, Foss, Kristensen, & Kehlet, 2004, Robinson & Eiseman, 2008) the Minimum standards suggest behavioural assessments, noting aggression, agitation and guarding for example; this is supported in the literature (e.g. see Abou-Setta et al., 2011, Herr et al., 2006).

The Minimum standards require that '*all pain regimes should be clearly documented in clinical notes*' and communication of this to the multidisciplinary team and the GP to ensure post-operative and post-discharge pain management continues. A study of pain assessment and pharmacological management reported pain was documented in patients' notes for 99% of hip fracture patients, however, only 54.4% had pain assessed with a numeric rating scale, 4.2% with a non-numeric rating scale, and 7.4% with nonverbal pain behaviours, leaving 34% of patients with no objective assessment of pain documented (Herr & Titler, 2009). The study concluded that using a standard assessment tool such as the NRS, VDS, or observational behavioural assessment in cognitively impaired patients, led to increased documentation of pain, which suggested that pain assessment practices also improved.

## Comparison of Standard 2 with other standards/guidelines

All other guidelines included pain management recommendations that aligned with Standard 2. ANZHFR guidelines recommend that *“There should be prompt assessment and management of pain. The effectiveness of pain relief should be evaluated regularly. Nerve blocks should be included as a strategy to relieve pain.”* The recommended times to assess pain are identical to those in the Minimum standards, and NICE guidelines; and types of agents to offer are also the same.

The ACSQHC Standard requires that *“A patient with a hip fracture is assessed for pain at the time of admission and regularly throughout their hospital stay and receives pain management, as clinically appropriate”*. The SIGN guidelines are very similar suggesting early analgesia, tailored to the patient, and *“Regular assessment and formal charting of pain scores should be adopted as routine practice in post-operative care.”* The AAGBI recommends a formalised analgesia protocol, recording of pain scores, the use of paracetamol and nerve blocks, and use of opiates with caution. The AAOS guidelines do not specify timing of assessment but recommend pre-operative regional analgesia and post-operative multimodal analgesia (no particular technique recommended). The Canadian MoH makes several recommendations, including pre-operatively: the use of scales to assess pain, pre-hospital long acting analgesics, multimodal analgesia and consideration of nerve blocks; and post-operatively: analgesics for 72 hours, multimodal analgesia, consideration of the use of Intravenous Patient Controlled Analgesia (IVPCA) and regional anaesthesia.

### Implications for the Minimum standards

- Greater emphasis on the need to measure pain levels more effectively, including in patients with cognitive impairment and other patients who cannot adequately communicate their level of pain.

## Standard 3: Timing of surgery

Timely surgery is strongly recommended in the literature (Moja et al., 2012). Surgery less than 48 hours following presentation with a hip fracture is associated with improved outcomes, such as reduction in mortality, increased return to independent living, reduced pressure ulcers, reduced major and minor complications (Parker, Griffiths, & Appadu, 2002 via Agency for Clinical Innovation, 2013a), patient-centred benefits such as improved patient dignity and well-being (Kalsen, Mulgrew, Cook, and Lovell (2009), and reduced length of stay (Siegmet, Gurusamy, & Parker, 2005). As noted in the Minimum standards, it must be acknowledged that studies that conclude better outcomes for early surgery are at risk of bias, as patients whose surgery is delayed may have higher rates or co-morbidities.

Also to be noted, the Minimum standards require that patients should undergo surgery for hip fracture only as soon as they have been deemed medically stable.

To enable surgery within 48 hours, the Minimum standards recommend that correctable co-morbidities should be treated and/or stabilised to optimise the patient for surgery.

Correctable comorbidities listed are as follows:

- anaemia
- anticoagulation
- volume depletion

- electrolyte imbalance
- uncontrolled diabetes
- uncontrolled heart failure
- correctable cardiac arrhythmia or ischaemia.

Although the Minimum standards do not imply this is a definitive list, several common comorbidities are not included, for example: chest infection, chronic obstructive pulmonary disease, and renal failure (Marsland & Chadwick, 2010).

Some organisations suggest a shorter time to surgery should be aimed for. For example, the Royal College of Physicians' guidelines recommend that patients should be operated on within 24 hours of admission (Physicians, 1989, via Mallick, Gulihar, Taylor, Furlong, & Pandey, 2011), and the new Best Practice Tariff (a system to incentivise hospitals in the UK to improve care) set the hip fracture surgery target at 36 hours from admission (S. Khan, Weusten, Bonczek, Tate, & Port, 2013). The differences in outcomes of surgery at 24 or 36 hours versus 48 hours have not been studied in depth. The general consensus in the literature is that delay in surgery leads to poorer patient outcomes and increased hospital costs as length of stay increases.

The S. Khan et al. (2013) audit of hip fracture treatment in a UK hospital summarised reasons for surgical delay. These are shown Table 4.

**Table 4 - Reasons for surgical delay documented in S. Khan et al. (2013)**

Category of delay		Reason for delay	Example	Steps taken
<b>Surgical</b>	Organisation delays	Insufficient operating time in 7-day week	Ring-fenced trauma operating time	Increased from 45 to 65 hours
			Trauma list over-run	Minimising turnover time
			Other non-trauma surgical emergency	Parallel theatres opened to accommodate
	Prioritisation delays	Non-neck of femur fracture trauma cases	Paediatric cases, hand trauma cases	Neck of femur fractures prioritised routinely
		Neck of femur fractures with special considerations	Concurrent orthopaedics (e.g. upper limb) injury requiring surgery	Improved liaison for both procedures to be done in same setting
	Investigation delays	Medical	Echocardiography	Neck of femur fracture echo requests prioritised
		Surgical	Head injury	Head computed tomography scan routinely done during accident and emergency admission
	Optimisation delays	Treatment of acute life-threatening conditions		Earlier start for geriatrician ward rounds to review new patients
		Optimisation of sub-acute or chronic conditions		
	<b>Orthogeriatric review delays</b>		Orthogeriatric ward rounds per week	
Orthogeriatric consultant hours per week				Increased from 4 to 11

Source: S. Khan et al., 2013

A review of surgical delay by Marsland and Chadwick (2010) listed the following non-medical reasons for surgical delay (in descending order of days delayed):

- full trauma list
- no anaesthetist
- specialist case on trauma list
- name not on trauma board
- x-ray not available in theatre
- no prosthesis
- delayed diagnosis
- patient initially refused surgery.

Strategies to expedite parts of the care pathway which frequently led to delays were also investigated. Two studies investigated the effect of an additional or dedicated hip fracture theatre list in an attempt to avoid delays due to full trauma lists. Results showed that the addition of an extra trauma list reduced delays, but was not statistically significant (Marsland & Chadwick, 2010), while the other study concluded that extra lists may enable Trusts to cope better with hip fracture but do not change mortality (Kalson et al., 2009). Another study (Kosy, Blackshaw, Swart, Fordyce, & Lofthouse, 2013) implemented a coordinated management pathway including the following strategies:

- The implementation of a trauma coordinator – a senior nurse with ward management experience who was competent in cannulation, x-ray request procedure, analgesic prescribing and provision of femoral nerve blocks.
- Moving tasks previously performed in the emergency department to other team members outside the emergency department, therefore avoiding the delays found in this department.
- Implementation of a protocol to reverse the anticoagulant effects in the blood of patients on regular anticoagulant medication (which could delay surgery).

The new pathway led to improved efficiency, reduced inpatient length of stay and likely financial savings.

As well as within 48 hours, Standard 3 suggests surgery should be performed within standard daytime working hours. The evidence base for this condition is not provided in the guideline. A recent study showed no increased risk of complications when patients were operated on outside working hours, and no medical reason to postpone surgery until working hours (Bosma, de Jongh, & Verhofstad, 2010). Surgery outside working hours may help to alleviate delays due to full trauma lists.

### **Comparison of Standard 3 with other standards/guidelines**

All other standards/guidelines reviewed aligned with timely surgery (as soon as possible but not more than 48 hours). The ANZHFR Guidelines support this Standard, advising to “*Perform surgery on the day of, or the day after presentation to hospital with a hip fracture*”. This is based on the NICE guideline but has been adapted to refer to ‘after presentation to hospital’ rather than after admission, as the patient may present to a non-operating hospital initially. The ACSQHC Standard is based on the ANZHFR Guidelines and so is identical. The AAGBI, AAOS and MoHHQO all recommend surgery within 48 hours of hospital admission, and SIGN recommends maximising “*the proportion of medically fit patients receiving surgery as soon as possible, within safe operating hours (including weekends), after presenting to hospital.*”

The Minimum standards recommend that correctable co-morbidities should be treated and/or stabilised to optimise the patient for surgery. The list of possible comorbidities is the same as in ANZHFR and NICE Guidelines, except for 'acute chest infection' and 'exacerbation of chronic chest conditions', which are not included in the Minimum standards. The AAGBI guidelines note the Nottingham Hip Fracture Score (which predicts postoperative mortality according to comorbidities and other factors) is a useful tool to inform the anaesthetist about outcomes that may be discussed with the patient and/or family.

SIGN does not specify a list of comorbidities to consider but does include an assessment checklist as follows:

*"Early assessment, in the ED or on the ward, should include a formal recording of:*

- *pressure sore risk*
- *hydration and nutrition*
- *fluid balance*
- *pain*
- *core body temperature using a low reading thermometer*
- *continence*
- *coexisting medical problems*
- *mental state*
- *previous mobility previous functional ability*
- *social circumstances and whether the patient has a carer"*

Similarly, MoHHQO requires assessment and documentation of:

- *reason for the fall*
- *fluid balance*
- *pressure sore risk*
- *hydration and nutrition*
- *pain*
- *temperature*
- *other collateral injuries*
- *tests for appropriate blood work*
- *x-rays*
- *assess comorbid conditions*
- *current drug therapy, including any anticoagulants*
- *continence*
- *pre-fracture functional ability and mobility*
- *physical and functional level*
- *mental state based on pre-morbid functioning level, using a validated screening tool such as MMSE, MOCA, or CAM*
- *social circumstances, including caregiver status, existing community supports, family involvement.*

The Minimum standards do not include an assessment checklist.

#### **Implications for the Minimum standards**

- No change required.

## Standard 4: Patient's surgery is not cancelled

The Minimum standards recommend avoiding cancellation of surgery due to increased rates of morbidity, increased risk of complications (pressure ulcers) and that prolonged fasting puts elderly patients at high risk of malnutrition.

Cancellation of surgery was seldom mentioned explicitly in papers. However, there is a large overlap with the previous Standard. The fact that cancellation specifically was not often mentioned could indicate a gap in the knowledge surrounding the effects of cancellation of surgery.

One of the problems associated with cancellation of surgery is prolonged fasting. Once a patient's surgery is scheduled, they must fast in preparation for the anaesthetic. The Minimum standards suggest fasting should be minimal, with a maximum period of oral fasting no greater than 12 hours under any circumstance. Elderly, frail patients may be at high risk of malnutrition, therefore repeated fasting could affect their fitness for surgery and cause further delays.

As discussed in the previous section, early surgery is widely recommended. Cancellation of surgery may lead to delays of more than 48 hours, depending on the patient and the hospital's protocol for re-scheduling cancelled surgery (e.g. next available slot, next day's list, etc.). One study reported that delays up to four days did not increase mortality, but a delay of more than four days significantly increased mortality (Moran, Wenn, Sikand, & Taylor, 2005).

Extended length of stay due to cancellation also increases hospital costs. It is estimated that every additional 8-hour delay to surgery after the initial 48 hours results in an extra day in hospital (Adunsky, Lusky, Arad, & Heruti, 2003).

A UK study reported a hip fracture surgery cancellation rate of 21%, with the top three reasons for cancellation being: the patient was medically unfit (48%), there was a lack of operation time (32%), and that the patient was unprepared (6%) (Boutefnouchet, Budair, Qadri, & 2013).

### Comparison of Standard 4 with other standards/guidelines

No other guidelines specifically mention cancellation. Again, this could indicate a gap in other guidelines, or that the Minimum standards (unlike the others) consider this a separate issue to that of early surgery and minimisation of delay (as covered in Standard 3).

The ANZHFR guidelines refer to fasting, "*Periods of prolonged or repeated fasting are also not in the best interests of this population,*" under 'Timing of surgery', which illustrates the overlap with Standard 3.

### Implications for the Minimum standards

- No change required.

## Standard 5: Early mobilisation

The Minimum standards recommend early mobilisation (re-establishing movement and function) within 24 hours of surgery. Early mobilisation such as transfer from sitting to standing, maintaining upright posture and gentle ambulation, is widely recommended in the literature due to an association with improved quality of life, reduced fall risk and improved capacity for patient care (Agency for Clinical Innovation, 2013a). The Minimum standards recommend following the ACI Rehabilitation Model of Care (NSW Health, 2013), which suggests early mobilisation can also lead to reduced length of stay in hospital, which benefits the patient and reduces hospital costs.

Patient measures of successful mobilisation are listed in the Minimum standards as: 'ability to transfer', 'chair rise ability', 'timed walking assessment', 'balance assessments', 'muscle strength' and 'independence in ADLs', but no scales or assessment tools are recommended for use. In a study of function early after hip fracture surgery, Taraldsen et al. (2014) used standard measurements such as the measure of upright time recorded for 24 hours four days after surgery by the use of an accelerometer-based activity monitor to provide a reliable measure of mobility.

Effective pain management (Standard 2) is an essential component of early mobilisation, and if insufficient, can be a barrier to achieving this. Pain should be assessed regularly at rest and during mobilisation periods, to ensure that analgesia is sufficient (Taraldsen et al., 2014).

Rehabilitation is also a component of Standard 5. It is suggested that patients with '*very poor mobility, functional impairments and multiple co-morbidities*' should be assessed for multidisciplinary rehabilitation by a clinician with expertise in rehabilitation to determine the patient's requirements, including intensity and care setting.

Rehabilitation after hip fracture is recommended in the literature. A 2005 review showed that programs that assist hip fracture patients to regain function and return home are likely to be cost-effective as they appear to increase the percentage of people who return home, and remain there (Cameron, 2005). O'Malley, Blauth, Suhm, and Kates (2011) suggested that hospital multidisciplinary rehabilitation programs were effective in earlier discharge and reducing falls, morbidity and mortality. The resulting functional benefits can also lead to improved self-care ability, which is shown to influence, and may improve depressive symptoms in older patients (Shyu et al., 2008).

It is important that the patient is supported to continue rehabilitation post-discharge. A recent study showed that a post-discharge telephone intervention with hip fracture patients and their family and carers improved patient compliance with doctors' advice and promoted functional hip joint rehabilitation (Li et al., 2014).

### Comparison of Standard 5 with other standards/guidelines

All other guidelines recommend early mobilisation, except for the AAOS. The ANZHFRC suggests that "*Unless medically or surgically contraindicated, mobilisation should start the day after surgery*"; the ACSQHC states that the patient "*is offered mobilisation without weight restriction the day after surgery and at least once a day thereafter, depending on the patient's clinical condition and agreed goals of care*"; NICE recommends patients are offered a physiotherapy assessment the day after surgery and mobilisation at least once a day; AAGBI notes that early mobilisation is a key part of hip fracture management but does

not suggest a timeframe; SIGN does recommend mobilisation and multidisciplinary rehabilitation to begin within 24 hours of surgery and the MoHHQO is more specific in recommending mobilisation as soon as medically stable within 12-24 hours of surgery, progressing to standing within 24 hours. The AAOS does not mention early mobilisation specifically but does include recommendations for occupational and physical therapy across the care continuum, including post-discharge for improved functional outcome.

#### Implications for the Minimum standards

- No change required.

### Standard 6: Re-fracture prevention

The ACI recommends compliance with the *Musculoskeletal Network Osteoporotic Re-fracture Prevention Model of Care* (Agency for Clinical Innovation, 2011) in order to help prevent secondary fractures and reduce re-admission. Osteoporosis is a chronic disease characterised by reduced bone density which increases the likelihood of trauma fractures; it is often undiagnosed and under-treated which can lead to recurrent fractures (Agency for Clinical Innovation, 2012). Re-fracture may be prevented if people at risk of osteoporosis are identified and treated following their first fracture – this is the aim of the re-fracture prevention model of care. The main principle of the model involves case management by fracture liaison coordinators who will provide patients with disease management education, support for self-management, and will initiate specific treatment to reduce the risk of further fractures.

As mentioned in the *Osteoporotic Re-fracture Prevention Model of Care*, there is high quality international evidence that implementation of models of care in osteoporotic patients can reduce length of stay, improve quality of life, and reduce health system usage (Agency for Clinical Innovation, 2011). Treatments for osteoporosis include exercise and supplements/medication such as calcium and vitamin D supplements, bisphosphonates, hormone therapy, selective oestrogen receptor modulators, strontium ranelate and parathyroid hormone (Royal Australian College of General Practitioners, 2010). A study by O'Malley et al. (2011), suggested that despite osteoporosis prevention being primarily medical, exercise and education may contribute to increased bone mineral density, compliance and better treatment results. Piziak and Rajab (2011), investigated ways to improve post-hip fracture management by improving the use of and adherence to calcium, vitamin D and bisphosphonate supplementation. The review found that discharging all patients on calcium and vitamin D was beneficial, as was an endocrinology follow-up appointment although considerable financial cost was incurred as all eligible persons were offered bisphosphonates or other therapy for fracture prevention.

The *Osteoporotic Re-fracture Prevention Model of Care* was piloted in three NSW hospitals in 2012 and a formative evaluation was conducted (Agency for Clinical Innovation, 2012). The findings suggested that implementation of the model was associated with a significant reduction in the number of patients readmitted for care of a subsequent re-fracture at the same health service. It also had an impact of the number of patients receiving osteoporotic medications, improvement in patients' awareness of the cause of their fracture, increased exercise and calcium intake, and improved quality of life. The evaluation made ten further recommendations for implementation of the model, one of which included that the model be rolled-out across the whole of NSW.



## Comparison of Standard 6 with other standards/guidelines

Re-fracture prevention (including falls prevention, osteoporosis screening and treatment), were considered in most of the other standards/guidelines reviewed. Due to the large breadth of this topic (covering pharmaceuticals, supplements, fall prevention, screening for osteoporosis, etc.) no standard/guideline covered all components. To accommodate this, NICE, SIGN and the Minimum standards all refer readers to another, specific re-fracture, or secondary fracture prevention standard/guideline.

ANZHFR recommended “*continued, coordinated, orthogeriatric and multidisciplinary review and discharge planning liaison or integration with related services, including falls prevention, secondary fracture prevention, mental health, cultural services, primary care, community support services and carer support services*”; the ACSQHC Standard says that “*Before a patient with a hip fracture leaves hospital, they are offered a falls and bone health assessment, and a management plan based on this assessment to reduce the risk of another fracture*”. NICE noted that their guidelines “*exclude aspects covered by parallel NICE guidance, most notably primary and secondary prevention of fragility fractures, but recognises the importance of effective linkage to these closely related elements of comprehensive care*”; AAGBI stated, “*Measures should be taken to prevent secondary falls*” but did not elaborate further; SIGN also referred readers to a separate guideline on secondary prevention; AAOS made recommendations separately on interdisciplinary care program (which did mention fall prevention in the evidence base), calcium and vitamin D screening and supplementation, and osteoporosis evaluation and treatment; MoHHQO covers osteoporosis treatment/prevention as a separate issue, and falls prevention is mentioned in the rehabilitation topic area.

### Implications for the Minimum standards

- No change required.

## Standard 7: Local ownership of data systems

The final Standard involves the collection of data to allow monitoring of service delivery and performance, for comparison with Local Health District (LHD) and Statewide standards. Local MDTs will be able to use audit tools and metrics to identify areas for improvement, and to measure these improvements. This will provide information to help evaluate the Minimum standards in terms of their implementation, their success, their barriers and enablers and their effects into the future.

The Standard suggests quality measures to assess achievement of the Minimum standards, system measurements (e.g. average length of stay) and patient measurements (e.g. 30-day mortality) will be collected.

## Comparison of Standard 7 with other standards/guidelines

Only the MoHHQO includes a guideline that aligns with this Standard. It makes the following suggestions with regards to reporting: “*The absence of standardized provincial reporting of outpatient rehabilitation clinic activity creates a void in understanding the pathway of hip fracture patients. The Ministry should implement mandatory standardized reporting of outpatient rehabilitation activity. Outpatient rehabilitation reporting should include collection of standard outcome measures collected at standard timeframes (e.g. FIM assessment 4*

months after discharge)". The MoHHQO also recommended the use of the *Ontario Hip Fracture Quality Scorecard*, a performance measurement tool.

No other guidelines make specific recommendations that align with Standard 7.

#### **Implications for the Minimum standards**

- No change required.

# Findings from the quantitative analysis

3

This Chapter provides an analysis of quantitative data related to hip fracture across NSW and the study hospitals. This includes estimates of the 'performance' of hospitals against some of the Minimum standards.

The Chapter also addresses a number of the contextual and evaluation questions for this study. These include:

- the broad trends in hospitalisation for hip fracture across NSW
- the characteristics of patients hospitalised for hip fracture across NSW
- the trends and characteristics of the six study sites
- estimates of the time to surgery, the extent to which Standard 3 has been met and improvements in the achievement of this Standard over time
- estimates of cancelled surgery
- survival of patients following hip fracture, factors that impact survival and evidence of improvement in survival over time
- length of stay for patients admitted for hip fracture and factors that influence length of stay
- discharge destinations for patients admitted for hip fracture.

## Data sources - overview

The data on which the analysis was based was from two sources:

- NSW Admitted Patient Data Collection linked with state mortality data (from the NSW Ministry of Health).
- Extracts from operating theatre systems (directly from the case study sites).

Episodes of interest were initially extracted from the NSW Admitted Patient Data Collection (from the Secure Analytics for Population Health Research and Intelligence – SAPHaRI – repository managed by the NSW Ministry of Health). The initial extraction was based on the following criteria:

- the episode of care type was acute
- the patient was aged 65 years or more AND
- one of following International Classification of Disease -10th Revision – Australian Modification (ICD-10-AM) codes was recorded for the patient as the principal diagnosis (i.e. which is defined as the reason, after investigation, chiefly responsible for the patient's admission to hospital), or as an additional diagnosis (i.e. other diagnoses co-existing with the principal diagnosis or arising during the hospital stay):
  - S72.0x<sup>2</sup> Fracture of neck of femur
  - S72.1x Pertrochanteric fracture

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<sup>2</sup> Note: 'x' indicates any character following the first four digits indicated. For example, S72.0x includes S72.00, S72.01 etc.

- S72.2x Subtrochanteric fracture

A subsequent extract was obtained also from the same repository reflecting other hospital episodes that occurred for the patients identified in the first extract based on a diagnosis of hip fracture. Data were then analysed to allow all consecutive episodes for a patient to be grouped together, for example, where a patient was admitted to one hospital and then transferred to another for definitive treatment. At times patients were also subsequently transferred to another facility for rehabilitation. This allowed a *main episode* to be identified, representing the episode in which a patient received definitive treatment for the hip fracture. Box 3 below shows the criteria used to flag an episode as the main episode.

In some instances the main episode may have been preceded by a *prior episode*, where the patient presented to a hospital with hip fracture at which surgery is not provided, either because the hospital does not offer this surgery or because the patient elected to be transferred to a private hospital for treatment.

At the end of an acute episode patients may be transferred to another unit within the hospital for rehabilitation, palliative or maintenance care (where the mode of discharge is a 'type change') or to another (public or private) hospital for rehabilitation, palliative or maintenance care (where the mode of discharge is a 'transfer'). In some instances patients are transferred to another hospital for further acute treatment.

After discharge, patients may be readmitted. Readmissions were also identified. In some instances these readmissions were for another hip fracture.

These possible patient journeys are depicted in Figure 1 below.

## Data sources for calculation of time to surgery

The NSW Admitted Patient Data Collection identifies the date on which a procedure is undertaken, but not the time of day. Using data from the operating theatre system extracts, the time of day on which a procedure was undertaken for a patient was simulated. Comparisons with the operating theatre data indicated that the simulated times were an accurate representation of actual times.

Extracts from the operating theatre information systems from the six study hospitals were supplied as an input into the STARS application developed for sites by the ACI. The extracts included more detailed information on the date and time that procedures were undertaken, and the type of procedures. These extracts also included a broader range of procedures undertaken for the patient cohort of interest, including procedures that are not usually associated with a hip fracture. The procedure descriptions were reviewed, and only those related to hip fracture were further analysed. In some instances, the descriptions indicated that the operation was cancelled or did not proceed. Analysis of the extracts, and comparison with the Admitted Patient data, demonstrated that the operating theatre extract did not cover all procedures across all the relevant time periods. While coverage is improving over time, and is almost complete for some hospitals, there were some gaps in the extracts. The fact that these extracts included procedures not related to hip fracture is problematic when they are used for calculating time to surgery. However, once the issues above were addressed, these data provide a good basis for estimating the time of day on which surgery was performed, and also time to surgery for hip fracture. As discussed above,

these data were used to simulate the date and time of surgery for the full population of hip fracture patients identified in the Admitted Patient data.

### **Box 3 – Criteria for identifying an episode as the main hip fracture episode**

The core and subsequent extracts were sorted by the episode start date/time for each patient. The main episode was identified based on the hierarchy below.

1. The first episode (in the core or subsequent extract) with a principal procedure of one of the following hip procedures, grouped as indicated:

#### **01 Reduction/fixation**

47519-00	Internal fixation of fracture of trochanteric or subcapital femur
47531-00	Closed reduction of fracture of femur with internal fixation.
47528-01	Open reduction of fracture of femur with internal fixation
47537-00	Internal fixation fx of femoral condyle
47516-01	Closed reduction of fracture of femur
47528-00	Open reduction of fracture of femur
47921-00	Insertion internal fixation device NEC

#### **02 Hemi or partial arthroplasty**

49315-00	Partial arthroplasty of hip
47522-00	Hemiarthroplasty of femur

#### **03 Total arthroplasty**

49318-00	Total arthroplasty of hip, unilateral
49319-00	Total arthroplasty of hip, bilateral

#### **04 Revision of arthroplasty**

49324-00	Revision of total arthroplasty of hip
49330-00	Rev tot arthroplasty hip, bone gft femur
49333-00	Rev arthroplasty hip, bone gft acetab & femur
49342-00	Rev arthroplasty hip w allograft femur
49346-00	Revision of partial arthroplasty of hip

#### **05 Other OR procedure**

90552-00	Other repair of hip
49303-00	Arthrotomy of hip
49306-00	Arthrodesis of hip
49312-00	Excision arthroplasty of hip

Consideration was given to whether revision arthroplasty would be a procedure performed for patients in scope of this analysis. There were a small number of patients (0.8% of all patients) who met the criteria for inclusion, for whom this procedure was reported, and it was concluded that there are circumstances in which a patient who has previously had a hip replacement may subsequently have a hip fracture requiring a revision.

2. If none of the patient's episodes were identified as having had one of the hip procedures above as the principal procedure, the first episode with any of the hip procedures (regardless of whether or not a principal procedure was coded) was taken to be the main episode.

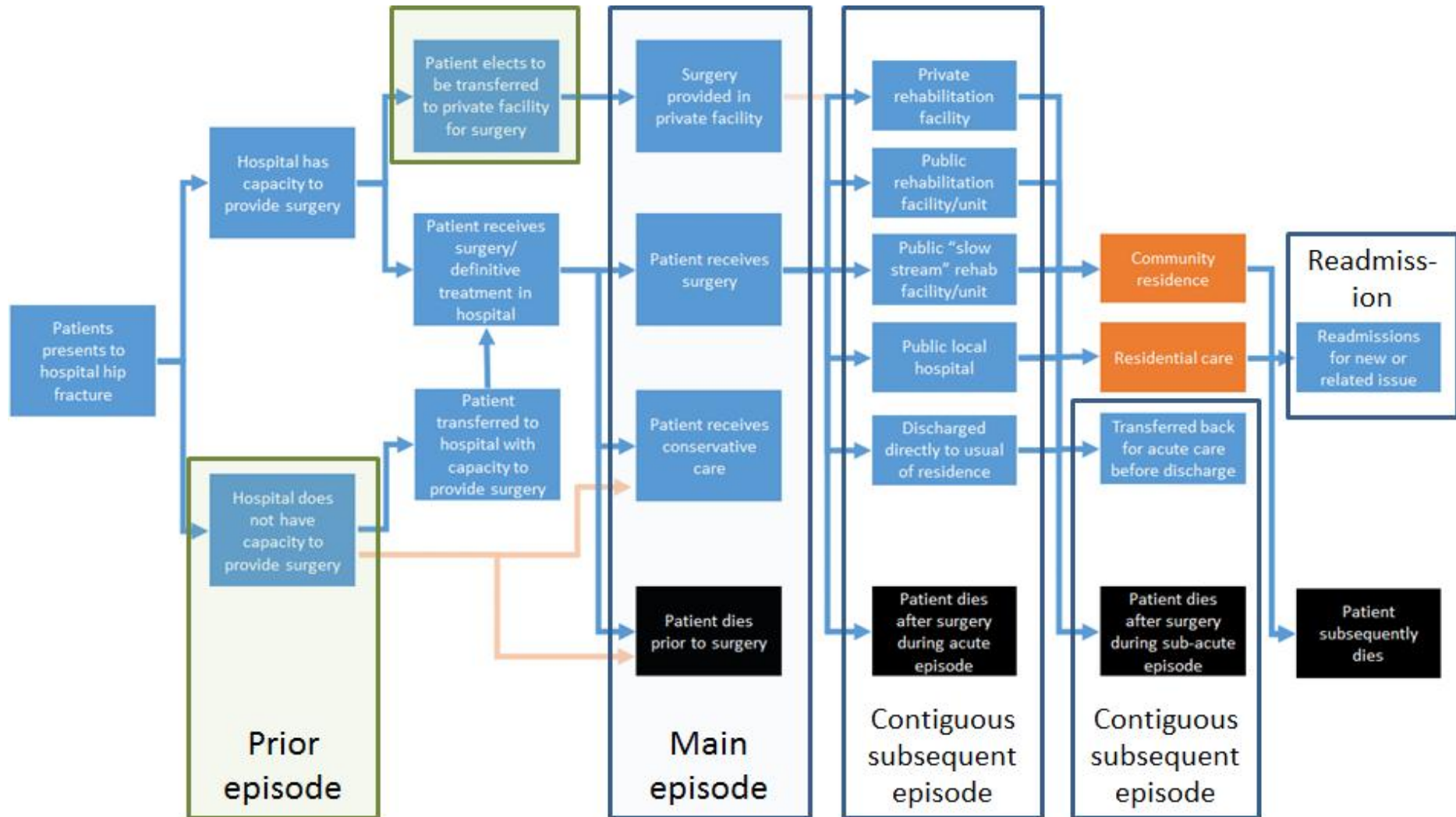
3. If none of the above hip procedures were performed in any of the episodes, then the episode with an acute service category with the longest length of stay was taken to be the main episode.

Some episodes flagged as a main episode were excluded. These were ones where the length of stay was short (i.e. three days or less), the patient was discharged (i.e. did not die and was not transferred to another hospital), none of the above procedures were performed yet the episode occurred in a hospital where hip surgery is performed. The assumption was that these episodes were miscoded as acute, or alternatively a match with a subsequent episode in which the patient had surgery was possible (e.g. where a patient transfers to a private hospital to receive the procedure).

Other episodes that were thought to be miscoded or orphan episodes were also excluded from the analysis. These included ones where:

- The admission was classified as 'elective' or 'other'.
- The episode did not occur in a hospital providing hip surgery, and there was no subsequent episode identified, and the mode of discharge was one of the following:
  - 03 Transfer to nursing home
  - 04 Transfer to public psychiatric hospital
  - 05 Transfer to other hospital
  - 08 Transfer to other accommodation
  - 11 Transfer to palliative care unit / hospice.
- The episode occurred in a non-hip surgery hospital, had a short length of stay (three days or less), with no related episodes in a hospital providing hip procedures, but did not have a discharge status of death.
- The episode involved no operating room procedure, and instead had a principal procedure of one of the following allied health interventions:
  - 95550-00 Allied health intervention, dietetics
  - 95550-14 AH intervention diabetes education
  - 96022-00 Health maintenance or recovery assess
  - 96023-00 Ageing assessment
  - 96034-00 Alcohol and other drug assessment
  - 96037-00 Other assessment/consultation/evaluation
  - 96092-00 Applicn/fit/adjust/replace oth dev/equip
  - 96130-00 Skills train body position/mobility/move
  - 96175-00 Mental/behavioural assessment
  - 96205-03 Other admin of pharmac agent steroid

Figure 1 – Hospital pathways for hip fracture patients



## Data sources for determining survival

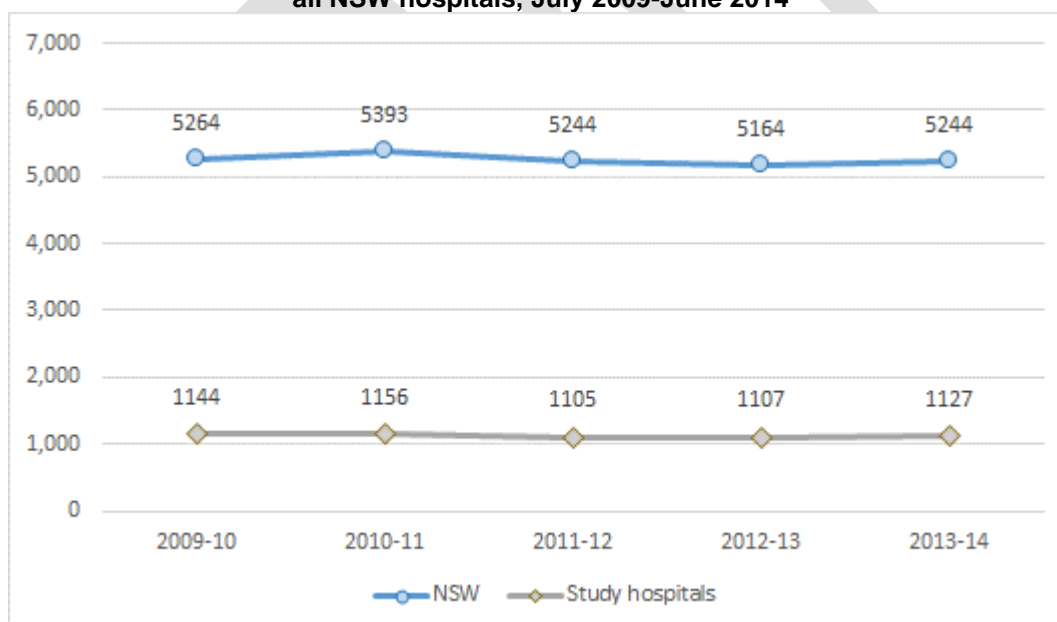
The data extract provided from SAPHaRI also included the date of death for patients that had died, from the state death register. For patients that died in hospital, the date of death was checked against the date from the deaths register. The dates of death were used for the survival analysis undertaken for the patient cohort.

## Trends in hospitalisation for hip fracture

In 2013-14 there were an estimated 5,244 people aged 65 years and older admitted for hip fracture across NSW (see Figure 2). For the period from July 2009 to June 2014, the number of admissions for hip fracture was stable (an annual average decrease 0.07%). At the individual hospital level, there are some hospitals experiencing an increasing number of admissions over time, and others reduced admissions. These are further explored in the discussion of the six study sites below. The six case study hospitals admitted an estimated 1,127 hip fracture patients in 2013-14, about 21.5% of the state total.

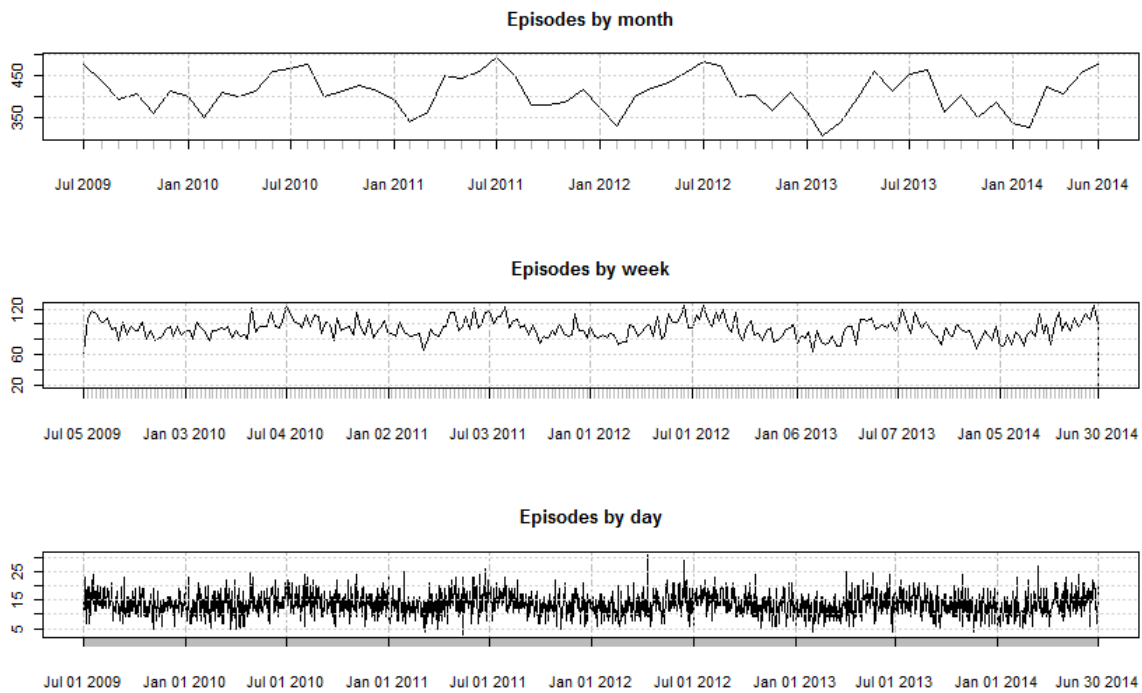
Across NSW, an average of 13.5 people per day aged 65 years and older were admitted to hospital with a hip fracture. This estimate takes into account that some patients are initially admitted to one hospital and subsequently transferred to another hospital to receive surgery. In these cases, only one admission is counted. There is a high level of variation around this estimate, as can be seen in the charts below. It is not uncommon for more than 20 patients to be admitted on any single day (7.4% of days), or on some days, for less than 10 to be admitted (23.6% of days) (see Figure 4). The fluctuation in demand partly reflects seasonal variations, with higher levels of admissions for hip fracture in the winter period (see Figure 3).

**Figure 2 – Distribution of number of admissions for hip fracture per day, all NSW hospitals, July 2009-June 2014**



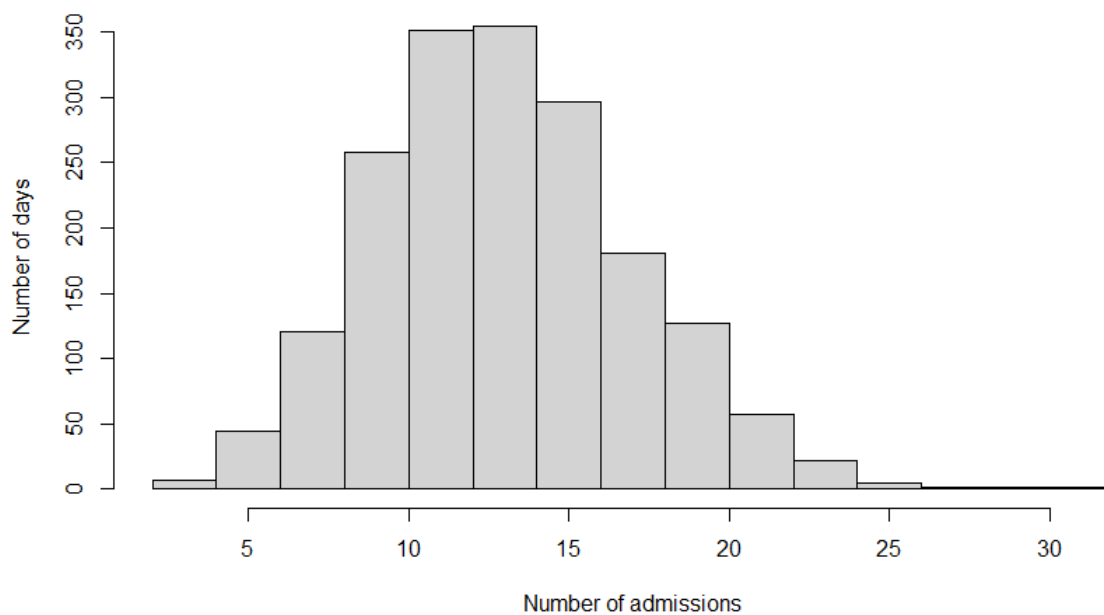


**Figure 3 – Trends in admissions for hip fracture<sup>7</sup>, all NSW hospitals, July 2009-June 2014**



\* In this Figure and all tables and figures following, admissions for hip fracture are based on patients aged 65 years and older, with a principal or additional diagnosis of hip fracture, with a care type of acute. Contiguous episodes (where a patient is admitted at one facility and transferred to another) have been aggregated so that they count as one episode.

**Figure 4 – Distribution of number of admissions for hip fracture per day, all NSW hospitals, July 2009-June 2014**

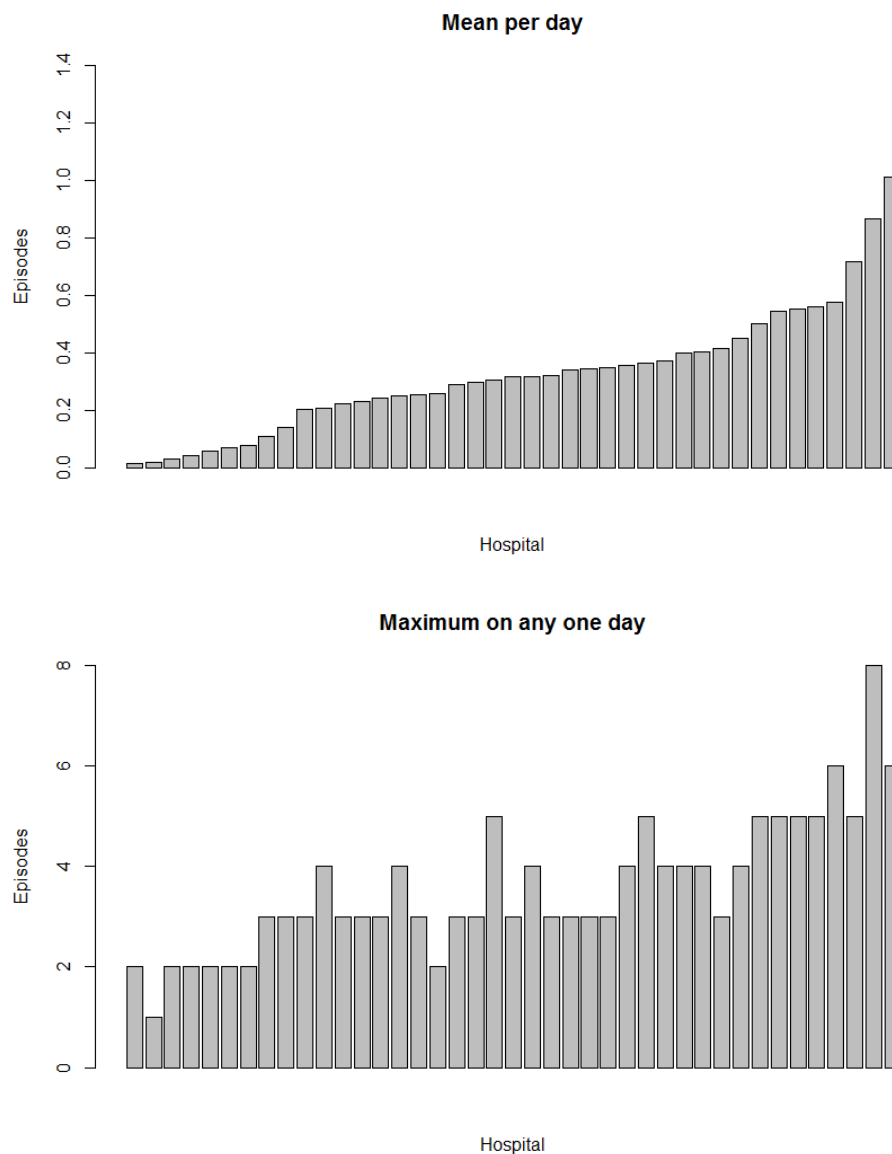


An analysis of the level of demand at the hospital level (Figure 5) shows that the hospitals experiencing the highest volumes of hip fracture admissions (in descending order of volume) are:

- John Hunter
- Gosford
- Wollongong
- St George
- Nepean
- Royal North Shore
- Liverpool
- Westmead
- Prince of Wales
- Concord

Volumes at the regional hospitals (John Hunter, Gosford and Wollongong) are significantly higher than for other hospitals in the state. All hospitals experience peaks in demand, most commonly with a maximum of four admissions in a single day. Gosford Hospital experienced on day where eight patients were admitted with a hip fracture.

**Figure 5 – Mean hip fracture episodes per day by hospital and maximum in any single day, Top 40 hospitals by volume, July 2009-June 2014**



## Characteristics of hip fracture patients

An estimated 72.0% of patients admitted for hip fracture were female. The mean age of patients was 84.2 years (standard deviation 7.6) and the median was 85.1 years. Figure 6 shows the distribution of ages.

**Figure 6 – Distribution of age of hip fracture patients, July 2009-June 2014**

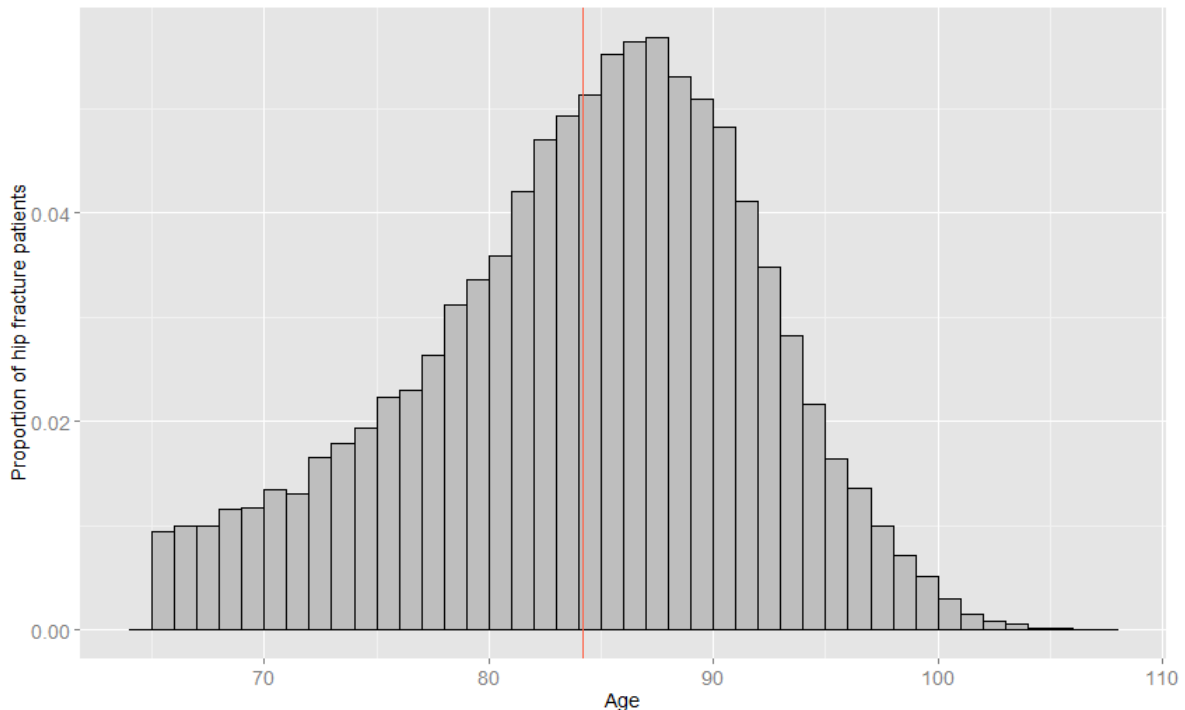


Table 5 shows the principal diagnoses for the patients identified using the criteria specified in Appendix A. An estimated 52% of patients have a principal diagnosis of *fracture of neck of femur* coded, of which the single largest sub category is *fracture of subcapital section of femur* (35% of all cases). Episodes with a principal diagnosis of *perthrochanteric fracture* account for around 42% of cases and episodes with a principal diagnosis of *subthrochanteric fracture* account for 5.5% of cases.

Table 6 shows the first procedure coded in the *Admitted Patient* data. A *reduction/ fixation* procedure is recorded as the first procedure for 60.1% of episodes. *Hemiarthroplasty or partial arthroplasty of femur* is recorded as the first procedure for 27.8% of episodes, and *total arthroplasty* for 5.1%. Revision of arthroplasty is recorded for 0.8% of episodes and other hip related operating room procedures for a further 0.3%. In a small number of cases the episode will have a hip fracture related procedure coded as one of the additional procedures. The second section of Table 6 shows the proportion of episodes in which at least one hip related operating theatre procedure is recorded. This suggests that 94.2% of episodes have a hip procedure recorded. The remaining 5.8% of patients for whom no hip related operating theatre procedure was coded include:

- Patients admitted to outlying hospitals who die prior to transfer to a hospital for definitive treatment.
- Patients admitted originally to public hospitals who elect to be transferred to a private hospital for surgery (in these cases the linkage of patients may be more problematic). Most of these should have been excluded using the criteria discussed at the beginning of this Chapter.

- Patients admitted to a NSW hospital and transferred interstate for surgery (data on interstate hospital activity was not available for the extract).
- Patients for whom only palliative support is offered.

**Table 5 – Principal diagnosis for patients admitted meeting criteria, NSW, July 2009-June 2014**

ICD10-AM Principal diagnosis	Study hospitals*						Other hosps	Total NSW	%
	A237	C208	B218	B202	H272	R219			
<b>S72.0x Fracture of neck of femur</b>	<b>409</b>	<b>422</b>	<b>556</b>	<b>1,001</b>	<b>347</b>	<b>368</b>	<b>11,414</b>	<b>14,517</b>	<b>52.1%</b>
S72.00 Fracture of neck of femur, part unspecified	19	48	65	173	93	54	1,423	1,875	6.7%
S72.01 Fracture of intracapsular section of femur	2	22	13	20	-	3	130	190	0.7%
S72.02 Fracture of upper epiphysis (separation) of femur	-	-	-	-	-	-	8	8	0.0%
S72.03 Fracture of subcapital section of femur	306	273	377	690	201	270	7,625	9,742	35.0%
S72.04 Fracture of midcervical section of femur (includes transcervical not otherwise specified)	25	20	46	14	7	19	609	740	2.7%
S72.05 Fracture of base of neck of femur (includes cervicotrochanteric section)	22	19	24	32	7	11	667	782	2.8%
S72.08 Fracture of other parts of neck of femur (includes fracture of hip not otherwise specified, and head of femur)	35	40	31	72	39	11	952	1,180	4.2%
<b>S72.1x Ptertrochanteric fracture</b>	<b>377</b>	<b>361</b>	<b>497</b>	<b>697</b>	<b>209</b>	<b>321</b>	<b>9,346</b>	<b>11,808</b>	<b>42.4%</b>
S72.10 Fracture of trochanteric section of femur, unspecified	97	63	68	174	27	54	1,826	2,309	8.3%
S72.11 Fracture of intertrochanteric section of femur	280	298	429	523	182	267	7,520	9,499	34.1%
<b>S72.2 Subtrochanteric fracture</b>	<b>70</b>	<b>51</b>	<b>73</b>	<b>95</b>	<b>39</b>	<b>46</b>	<b>1,145</b>	<b>1,519</b>	<b>5.5%</b>
<b>Other principal diagnoses</b>	<b>-</b>	<b>-</b>	<b>1</b>	<b>1</b>	<b>-</b>	<b>-</b>	<b>8</b>	<b>10</b>	<b>0.0%</b>
<b>Total episodes</b>	<b>856</b>	<b>834</b>	<b>1,127</b>	<b>1,794</b>	<b>595</b>	<b>735</b>	<b>21,913</b>	<b>27,854</b>	<b>100.0%</b>

\* A237 = Concord; C208 = Prince of Wales; B218 = Royal North Shore; B202 = Gosford; H272 = Port Macquarie; R219 = Wagga Wagga Base.

There is also the possibility that coding or administrative data items have been inappropriately assigned, for example, identifying patients as 'acute' when in fact the patient is admitted for rehabilitation or other sub or non acute care. The exclusions discussed at the beginning of this Chapter reflected an attempt to exclude these cases to the extent possible.

In terms of Australian Refined Diagnosis Related Groups (AR-DRGs), the most common were those grouped to *Other Hip and Femur Procedures* with and without catastrophic complications and co-morbidities (I08A and I08B), which together accounted for 57.9% of cases (Table 7). This was followed by the *Hip Replacement* with and without catastrophic complications and comorbidities (I03A and I03B), which together accounted for 31.8% of cases. Around 5.3% of cases were allocated to *Fractures of Neck of Femur* with and without catastrophic or severe complications and comorbidities (I78A and I78B). These are ones with no operating room procedure recorded. Relatively small volumes of episodes were allocated to a range of other AR-DRGs related to trauma, patients requiring tracheostomy or ventilation, and a range of other (non-hip) procedures.

**Table 6 – Principal (first) procedure coded for patients admitted meeting criteria, NSW, July 2009-June 2014**

Australian Classification of Health Intervention (ACHI) Code	Study hospitals*						Other hosps	Total NSW	%
	A237	C208	B218	B202	H272	R219			
<b>Principal procedure</b>									
01 Reduction/fixation	525	506	669	1,044	349	471	13,164	16,728	60.1%
02 Hemi or partial arthroplasty	239	207	312	438	182	197	6,180	7,755	27.8%
03 Total arthroplasty	38	59	59	214	35	36	969	1,410	5.1%
04 Revision of arthroplasty	12	4	11	19	1	10	153	210	0.8%
05 Other OR procedure	-	1	11	4	3	1	51	71	0.3%
Other (no hip related OR procedure)	42	57	65	75	25	20	1,396	1,680	6.0%
<b>Total</b>	<b>856</b>	<b>834</b>	<b>1,127</b>	<b>1,794</b>	<b>595</b>	<b>735</b>	<b>21,913</b>	<b>27,854</b>	<b>100.0%</b>
<b>Hip related procedure identified in principal or other procedure codes</b>									
Yes	818	777	1,066	1,725	572	715	20,571	26,244	94.2%
No	38	57	61	69	23	20	1,342	1,610	5.8%
Total	856	834	1,127	1,794	595	735	21,913	27,854	100.0%
% with hip surgical procedure coded	95.1%	93.2%	94.2%	95.8%	95.8%	97.3%	93.6%	94.0%	

\* A237 = Concord; C208 = Prince of Wales; B218 = Royal North Shore; B202 = Gosford; H272 = Port Macquarie; R219 = Wagga Wagga Base.

**Table 7 – Australian Refined Diagnosis Related Group (AR-DRG), NSW, July 2009-June 2014**

AR-DRG Version 7.0	Study hospitals*						Other hosps	Total NSW	%
	A237	C208	B218	B202	H272	R219			
<b>AR-DRG</b>									
I08B Other Hip & Femur Procedures W/O Cat CC	259	314	414	602	249	349	7,747	9,934	35.7%
I08A Other Hip & Femur Procedures W Cat CC	257	169	225	399	100	112	4,932	6,194	22.2%
I03B Hip Replacement W/O Cat CC	116	130	217	377	151	164	4,070	5,225	18.8%
I03A Hip Replacement W Cat CC	150	127	148	267	63	65	2,799	3,619	13.0%
I78B Fractures of Neck of Femur W/O Cat/Sev CC	12	18	20	28	12	7	498	595	2.1%
I78A Fractures of Neck of Femur W Cat/Sev CC	23	36	24	34	11	11	729	868	3.1%
Other	39	40	79	87	9	27	1,138	1,419	5.1%
<b>Total</b>	<b>856</b>	<b>834</b>	<b>1,127</b>	<b>1,794</b>	<b>595</b>	<b>735</b>	<b>21,913</b>	<b>27,854</b>	<b>100.0%</b>
<b>Adjacent AR-DRG (i.e. AR-DRGs with and without complications &amp; comorbidities collapsed into a single category)</b>									
I08 Other Hip and Femur Procedures	516	483	639	1,001	349	461	12,679	16,128	57.9%
I03 Hip Replacement	266	257	365	644	214	229	6,869	8,844	31.8%
I78 Fractures of Neck of Femur	35	54	44	62	23	18	1,227	1,463	5.3%
Other	39	40	79	87	9	27	1,138	1,419	5.1%
<b>Total</b>	<b>856</b>	<b>834</b>	<b>1,127</b>	<b>1,794</b>	<b>595</b>	<b>735</b>	<b>21,913</b>	<b>27,854</b>	<b>100.0%</b>

\* A237 = Concord; C208 = Prince of Wales; B218 = Royal North Shore; B202 = Gosford; H272 = Port Macquarie; R219 = Wagga Wagga Base.

## Trends and characteristics of patients in the six study hospitals

There were six hospitals included in the formative evaluation. This section provides an overview of these hospitals. Table 8 provides an overview of the trends in the overall number of admissions for hip fracture in each financial year observed for the study hospitals. These data are plotted in Figure 7. These data show:

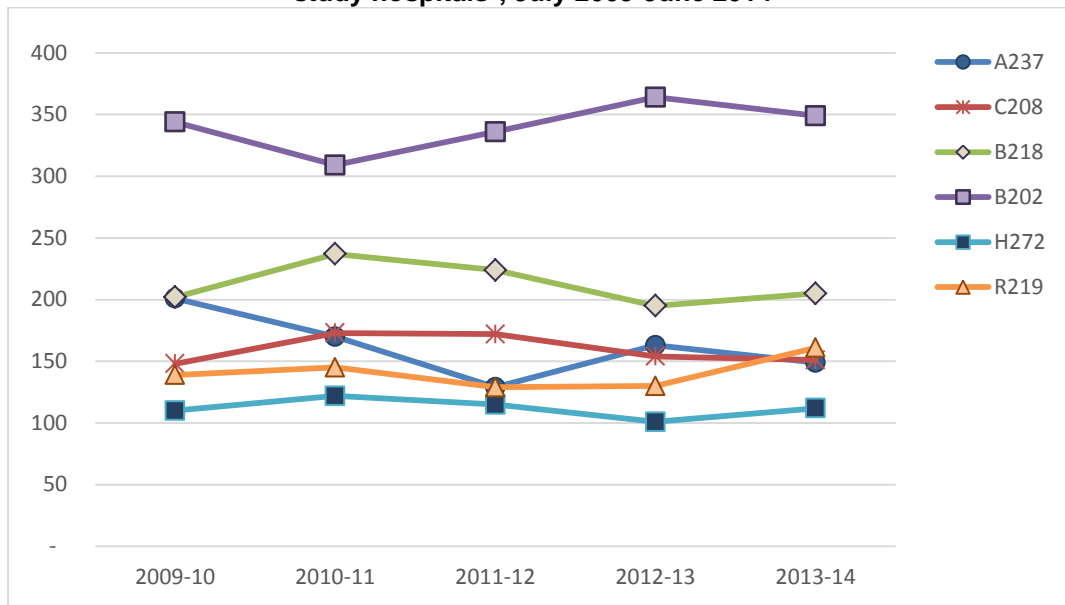
- The study hospitals represent just over 20% of all admissions for hip fracture across NSW.
- The volumes of patients managed was highest for Gosford Hospital followed by Royal North Shore. The lowest volume of patients is observed for Port Macquarie Hospital, with the other three hospitals experiencing similar volumes.
- There is evidence of growth in admissions over the period for Gosford Hospital. Growth in admissions for other study hospitals is mixed, but generally shows a downward trend. Trends in monthly admissions were further explored (see Figure 9 to Figure 14). In the analysis presented, variations in monthly total admissions were decomposed in a trend component, a seasonal component, and random component (not shown). These analyses confirm the general conclusions drawn above: that an overall growth trend is only clearly evident for Gosford Hospital. Most other hospitals experienced growth in 2010-11, but have mostly shown a downward trends since then.

**Table 8 - Hip fracture episodes by financial year, July 2009-June 2014**

Year	Study hospitals*						Other hosps	Total NSW
	A237	C208	B218	B202	H272	R219		
2009-10	201	148	202	344	110	139	4,120	5,264
2010-11	170	173	237	309	122	145	4,237	5,393
2011-12	129	172	224	336	115	129	4,139	5,244
2012-13	163	154	195	364	101	130	4,057	5,164
2013-14	149	151	205	349	112	161	4,117	5,244
<b>Total</b>	<b>812</b>	<b>798</b>	<b>1,063</b>	<b>1,702</b>	<b>560</b>	<b>704</b>	<b>20,670</b>	<b>26,309</b>

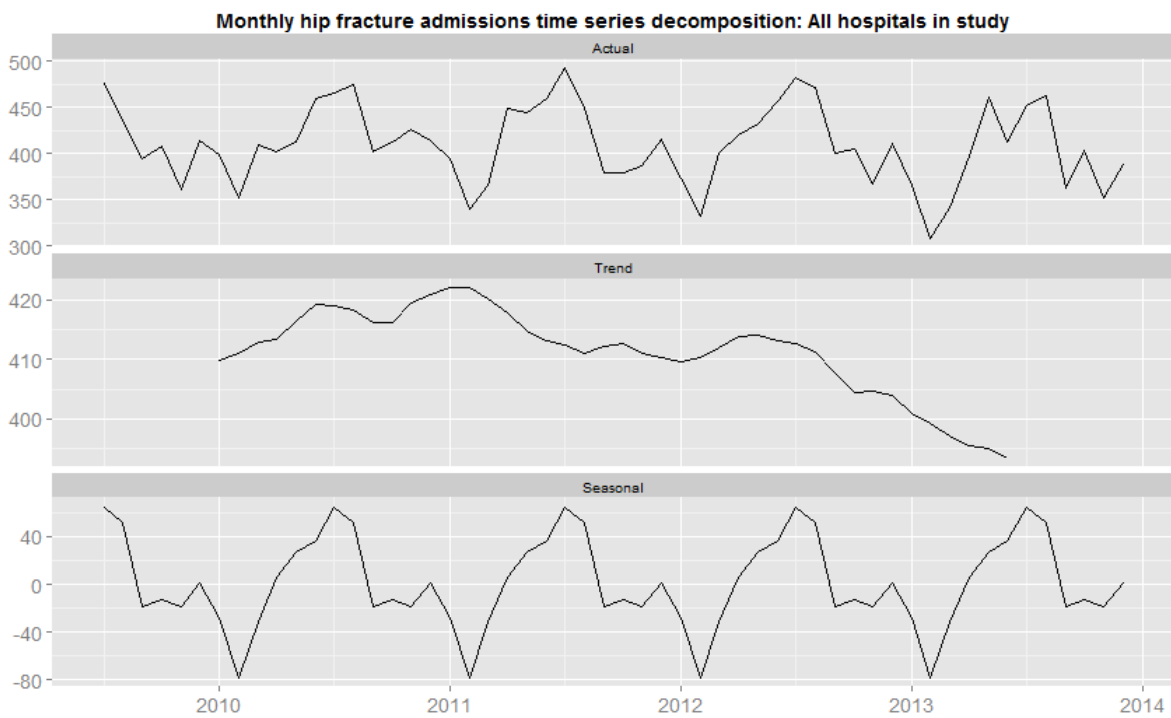
\* A237 = Concord; C208 = Prince of Wales; B218 = Royal North Shore; B202 = Gosford; H272 = Port Macquarie; R219 = Wagga Wagga Base.

**Figure 7 – Trends in annual number of hip fracture patients, study hospitals\*, July 2009-June 2014**

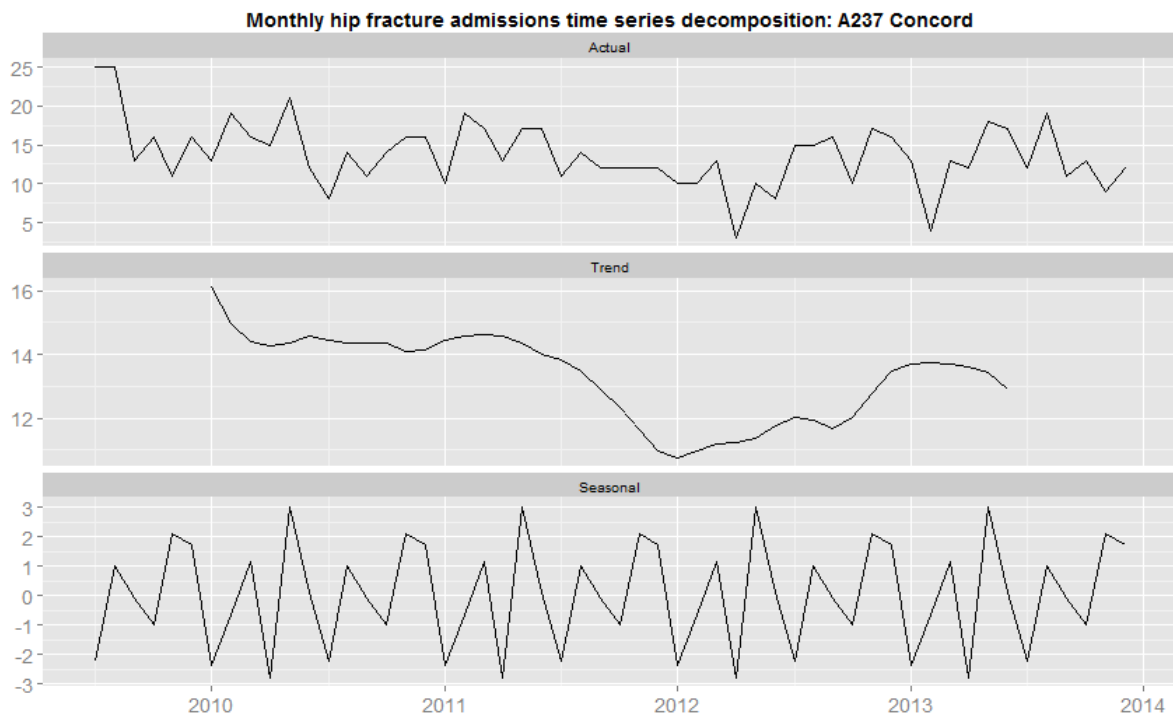


\* A237 = Concord; C208 = Prince of Wales; B218 = Royal North Shore; B202 = Gosford; H272 = Port Macquarie; R219 = Wagga Wagga Base

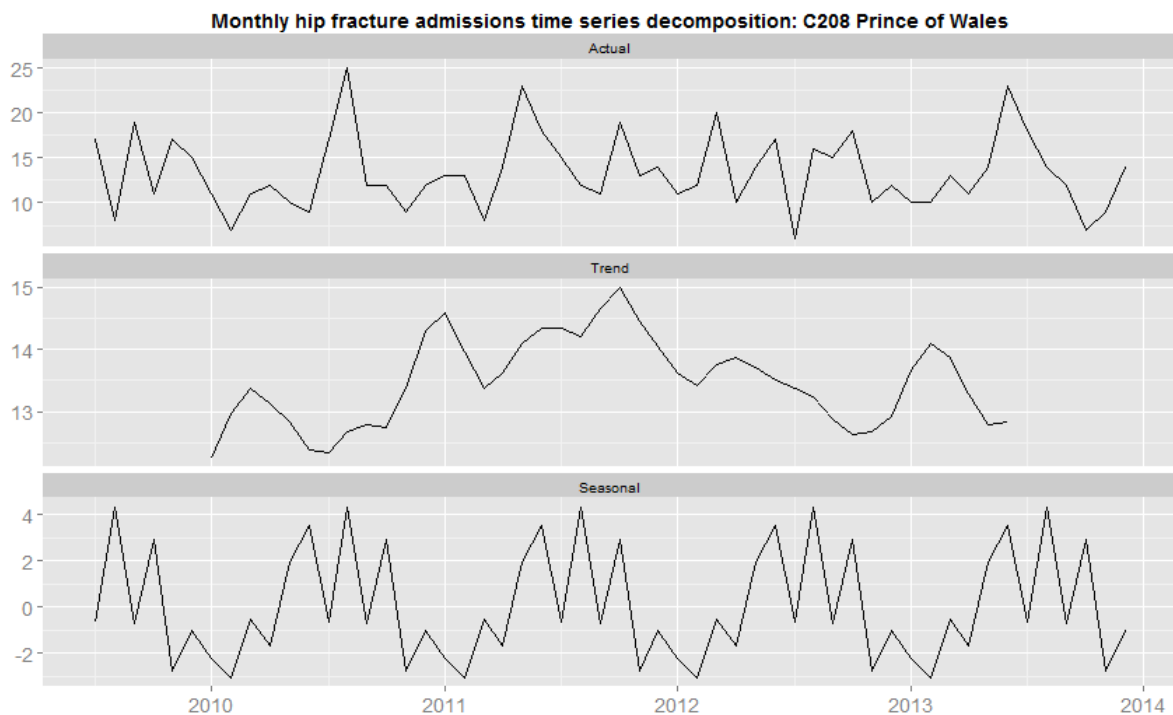
**Figure 8 –Trends in admissions for hip fracture, All six study hospitals, July 2009 - June 2014**



**Figure 9 –Trends in admissions for hip fracture, Concord Hospital, July 2009 - June 2014**

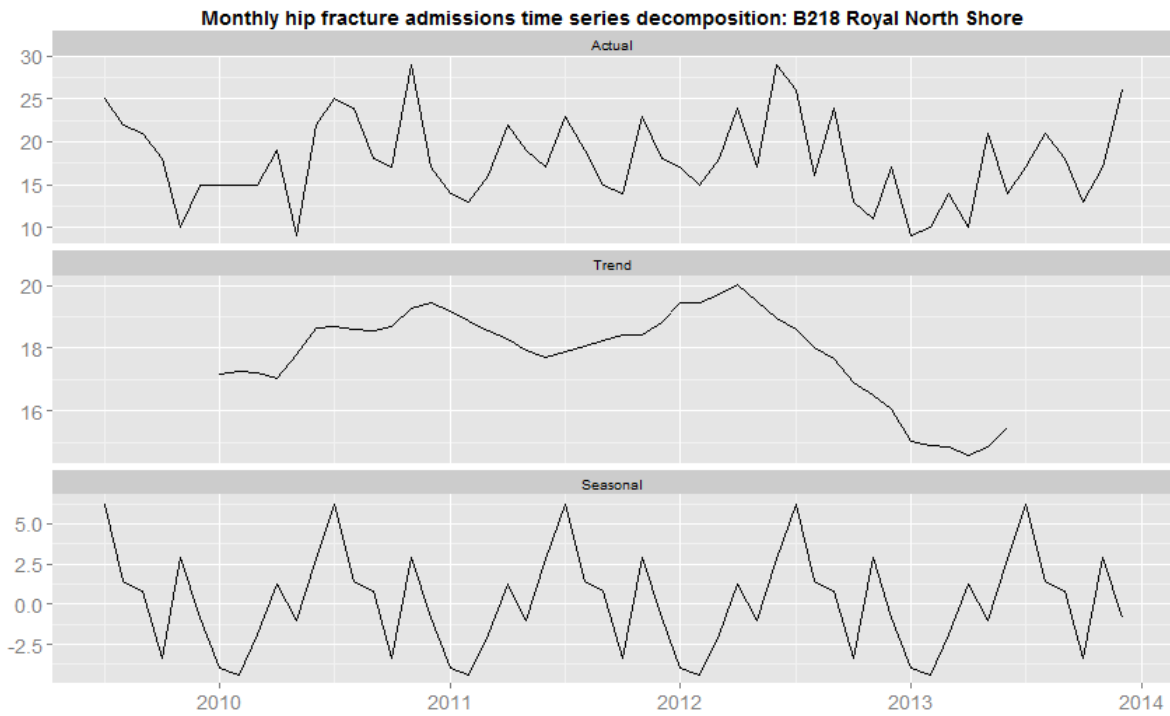


**Figure 10 –Trends in admissions for hip fracture, Prince of Wales Hospital, July 2009 - June 2014**

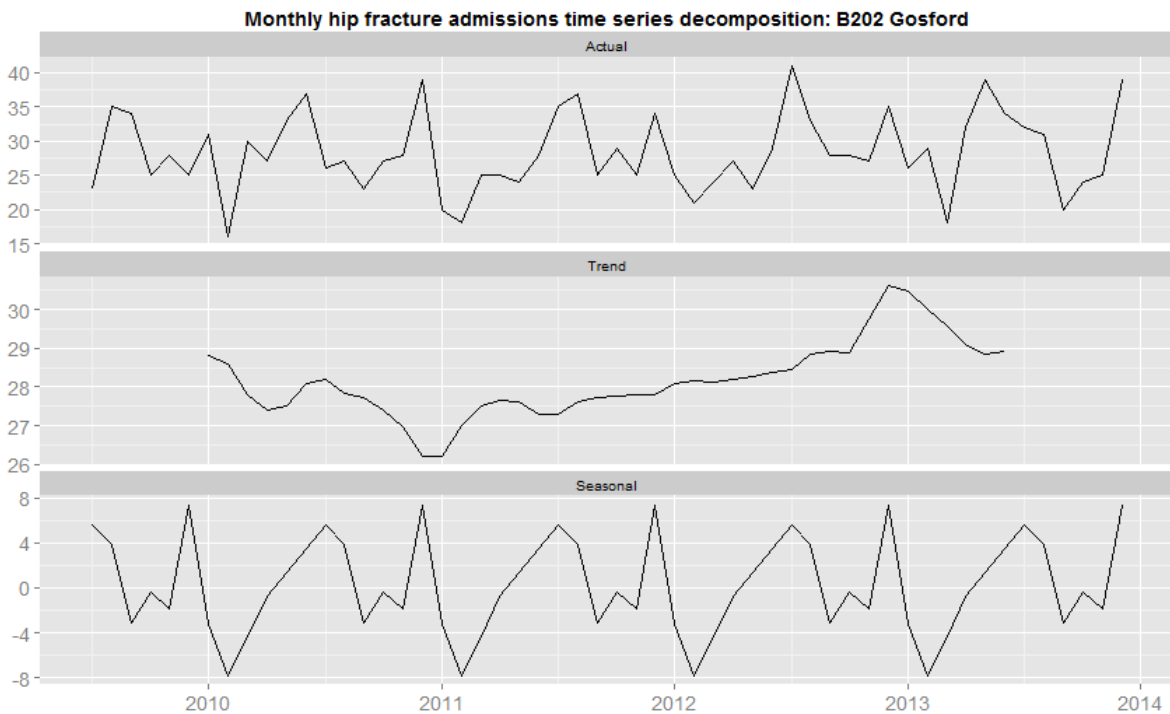




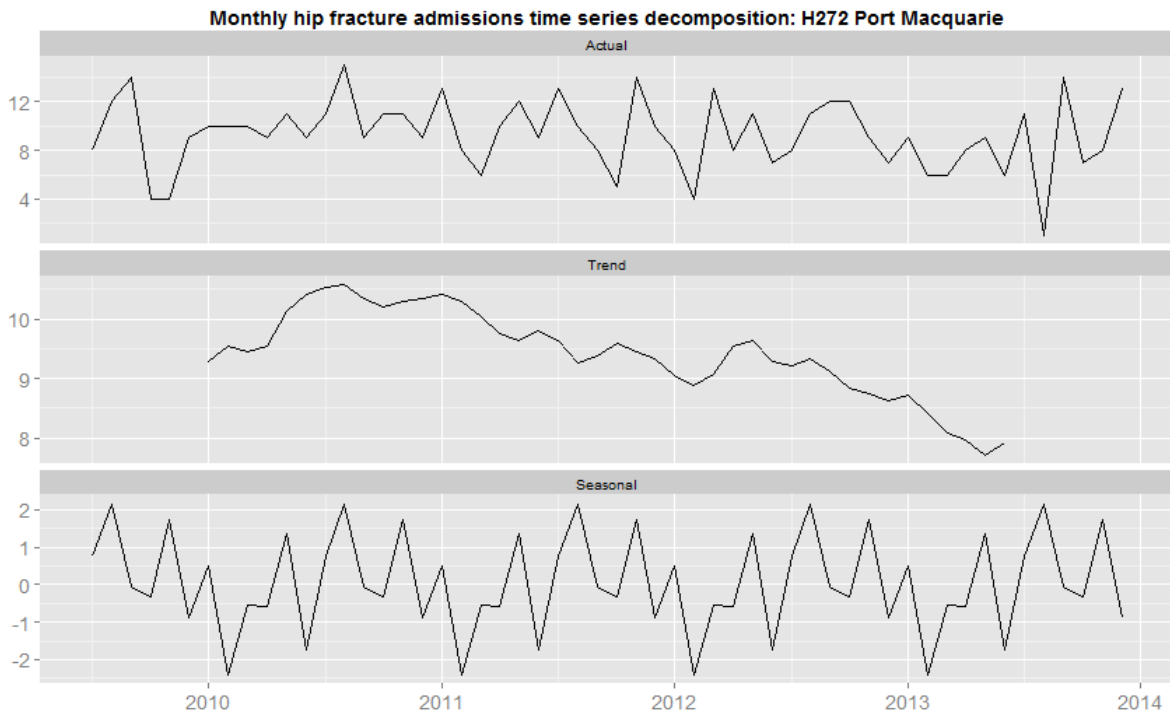
**Figure 11 –Trends in admissions for hip fracture, Royal North Shore Hospital, July 2009 - June 2014**



**Figure 12 –Trends in admissions for hip fracture, Gosford Hospital, July 2009 - June 2014**



**Figure 13 –Trends in admissions for hip fracture, Port Macquarie Hospital, July 2009 - June 2014**



**Figure 14 –Trends in admissions for hip fracture, Wagga Wagga Base Hospital, July 2009 - June 2014**

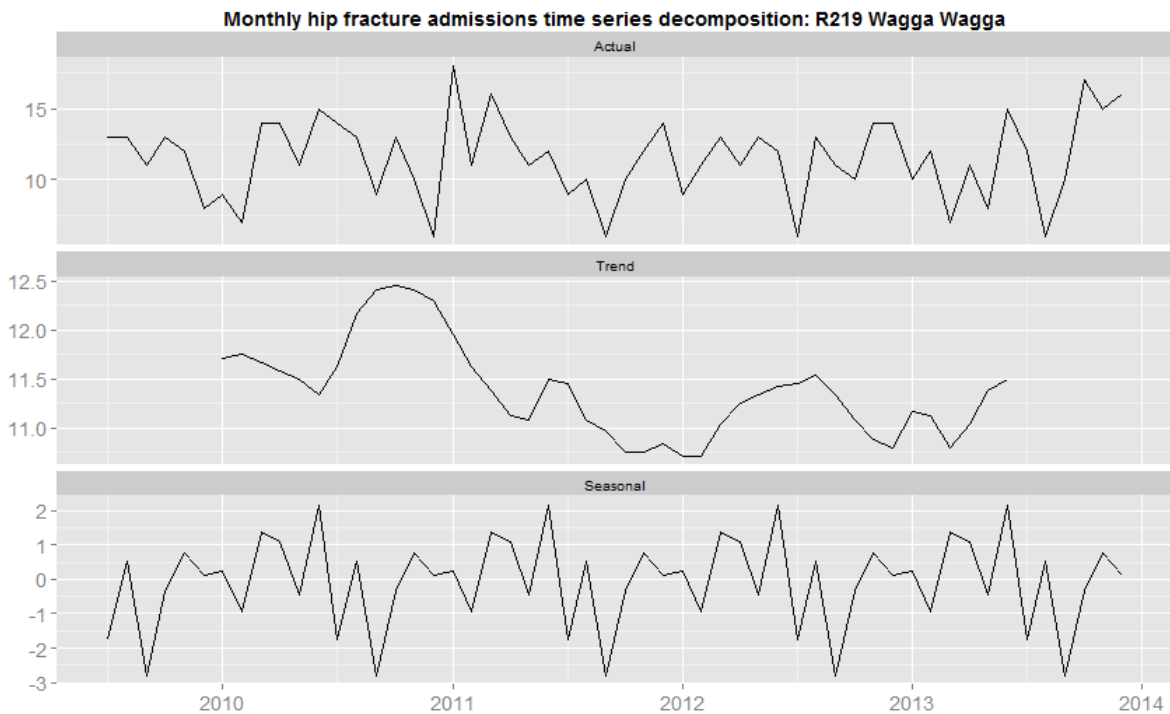


Table 9 provides a profile of hip fracture patients at each of the hospitals, with comparisons with the rest of the state and the NSW total. Key features include:

- Mean ages of patients in the study hospitals were slightly above the state average of 84.2 years, and ranged from 85.8 (Royal North Shore Hospital) to 84.0 years (Port Macquarie Hospital).
- The proportion of patients who are female ranged from 74.7% (Royal North Shore Hospital) to 71.6% years (Gosford Hospital). With the exception of Gosford Hospital, the proportions of female patient patients in the study hospitals were slightly above the state average of 72.0%.
- The proportion of patients for whom a fall was recorded as an external cause diagnosis ranged from 94.9% (Concord Hospital) to 97.7% (Wagga Wagga Base Hospital), compared with 95.8% across the state. The proportion of patients for whom a fall was recorded as an external cause diagnosis with a place of occurrence in a residential care setting ranged from 22.3% (Prince of Wales Hospital) to 33.9% (Port Macquarie Hospital). The state proportion was 29.7%.
- The data used were linked to analyse pathways for individuals in addition to examining episodes of admission. A 'main episode' was identified, representing the episode in which a patient received definitive treatment for their hip fracture. In some instances this may have been preceded by a prior episode, where the patient presented to a hospital at which surgery was not provided (either because the hospital does not offer this surgery or because the patient elected to be transferred to a private hospital for treatment). Subsequent episodes, which often involved rehabilitation of patients following hip fracture, were also identified.
- The mean length of stay for the main episode was 10.9 days, ranging from 8.1 days (Wagga Wagga Base Hospital) to 13.3 days (Concord Hospital). This compared with 11.6 days for the state. However, when contiguous episodes<sup>3</sup> are considered, the average length of stay was 29.1 days, ranging from 30.7 days (Gosford Hospital) to 24.2 days (Port Macquarie Hospital). Comparisons with the state level estimates for contiguous episodes are not valid, as the data were not extracted for related episodes for non-study hospitals.
- The proportion of main episodes with a prior episode ranged from 1.7% (Prince of Wales Hospital) to 54.3% (Wagga Wagga Base Hospital). Gosford (19.3%) and Port Macquarie (19.3%) also have higher proportions of prior episodes. However, all the Sydney metropolitan hospitals have less than 3% of patients with a main episode with a prior episode.
- The proportion of main episodes with subsequent subacute episodes ranged from 50.1% (Prince of Wales Hospital) to 67.9% (Wagga Wagga Base Hospital). The average number of days in subsequent episodes ranged from 15.2 to 19.9 days.

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<sup>3</sup> The phrase 'contiguous episode' is used to refer to an unbroken episode of care where the patient is transferred between two or more hospitals.

- For most hospitals, the mean length of stay for patients transferred to a nursing home<sup>4</sup> at the end of the main episode tended to be lower than for other episodes. The exception is Wagga Wagga Base, where patients transferred to nursing homes had a higher length of stay (potentially due to less options in the region).
- The mode of discharge from the main episode varied across the study hospitals. Some of this variation is likely to be due to differences in how the different modes are interpreted by staff collecting patient data. In particular, the NSW and national definitions of mode of discharge require that patients who were previously a resident of a residential care facility and discharged back to that facility to be categorised as being discharged 'home'. However, in some instances hospital staff may allocate these patients to the 'transferred to nursing home' category. This appears to be the practice at Concord Hospital, which has a high proportion of patients 'transferred to nursing home', and a lower proportion of that were discharged home. Between 49.2% (Prince of Wales Hospital) and 71.8% (Wagga Wagga Base Hospital) of episodes involved a transfer to another facility or type change, with the state rate being 58.0%. Between 2.7% and 5.4% of patients have a mode of discharge of death. Survival rates are discussed further in a later section of this report.

**Table 9 Key characteristics of hip fracture patients, NSW, July 2009-June 2014**

Measures	Study hospitals*						Other hosps	Total NSW
	A237	C208	B218	B202	H272	R219		
<b>Age of patient</b>								
Mean	84.7	84.7	85.8	84.6	84.0	84.5	84.1	84.2
Standard deviation	7.3	7.7	7.5	7.5	7.7	7.5	7.6	7.6
Median	85.5	85.2	86.5	85.6	84.7	85.2	85.0	85.1
<b>Sex of patient</b>								
% female	73.1%	72.3%	74.7%	71.6%	73.1%	73.6%	71.8%	72.0%
<b>Episodes with an external cause diagnosis of fall coded</b>								
% with fall code	94.9%	95.0%	96.0%	97.4%	97.3%	97.7%	95.6%	95.8%
<b>Episodes with diagnosis of fall and place of occurrence residential care</b>								
% of episodes	27.6%	22.3%	26.0%	33.8%	33.9%	31.7%	29.7%	29.7%
<b>Average length of stay (days)</b>								
Main episode only	13.3	12.8	10.9	10.8	8.1	8.2	11.8	11.6
All contiguous episodes	28.6	30.9	28.9	30.7	24.2	28.6	12.2	15.8
Prior episode days	0.1	-	0.1	0.1	0.1	0.4	0.2	0.1
Subacute episodes after main	15.2	18.1	17.9	19.7	16.0	19.9	0.2	4.0
<b>Number of contiguous episodes</b>								
Main episode	856	834	1,127	1,794	595	735	21,913	27,854
Prior episodes	22	14	29	199	115	399	2,630	3,408
Subsequent episodes	636	588	1,175	2,067	541	908	NA	NA
All contiguous episodes	1,514	1,436	2,331	4,060	1,251	2,042	24,885	37,519

<sup>4</sup> 'Transfer to nursing home' is the name given to one of the categories in the data element: mode of discharge, although the preferred terminology in Australia is 'residential aged care' or 'residential care'. The term 'nursing home' is used here to be specific about the NSW category that is being referred to.

Measures	Study hospitals*						Other hosps	Total NSW
	A237	C208	B218	B202	H272	R219		
% episodes with prior episode	2.6%	1.7%	2.6%	11.1%	19.3%	54.3%	12.0%	12.2%
% episodes with subsequent episode	55.7%	50.1%	62.4%	58.9%	57.3%	67.9%	1.4%	13.7%
Mean no of subsequent episodes	1.3	1.4	1.7	2.0	1.6	1.8	1.1	1.6
<b>Discharge mode for main episode</b>								
Discharge	10.6%	33.3%	35.8%	21.9%	28.4%	20.3%	30.3%	29.2%
Transfer/ type change	61.7%	49.2%	53.8%	61.1%	62.0%	71.8%	57.6%	58.0%
Transfer to nursing home	24.3%	13.1%	6.5%	11.6%	5.7%	5.2%	7.4%	8.2%
Death	3.4%	4.4%	3.8%	5.4%	3.7%	2.7%	4.0%	4.0%
Other	0.0%	0.0%	0.1%	0.0%	0.2%	0.0%	0.7%	0.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
<b>Mean length of stay of main episode by discharge mode</b>								
Discharge	14.5	12.2	11.8	10.7	7.5	8.4	11.9	11.7
Transfer/ type change	13.7	13.4	10.3	11.1	8.5	7.8	11.6	11.4
Transfer to nursing home	11.3	12.2	10.2	9.2	6.7	12.6	12.9	12.2
Death	17.1	13.9	13.3	11.2	6.6	7.6	11.6	11.7
Other	NA	NA	7.0	NA	23.0	NA	15.2	15.2

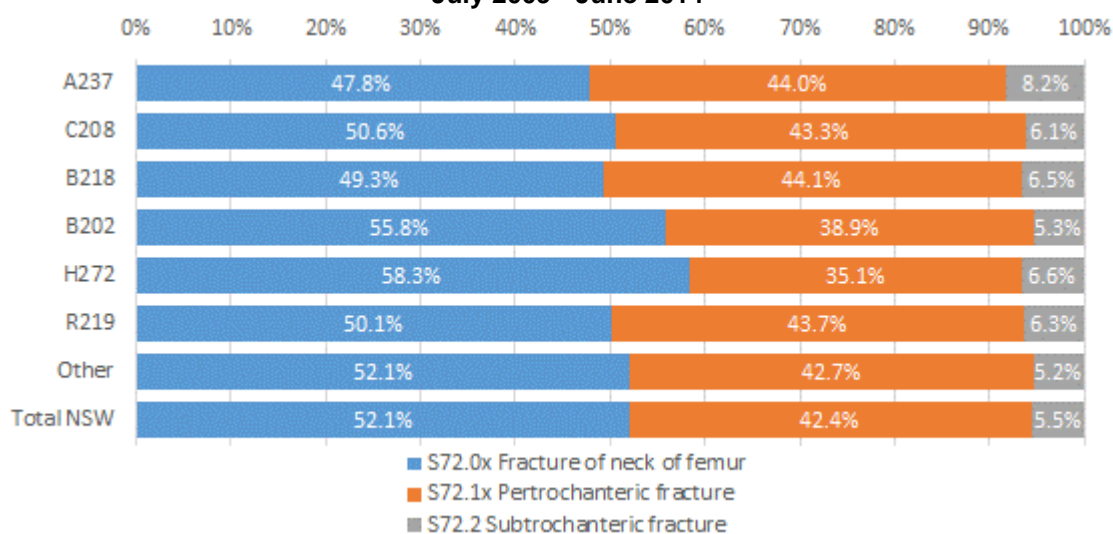
\* A237 = Concord; C208 = Prince of Wales; B218 = Royal North Shore; B202 = Gosford; H272 = Port Macquarie; R219 = Wagga Wagga Base.

Additional information on the diagnoses, procedures and AR-DRGs for the hip fracture patients in study hospitals is set out in Table 5 to Table 7. These data are shown as proportions in the charts in Figure 15 to Figure 18. The charts suggest:

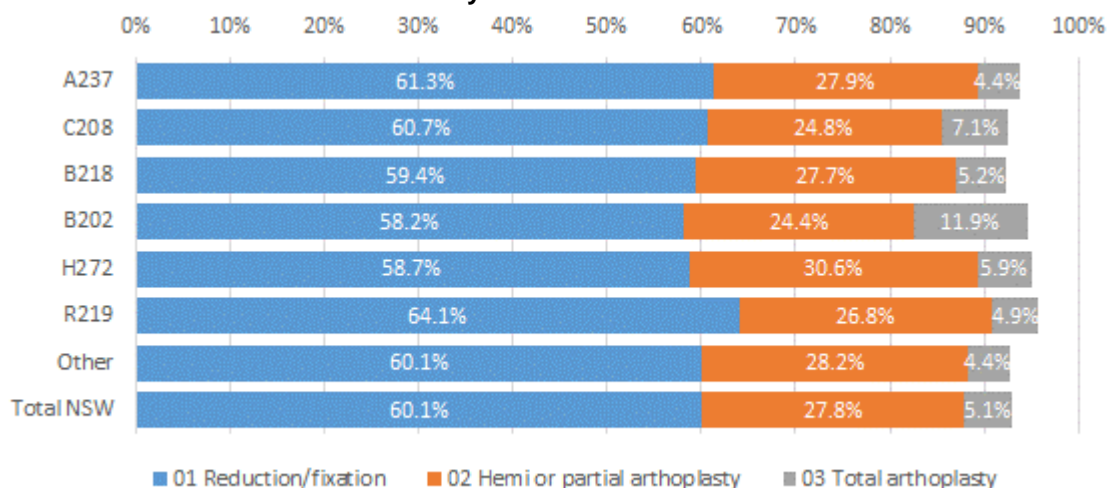
- Some differences between hospitals in the type of fractures. These may reflect coding difference or genuine differences in the mix of cases presenting to the hospitals.
- Some differences between hospitals in whether patients are managed with internal fixation, hemi or total arthroplasty (Figure 16). This is also reflected in the adjacent AR-DRGs presented in Figure 18.
- Some differences between hospitals in the proportion of patients for whom no hip related operating theatre procedure has been coded either as a principal or additional procedure (Figure 17). In interpreting these data, the qualifications highlighted above should be considered.

These differences between hospitals are not large, but in several instances are statistically significant (analysis not shown). These difference may or may not be clinically significant, but this requires further investigation and is not the specific focus of the Minimum standards nor the current evaluation.

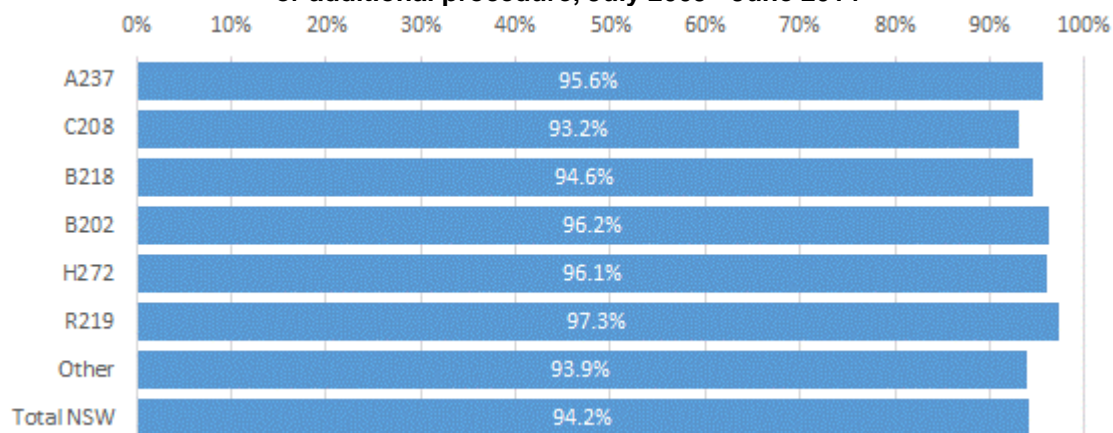
**Figure 15 – Proportion of main episodes with hip fracture by principal diagnosis, July 2009 - June 2014**



**Figure 16 – Proportion of main episodes with hip fracture by principal procedure, July 2009 - June 2014**

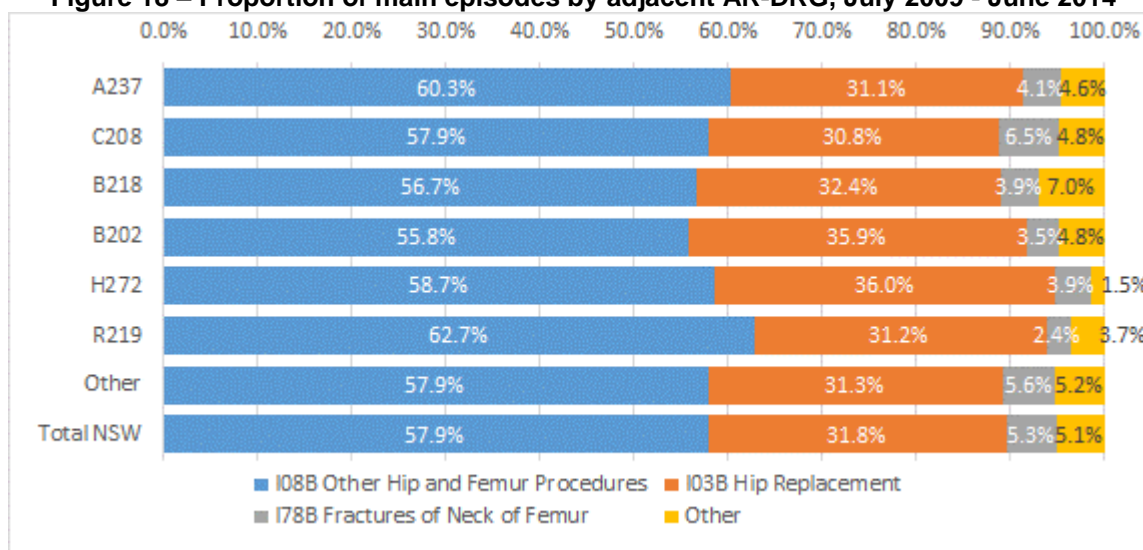


**Figure 17 – Proportion of main episodes with a hip fracture procedure coded as either principal or additional procedure, July 2009 - June 2014**



\* A237 = Concord; C208 = Prince of Wales; B218 = Royal North Shore; B202 = Gosford; H272 = Port Macquarie; R219 = Wagga Wagga Base.

**Figure 18 – Proportion of main episodes by adjacent AR-DRG, July 2009 - June 2014**



\* A237 = Concord; C208 = Prince of Wales; B218 = Royal North Shore; B202 = Gosford; H272 = Port Macquarie; R219 = Wagga Wagga Base.

The distribution of the number of admissions on any one day was also analysed (see Table 10). The situation in which several patients with hip fracture present on a single day can cause significant pressures on hospitals. The impact of these patterns on other factors (time to surgery and survival) are explored in later sections. The Table shows that days on which two or more patients present were a much higher proportion of days for Gosford Hospital.

**Table 10 – Distribution of patients per day, study hospitals, July 2009-June 2014**

Hospital	Number of patients admitted									
	0	1	2	3	4	5	6	7	8	
<b>Number of days (represents days over a 5-year period, total of 1,826 days for the period)</b>										
A237 Concord	1,174	511	121	20						
C208 Prince of Wales	1,181	517	110	16	2					
B218 Royal North Shore	1,032	571	182	35	5	1				
B202 Gosford	720	666	321	90	24	4				1
H272 Port Macquarie	1,354	386	80	6						
R219 Wagga Wagga Base	1,232	493	93	7	1					
<b>Proportion of days (%)</b>										
A237 Concord	64.3	28.0	6.6	1.1	-	-	-	-	-	-
C208 Prince of Wales	64.7	28.3	6.0	0.9	0.1	-	-	-	-	-
B218 Royal North Shore	56.5	31.3	10.0	1.9	0.3	0.1	-	-	-	-
B202 Gosford	39.4	36.5	17.6	4.9	1.3	0.2	-	-	-	0.1
H272 Port Macquarie	74.2	21.1	4.4	0.3	-	-	-	-	-	-
R219 Wagga Wagga Base	67.5	27.0	5.1	0.4	0.1	-	-	-	-	-

## Time to surgery

As discussed earlier in this Chapter, the time to surgery was estimated based on two sources of data: the operating theatre data and the *Admitted Patient* data (using a simulation approach informed by the patterns available in the operating theatre data). The Table below shows the number of valid records available from the operating theatre data and the



estimated proportion of total hip fracture patient episodes. Overall valid data was available for 66% of all hip fracture episodes, which substantial increases in available data for the later years.

**Table 11 – Number of records for which operating theatre data was available and estimated proportion of total episodes hip procedures, July 2009-June 2014**

Hospital	2009 Jul-Dec	2010	2011	2012	2013	2014 Jan-Jun	Total
<b>Number of records from operating theatre data</b>							
A237 Concord	107	167	155	134	150	106	819
C208 Prince of Wales	-	119	162	152	140	98	671
B218 Royal North Shore	-	-	103	209	184	147	643
B202 Gosford	-	-	247	318	334	241	1,140
H272 Port Macquarie	12	121	113	105	93	85	529
R219 Wagga Wagga Base	-	4	31	29	31	37	132
<b>Total</b>	<b>119</b>	<b>411</b>	<b>811</b>	<b>947</b>	<b>932</b>	<b>714</b>	<b>3,934</b>
<b>Estimated proportion of episodes for which a hip fracture related episode was provided</b>							
A237 Concord	97%	95%	93%	94%	98%	97%	96%
C208 Prince of Wales	0%	81%	94%	94%	90%	94%	80%
B218 Royal North Shore	0%	0%	48%	92%	97%	95%	57%
B202 Gosford	0%	0%	76%	93%	96%	95%	64%
H272 Port Macquarie	23%	97%	96%	95%	95%	93%	89%
R219 Wagga Wagga Base	0%	3%	22%	21%	22%	34%	18%
<b>Total</b>	<b>19%</b>	<b>36%</b>	<b>71%</b>	<b>85%</b>	<b>86%</b>	<b>87%</b>	<b>66%</b>

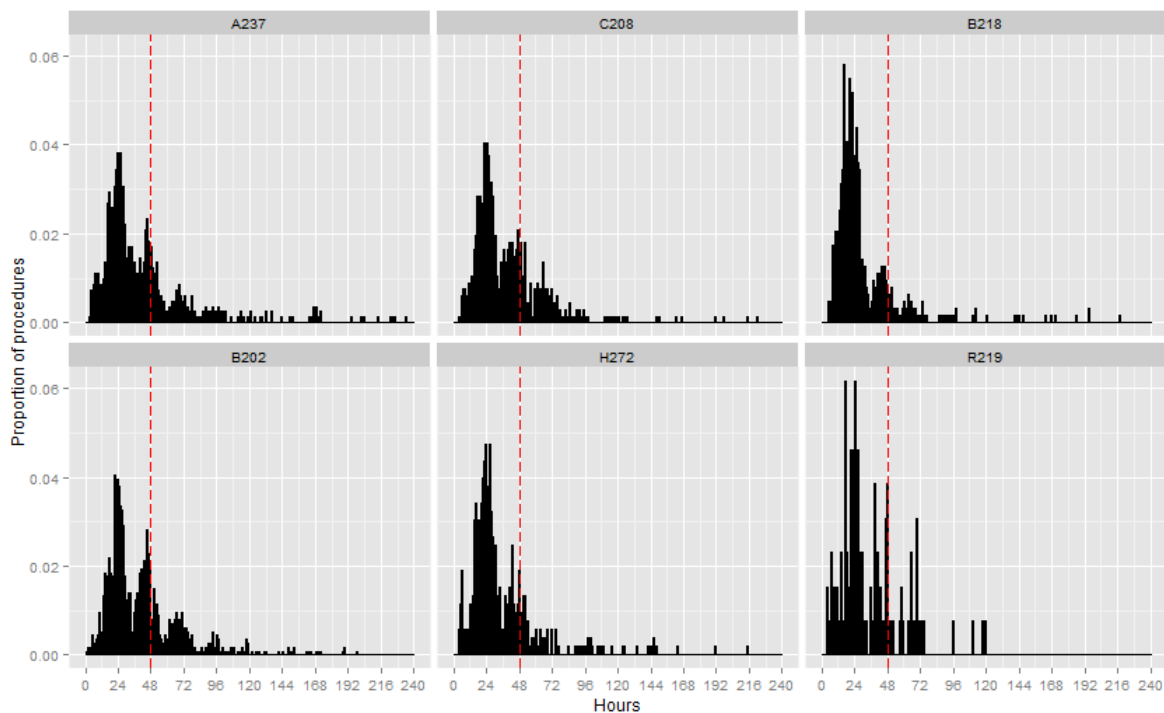
The figures below show the distributions of time to surgery from these sources: the data from the operating theatre system, and the simulated data from the Admitted Patient Data Collection (which has the date of the procedure, but not the time). Figure 19 shows the distribution of the operating theatre data, and Figure 20 the distribution the simulated Admitted Patient data. In these charts, the 48 hour point is represented by a vertical broken line. Observations that fall to the left of the line represent patients where *Standard 3: Surgery within 48 hours* has been met. Observations to the right represent patients where this Standard has not been met. In both figures there are two peaks that are evident in the data. These peaks are a logical consequence of the fact that time of admission is distributed across the day, while the time at which surgery is provided is generally clustered, with most of it undertaken between 9:00 am and 3:00 pm. The first peak represents patients receiving surgery on the day following admission, and the second patients receiving surgery on the day after that.

From these data, the proportion of patients for whom *Standard 3: Surgery within 48 hours* has been met can be estimated, along with other measures of interest, such as the mean and median times to surgery. A 'survival' analysis can also be conducted, in which the outcome of interest is the time to surgery. However, there is a basic issue that needs to be noted in this. This is how to handle patients in these analyses who do not receive surgery within the period observed, or at any time. (In survival analysis this is the issue of 'censoring' of observations.) In the analysis presented below, we have assumed that the population of interest relates only to patients who receive surgery. However, this can result in some biases (e.g. a patient who



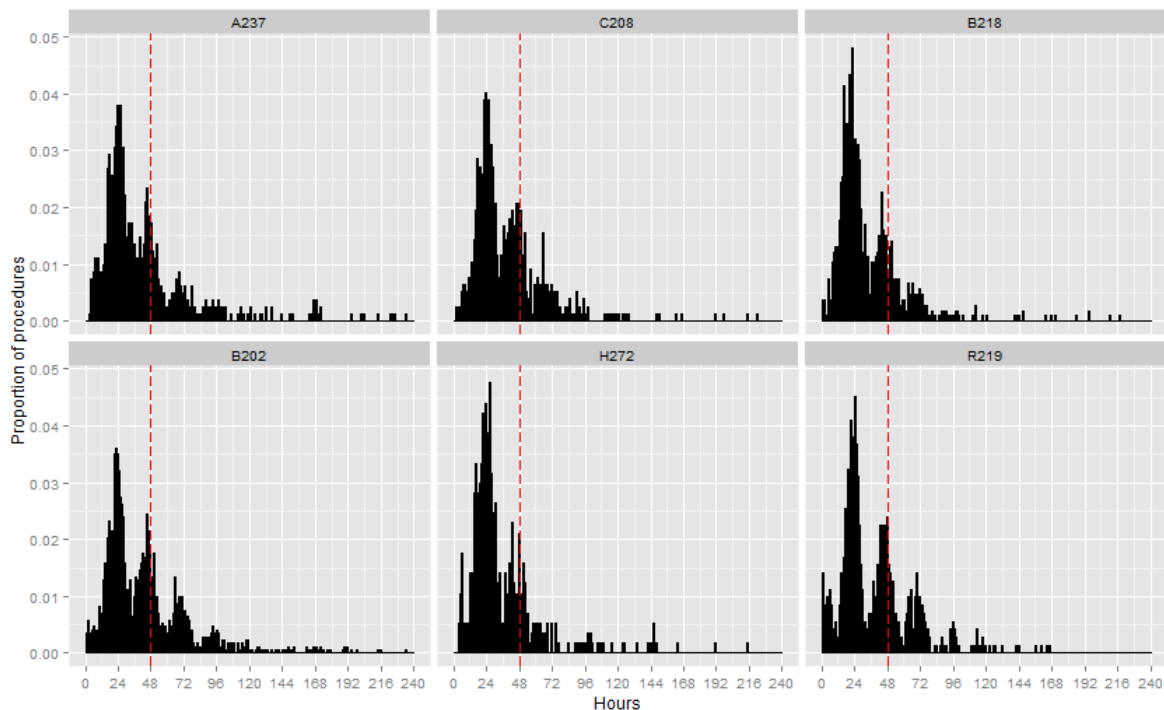
is considered suitable for surgery but dies before surgery is undertaken will not be included in the calculation.

**Figure 19 – Distribution of the time to surgery, based on operating theatre data, study hospitals**



\* A237 = Concord; C208 = Prince of Wales; B218 = Royal North Shore; B202 = Gosford; H272 = Port Macquarie; R219 = Wagga Wagga Base.

**Figure 20 – Distribution of the time to surgery, based on operating theatre data plus simulated times for episodes with missing operating theatre data, study hospitals**

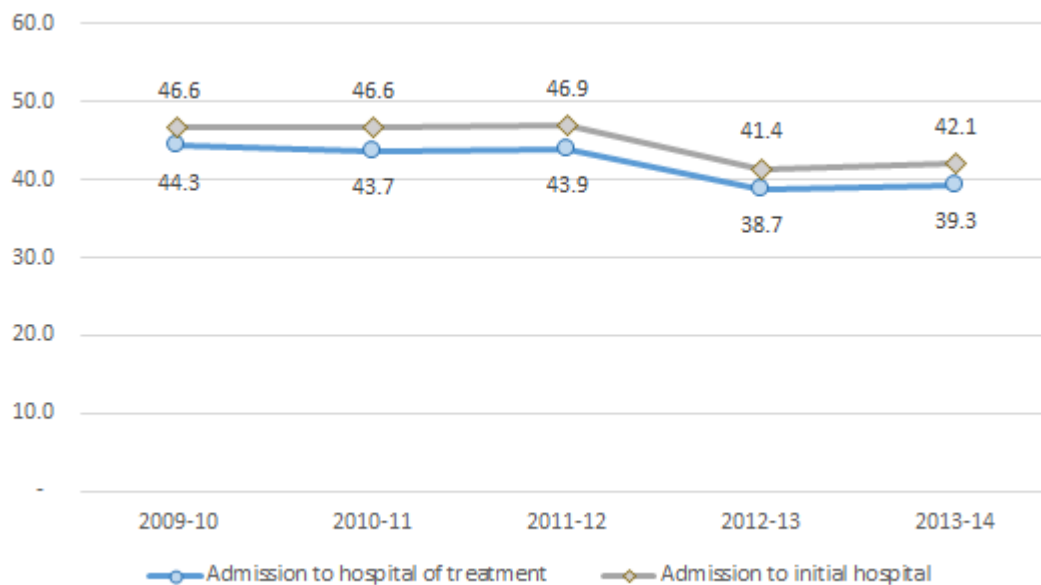


\* A237 = Concord; C208 = Prince of Wales; B218 = Royal North Shore; B202 = Gosford; H272 = Port Macquarie; R219 = Wagga Wagga Base.

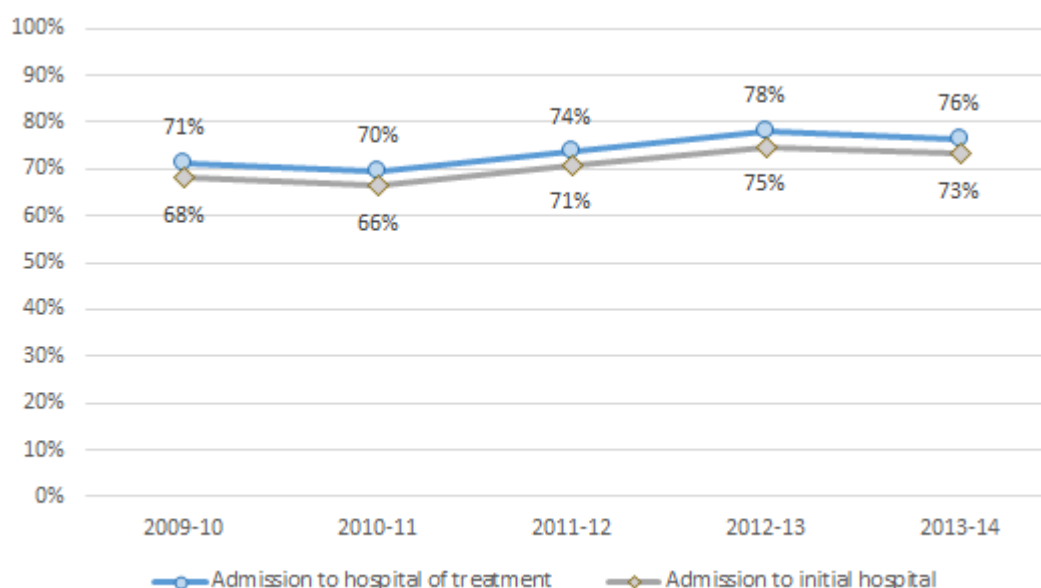
Figure 21 below shows the mean time to surgery for the study hospitals by year. There are two measures presented: the mean time calculated from when the patient was admitted to the hospital of treatment, and the mean time calculated from when the patient was admitted to an initial hospital prior to their transfer to the hospital at which they received surgery for their hip fracture. Overall, the mean time from when the patient arrived to the hospital where the surgery was undertaken to the actual surgery has fallen from 46.6 hours in 2009-10 to 42.1 hours in 2013-14.

An alternative measure, reflecting the actual standard, is the proportion of patients receiving surgery with 48 hours. This trend for the study hospitals is shown in Figure 22. Overall, the proportion, based on time calculated from the admission to the hospital of treatment, increased from 71% in 2009-10 to 76% in 2013-14.

**Figure 21 –Trends in mean time (hours) to surgery, study hospitals, July 2009 - June 2014**



**Figure 22 – Trends in proportion of patients receiving surgery within 48 hours, Study hospitals, July 2009 - June 2014**

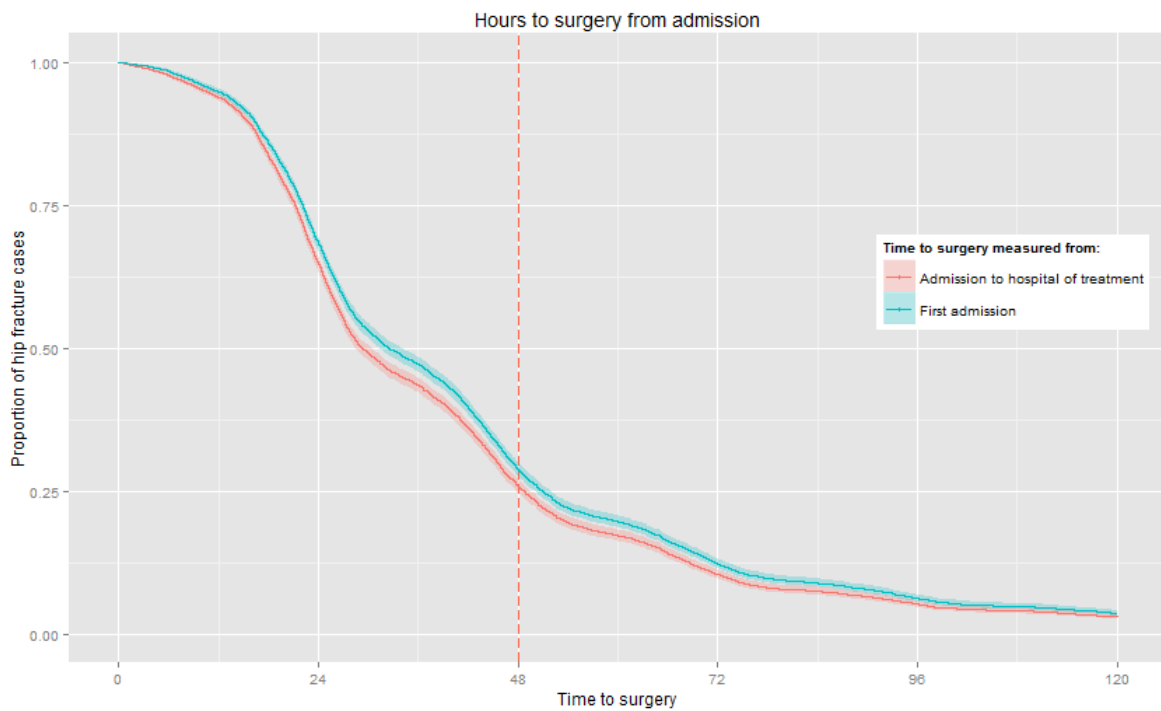


Time to surgery can be analysed using survival analysis techniques. Figure 23 shows Kaplan Meier curves for the data for the study hospitals across the full period. In this plot, the x axis shows the time to surgery. The origin (when  $x=0$ ), represents the time at which the patient is admitted to hospital. The y axis is the proportion of patients who have not received surgery. The complement of this ( $1-y$ ) is the proportion of patients who have received surgery. When  $x=0$ , 100% of patients have not received surgery, meaning 0% have received surgery. As time increases along the y axis, a lower proportion of cases will have not received surgery. An empirically based confidence interval for the curve can be estimate and is represented in the chart by the relevant shaded areas around the curve.

Two curves have been plotted to reflect time from either the admission to the hospital where hip fracture surgery has been provided, or from the admission to the first hospital at which the patient was admitted. Wagga Wagga Base Hospital is most impacted by the difference between these two measurement points. This is demonstrated in Figure 24.

The vertical red line represents the 48 hour point, reflected in Standard 3. The y values for the points at which the curves are intersected by the vertical red line give the proportion of patients who have not received surgery at the 48 hour target.

**Figure 23 –Kaplan-Meier curves for time to surgery, study hospitals , July 2009 - June 2014**



**Figure 24 – Impact on time to surgery calculations in using admission data/time to first hospital compared with admission date/time to hospital of treatment, Wagga Wagga Base Hospital, July 2009 - June 2014**

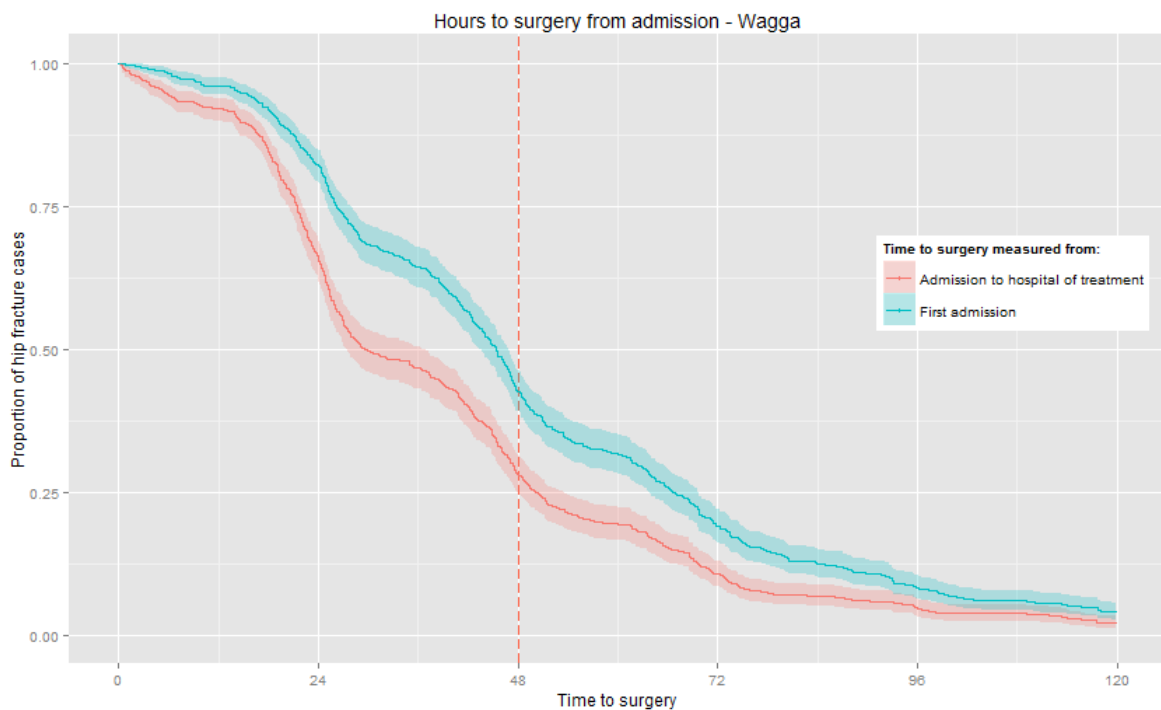
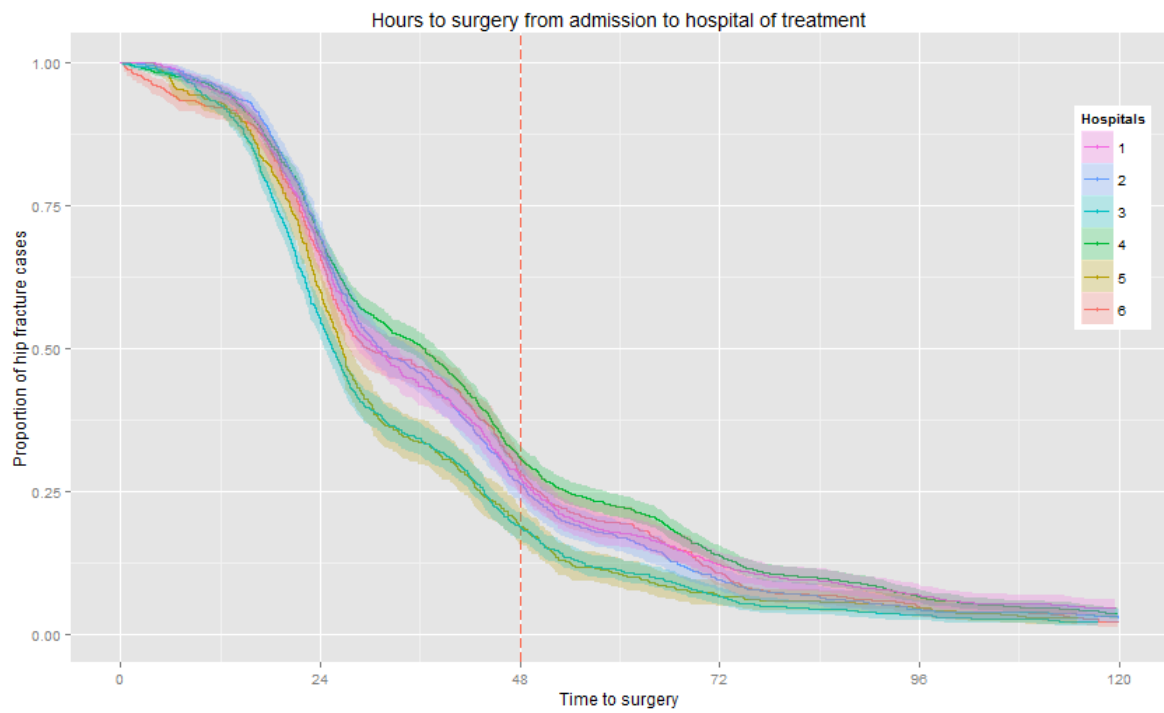


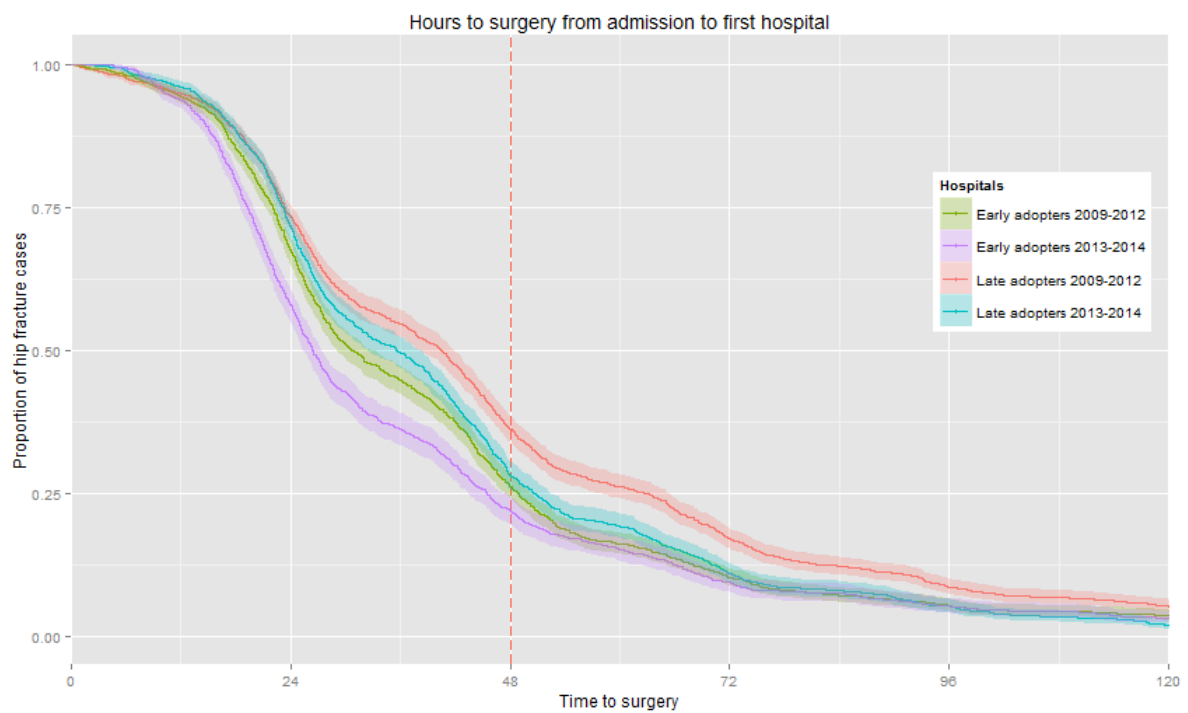
Figure 25 shows the Kaplan Meier curves for each of the hospitals over the full period examined. Hospitals have been de-identified. It can be seen that time to surgery is similar for most hospitals, although one hospital has a slightly higher curve (worse performance) and one hospital has a significantly lower curve (better performance).

To examine the question of whether time to surgery has changed over time, curves were estimated for two time periods: July 2009-June 2012 and July 2012-June 2014. Hospitals were also broken into two groups reflecting the extent to which they were identified as having been earlier adopters of the orthogeriatric model (Concord, Prince of Wales and Royal North Shore) or late adopters (the other study hospitals). This provides a two by two classification through which changes in time to surgery can be compared between early and late adopters. The analysis is presented in Figure 26. This chart suggests that there has been a significant improvement in time to surgery for the late adopter group between the two periods. Basically the late adopters have caught up to achieve a level of performance similar to the early adopters in the July 2009-June 2012 period. There have also been improvements in time to surgery for the early adopter group in the July 2012-June 2014 period.

**Figure 25 – Kaplan-Meier curves for time to surgery by study hospital, July 2009 - June 2014**

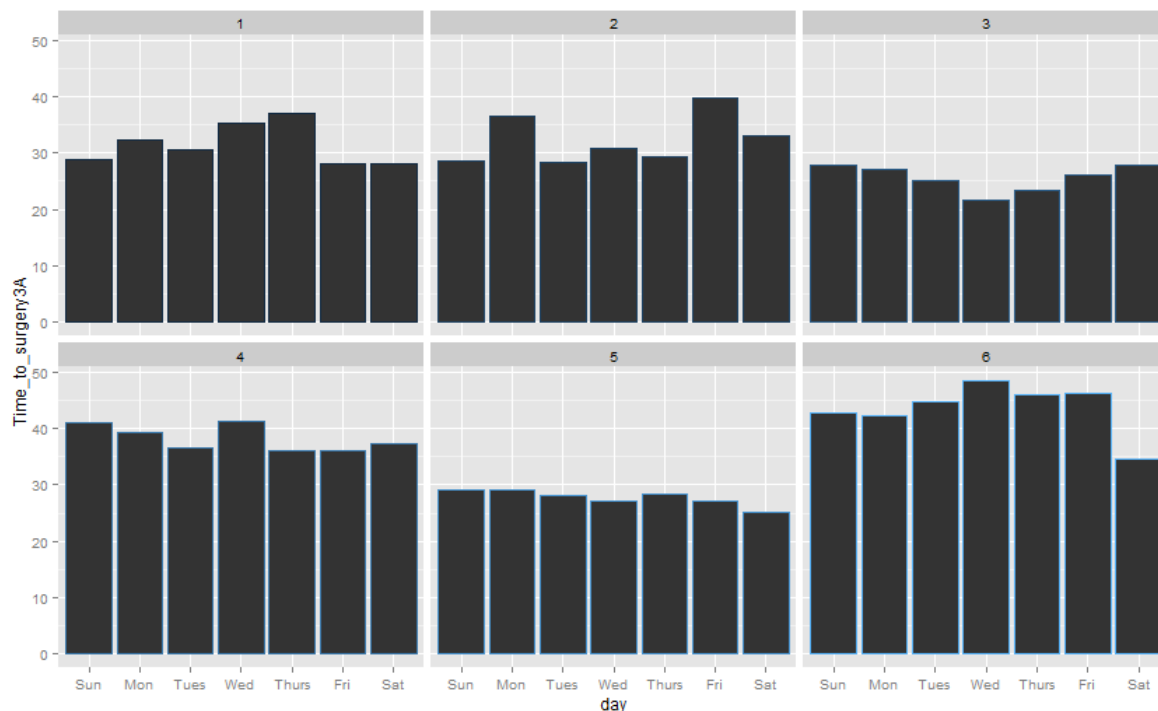


**Figure 26 –Time to surgery: Change over time for hospitals grouped by early versus late adopters of the Minimum standards, July 2009 - June 2014**



One issue that was investigated is whether the day on which a patient presents to hospital impacts on the mean time to surgery. While patterns varied across hospitals, one aspect of this analysis that was surprising was that patients admitted on a Wednesday or Thursday tended to have higher mean times to surgery (Figure 27).

**Figure 27 –Time to surgery by day of week of admission by study hospital (not identified), July 2009 - June 2014**



## Patient survival

Patient survival was analysed to identify whether there is any early evidence of the impact of the Minimum standards towards this. The overall Kaplan-Meier survival curve for all study hospitals is plotted in Figure 28. At six month post admission, around 20% of patients admitted for hip fracture had died, at one year 26%, and at 2 years 36%. However, it is not clear that the data supplied has captured all deaths, although based on a number of checks performed, dates of death seemed to be complete (e.g. cross check of deaths data with admitted patient data for patients that died in hospital). These survival estimates are broadly in-line with the literature. Zeltzer et al., 2014 estimated that 7.4% of patients in NSW receiving hip fracture died within 30 days. Our estimates for the study hospital are identical to this. A greater concern is that deaths that occur over a longer time frame post discharge have not been captured. Other studies have reported mortality of 10-28% at six months (Keene, Parker, & Pryor, 1993, Magaziner et al., 1997), and up to 33% in the first year (R. Khan, Fernandez, Kashifl, Shedden, & Diggory, 2002).

Figure 29 shows survival curves comparing earlier years with the later years. The plot suggests that the overall pattern of survival, particularly in the period immediately following the hip fracture, has not changed substantially over these time periods.

Figure 28 – Kaplan-Meier curves for time to death, study hospitals , July 2009 - June 2014,

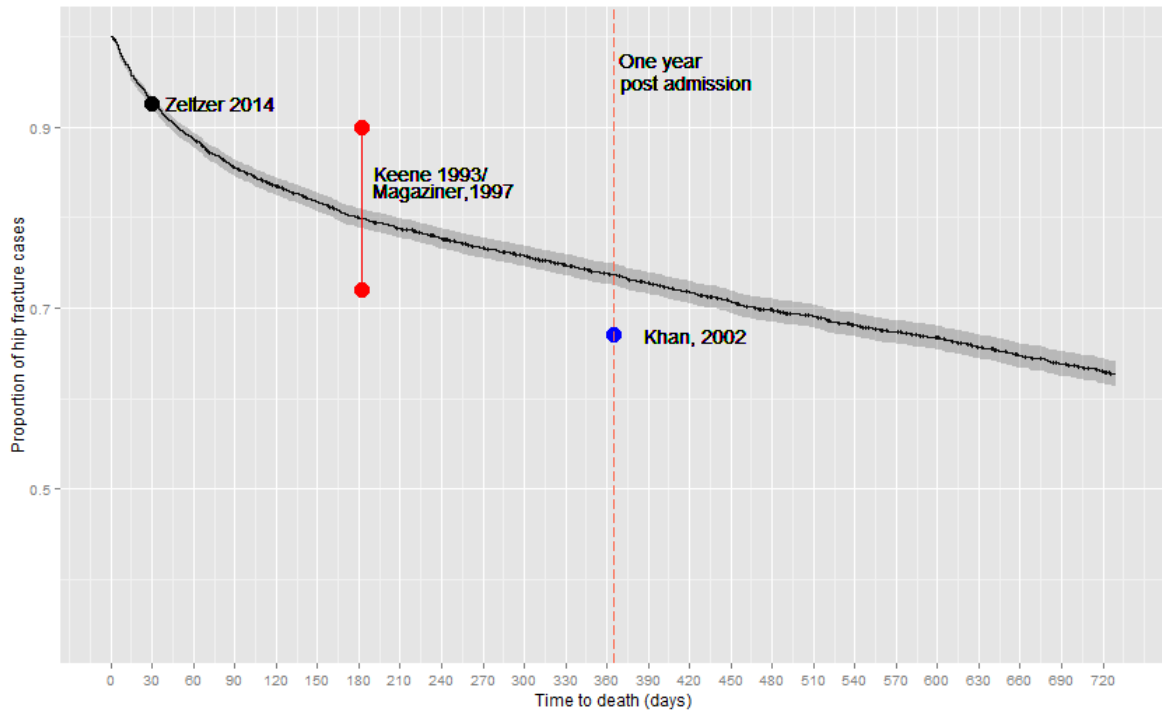


Figure 29 – Kaplan-Meier curves for time to death, study hospitals , July 2009 - June 2014, July 2009 - June 2014

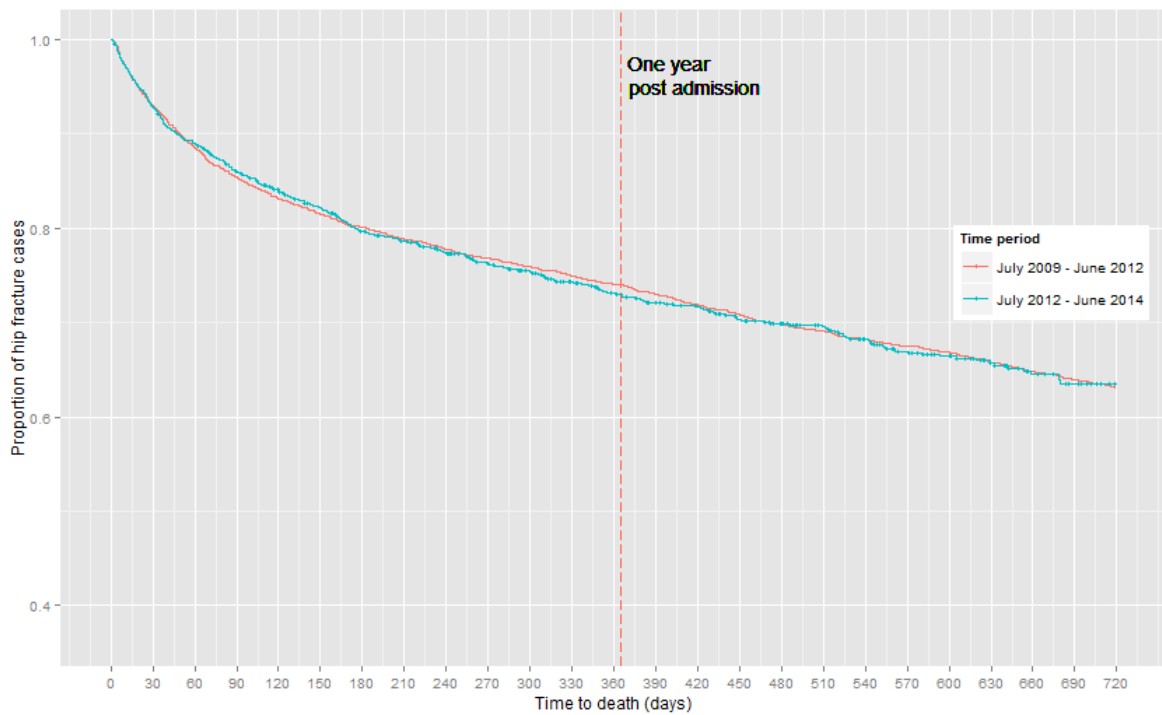
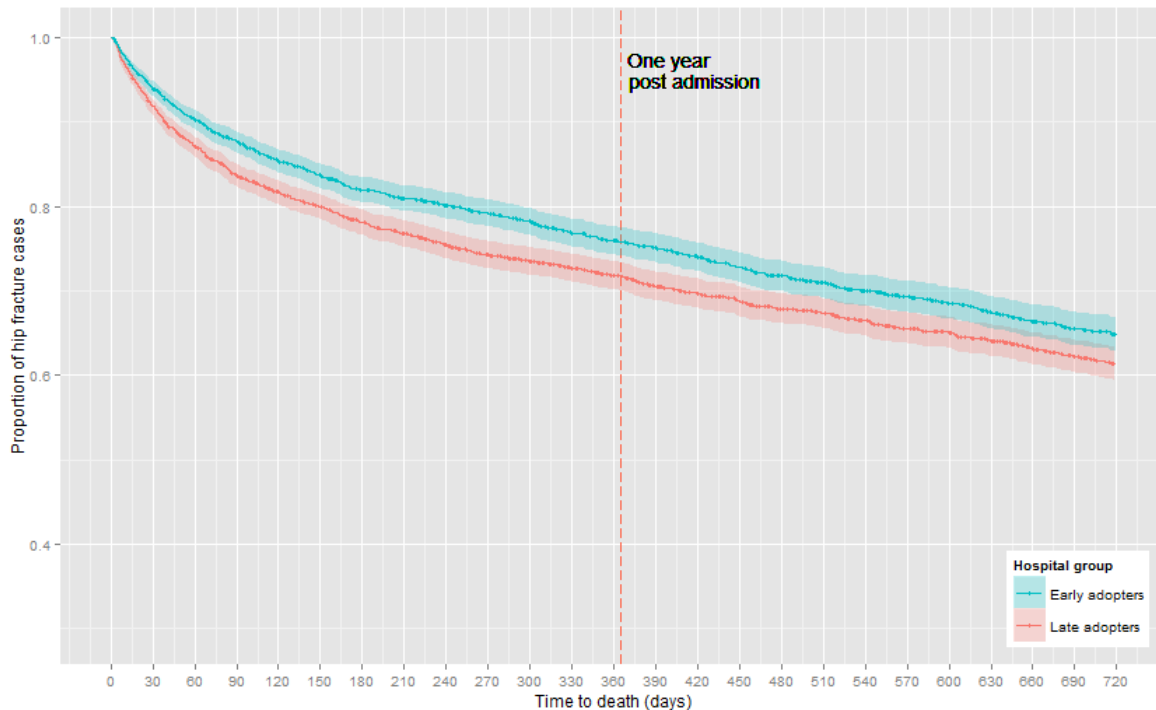


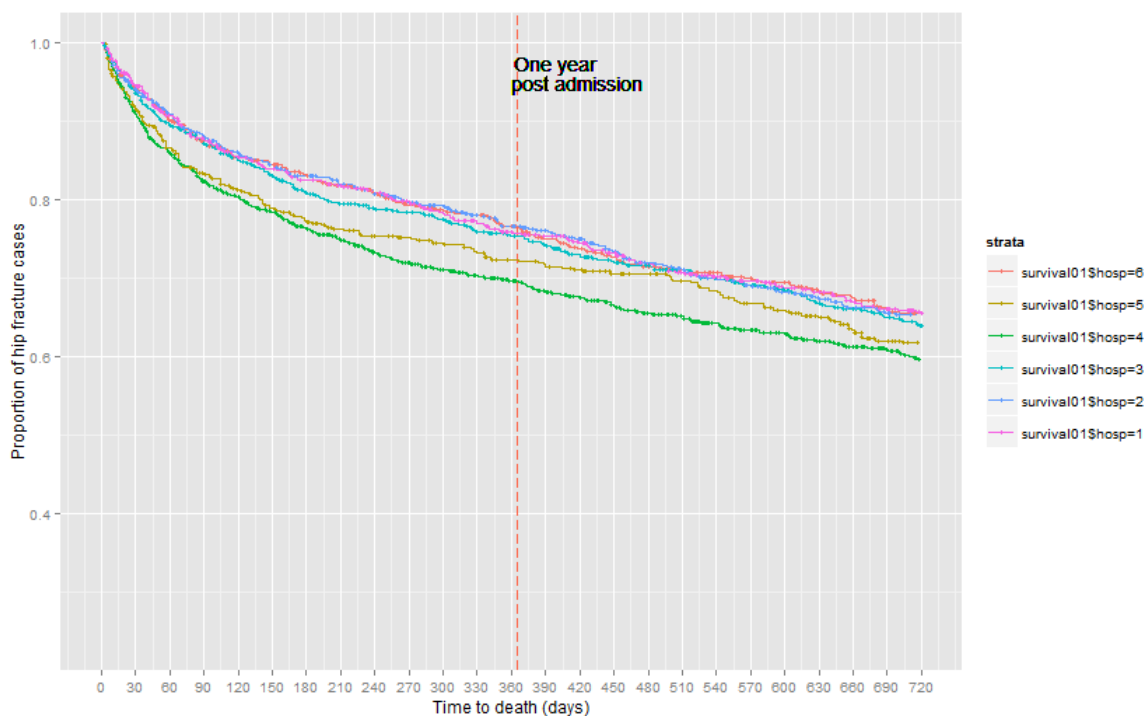


Figure 30 compares survival for hospitals identified as early adopters of the orthogeriatric model, and hospitals identified as late adopters. There was a significant difference in survival between these groups of hospitals. Figure 31 shows estimated curves for each of the hospitals (which are de-identified). This suggests survival curves for four hospitals are generally similar, while for two hospitals (both late adopters), survival tends to be lower.

**Figure 30 – Kaplan-Meier curves for time to death, study hospitals  
July 2009 - June 2014**

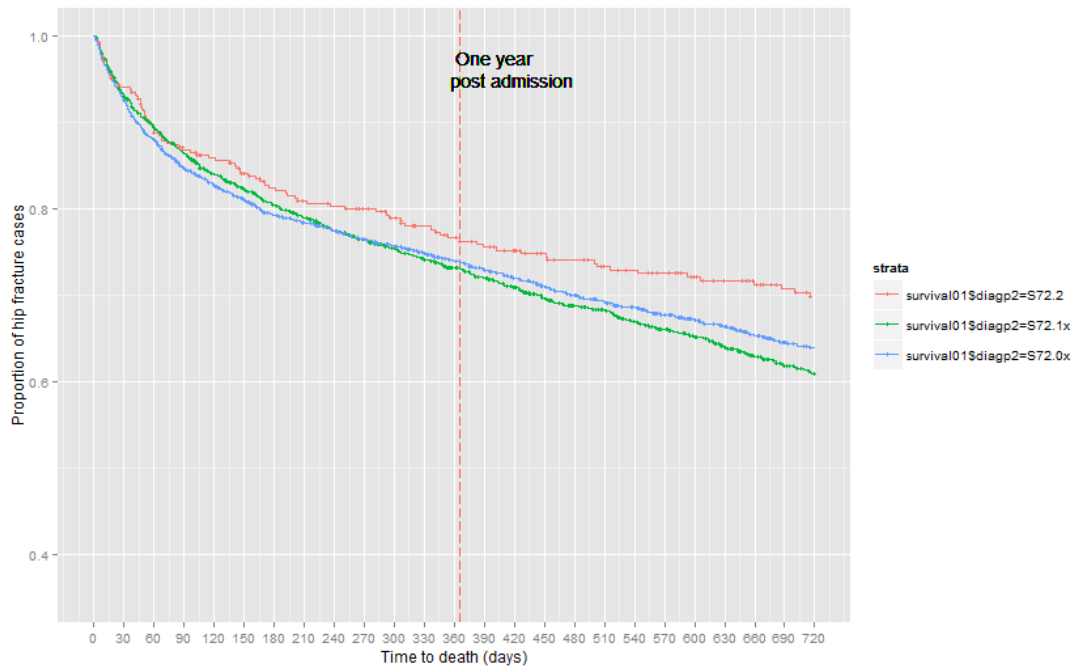


**Figure 31 – Kaplan-Meier curves for time to death by hospital, study hospitals ,  
July 2009 - June 2014**



To further explore survival, a Cox proportional hazards model was estimated in which characteristics of patients were included to control for the potential impact of differences in the mix of patients. The model included main effects for sex, age, the principal diagnosis and a grouping of the Charlson index of comorbidities. Survival curves for principal diagnosis are shown in Figure 32, and survival curves for the Charlson index groups shown in Figure 33. These each suggest significant effects on survival.

**Figure 32 – Kaplan-Meier curves for time to death by principal diagnosis, study hospitals, July 2009 - June 2014**



**Figure 33 – Kaplan-Meier curves for time to death by Charlson index group, study hospitals, July 2009 - June 2014**

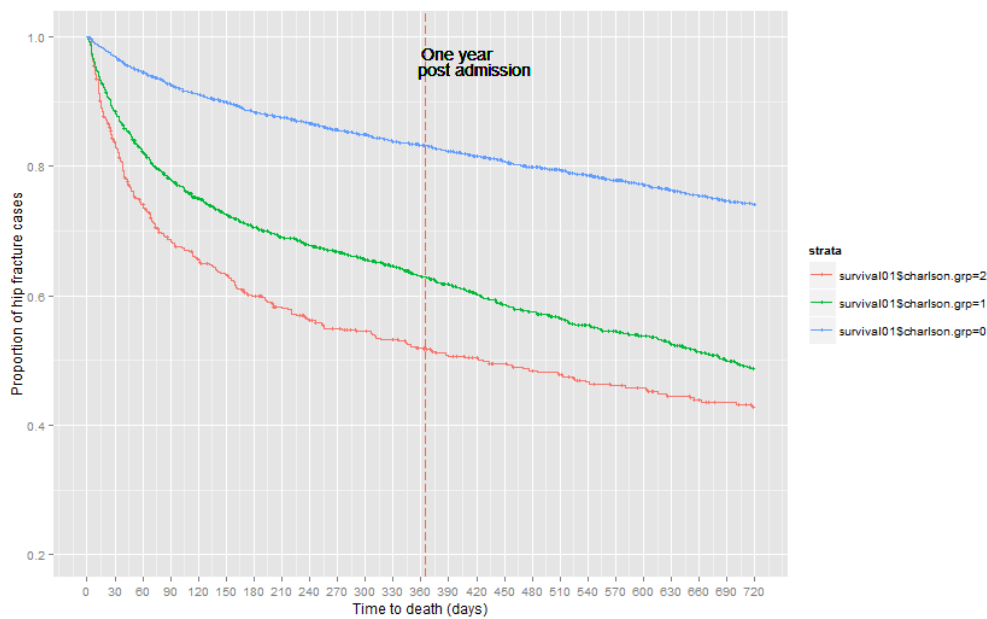


Table 12 shows the estimated coefficients for a model including the predictors described above plus an indicator of whether the patient received surgery within 48 hours. The column labelled 'Risk Ratio exp(coef)' is the exponent of the estimated coefficient. This can be interpreted as a risk ratio, in which values below 1 indicate a parameter reduces the risk of death and values above 1 indicate a parameter increases the risk of death. In this Table, the risk ratio for Time\_to\_surgery2Ax (where patients receiving surgery within 48 hours are assigned a value of 1), is 0.814, suggesting that receiving surgery within 48 hours reduces the risk of death by 18.6%, controlling for the other factors. The estimate is statistically significant (with a p value for less than 0.05).

Table 13 shows the estimates for a model in which the time to surgery indicator is set at 36 hours. In this case there is a small reduction in the risk ratio to 0.805 (around a 1% reduction in risk of death).

**Table 12 – Coefficient estimates for Cox Proportional Hazards model with testing the impact of time to surgery of less than 48 hours, July 2009 - June 2014**

Parameter	Coefficient estimate	Risk ratio exp(coef)	Standard error	z	p
Age	0.0563	1.0580	0.0031	18.3410	0.0000
Sex	-0.4978	0.6080	0.0445	-11.1820	0.0000
diagp2S72.1x	-0.0119	0.9880	0.0429	-0.2770	0.7800
diagp2S72.2	-0.1148	0.8920	0.0927	-1.2390	0.2200
factor(charlson.grp)1	0.7232	2.0610	0.0446	16.2240	0.0000
factor(charlson.grp)2	1.0062	2.7350	0.0667	15.0860	0.0000
Time_to_surgery2Ax (48 hours)	-0.2063	0.8140	0.0432	-4.7770	0.0000

**Table 13 – Coefficient estimates for Cox Proportional Hazards model with testing the impact of time to surgery of less than 36 hours, July 2009 - June 2014**

Parameter	Coefficient estimate	Risk ratio exp(coef)	Standard error	z	p
Age	0.0563	1.0580	0.0031	18.3200	0.0000
Sex	-0.4993	0.6070	0.0445	-11.2240	0.0000
diagp2S72.1x	-0.0044	0.9960	0.0429	-0.1030	0.9200
diagp2S72.2	-0.1216	0.8860	0.0927	-1.3120	0.1900
factor(charlson.grp)1	0.7231	2.0610	0.0446	16.2300	0.0000
factor(charlson.grp)2	1.0032	2.7270	0.0667	15.0460	0.0000
Time_to_surgery2Ay (36 hours)	-0.2174	0.8050	0.0416	-5.2210	0.0000

Table 14 shows a comparison of early and later adopter hospitals. In this model a factor was included in the model which indicates whether the hospital was one of the group of early adopters or a late adopter of the orthogeriatric model. The risk ratio for late adopters was 1.267, indicating that patients at late adopter hospitals have an increased risk of death of 26.7%.

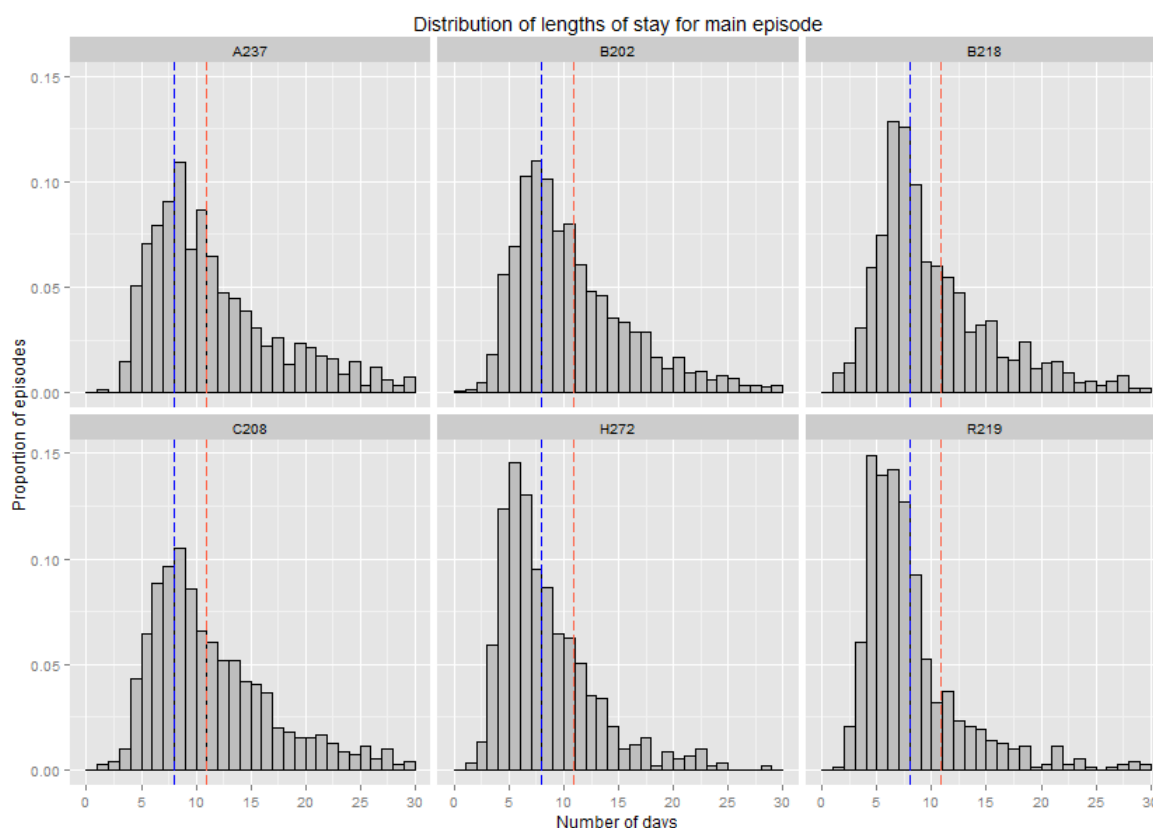
**Table 14 – Coefficient estimates for Cox Proportional Hazards model comparing survival for early and later adopter hospitals, July 2009 - June 2014**

Parameter	Coefficient estimate	Risk Ratio exp(coef)	Standard error	z	p
Age	0.0569	1.0590	0.0031	18.5630	0.0000
Sex	-0.5029	0.6050	0.0445	-11.3037	0.0000
diagp2S72.1x	-0.0038	0.9960	0.0430	-0.0873	0.9300
diagp2S72.2	-0.1075	0.8980	0.0927	-1.1601	0.2500
factor(charlson.grp)1	0.7483	2.1130	0.0445	16.8233	0.0000
factor(charlson.grp)2	1.0584	2.8820	0.0666	15.8876	0.0000
Late adopter	0.2367	1.2670	0.0416	5.6852	0.0000

## Length of stay analysis

As discussed above, the average length of stay can be analysed for the main episode, or also including the episode during which definitive treatment for the hip fracture was provided, and contiguous episodes that occurred prior to or after the main episode. The average length of stay for the main episode for the study hospitals was 10.9 days and the median was 8 days, suggesting skewed distribution. Mean length of stay varied by hospital as was shown in Table 9 and also Figure 34 below. Port Macquarie and Wagga Wagga Base hospitals tended to have lower lengths of stay for the main episode.

**Figure 34 – Distribution of average length of stay for the main episode, study hospitals July 2009 - June 2014**



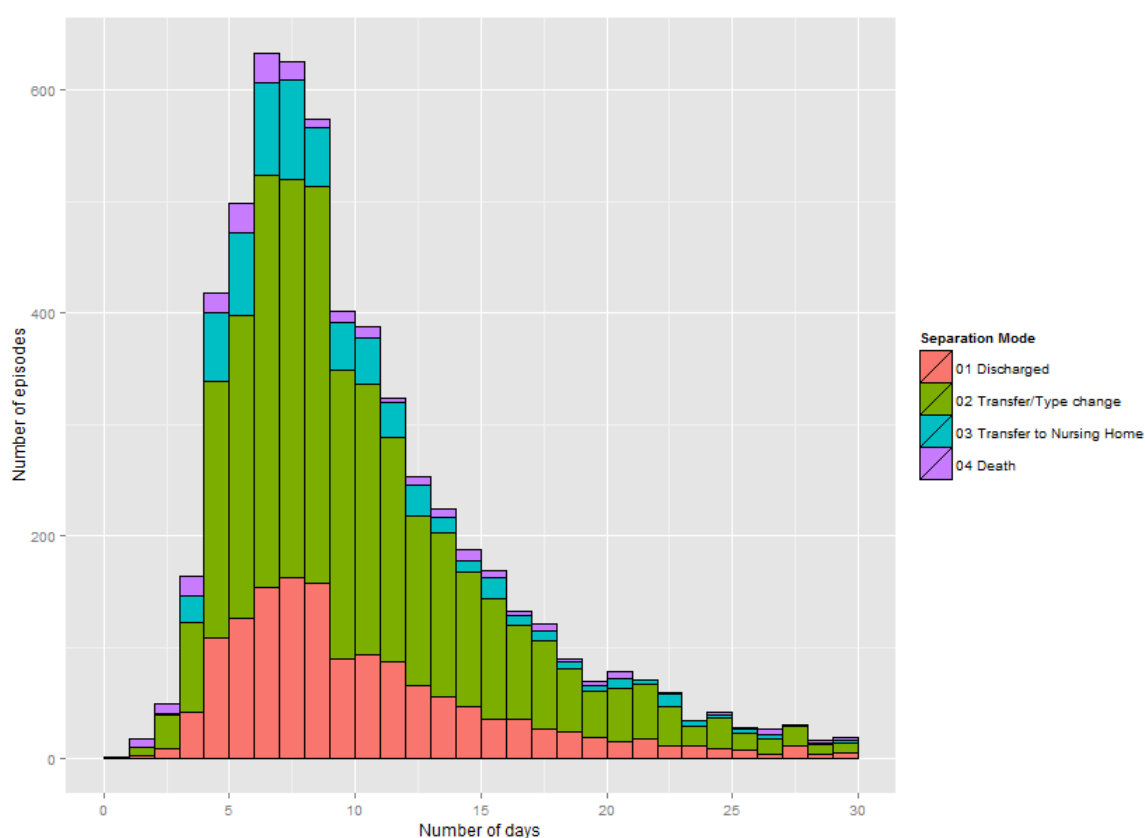
Note: Red dashed line= Mean for study hospitals; Blue dashed line= Median for study hospitals

Various factors are known to impact the length of stay. Two factors that are important are:

- The nature of the treatment provided to the patients (hip replacement, other surgical treatment or conservative treatment), which will be largely reflected in the AR-DRG to which the episode is assigned.
- The mode of discharge, for example, whether the patient is discharged, transferred to another hospital/unit, transferred to a nursing home, or dies.

Figure 35 shows the distribution of length of stay of the main episode with the mode of discharge highlighted.

**Figure 35 – Distribution of average length of stay for the main episode by discharge mode, study hospitals July 2009 - June 2014**



**Table 15 – Average length of stay by AR-DRG and mode of discharge, Study hospitals, July 2009 - June 2014**

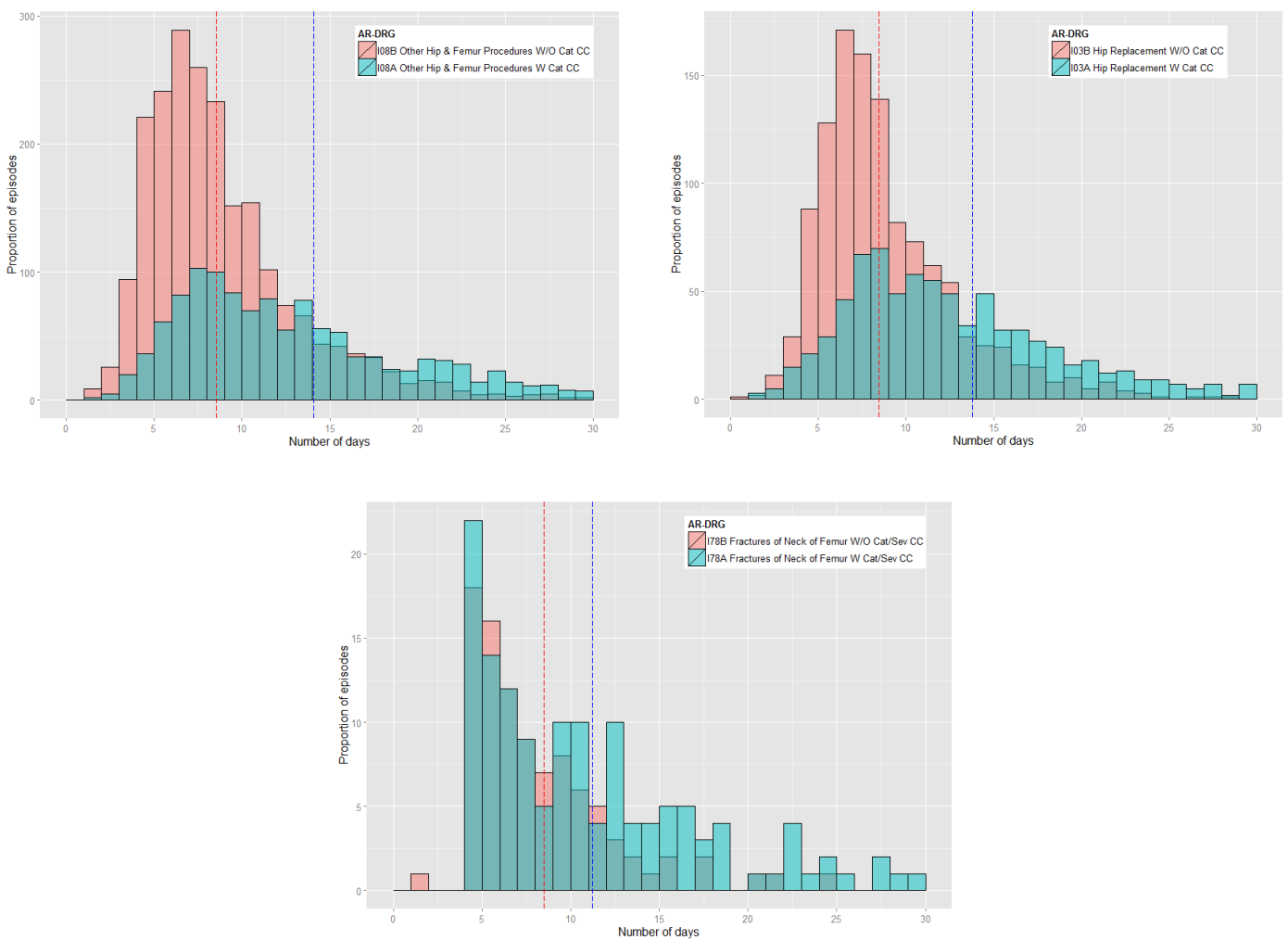
Australian Refined Diagnosis Related Group (AR-DRG) Version 7.0	Discharged*	Transfer/ type change	Transfer to nursing home	Death**	Total	Proportion of episodes
<b>Main episodes</b>						
I08B Other Hip & Femur Procedures W/O Cat CC	9.3	8.4	7.6	6.8	8.6	36.8%
I08A Other Hip & Femur Procedures W Cat CC	14.7	14.2	13.4	13.0	14.1	21.2%
I03B Hip Replacement W/O Cat CC	8.8	8.5	7.5	4.6	8.5	19.4%
I03A Hip Replacement W Cat CC	14.7	14.2	12.0	11.9	13.8	13.8%
I78B Fractures of Neck of Femur W/O Cat/Sev CC	9.0	8.6	5.8	6.0	8.5	1.6%
I78A Fractures of Neck of Femur W Cat/Sev CC	10.5	11.5	15.4	7.4	11.2	2.3%
Other	15.9	17.1	16.3	18.2	16.9	4.7%
All main episodes	10.9	10.9	10.5	12.0	10.9	

Australian Refined Diagnosis Related Group (AR-DRG) Version 7.0	Discharged*	Transfer/ type change	Transfer to nursing home	Death**	Total	Proportion of episodes
Proportion of episodes	25.0%	59.6%	11.3%	4.2%		100.0%
<b>Contiguous episodes (prior, main and post-acute)</b>						
I08B Other Hip & Femur Procedures W/O Cat CC	16.9	36.5	9.4	8.0	28.5	37.6%
I08A Other Hip & Femur Procedures W Cat CC	21.8	45.6	14.7	13.1	33.8	20.9%
I03B Hip Replacement W/O Cat CC	14.8	31.0	9.3	4.6	23.6	19.3%
I03A Hip Replacement W Cat CC	22.7	39.4	14.0	12.0	29.8	13.9%
I78B Fractures of Neck of Femur W/O Cat/Sev CC	10.7	25.9	5.8	6.0	18.4	1.3%
I78A Fractures of Neck of Femur W Cat/Sev CC	13.9	36.2	19.4	7.4	24.7	2.0%
Other	26.2	50.5	17.0	19.0	40.0	4.9%
All episodes	18.0	38.3	12.2	12.2	29.2	
Proportion of all contiguous episodes	17.1%	74.6%	6.2%	2.2%		100.0%

\* Note that many episodes in which the discharge mode is identified as 'discharged', there were contiguous prior or subsequent episodes identified, as discussed in the text.

\*\* Where the main episode has a discharge mode of death, there may be prior episodes identified, hence the average length of stay is slightly higher when contiguous episodes are considered.

**Figure 36 – Distribution of average length of stay by AR-DRG, study hospitals July 2009 - June 2014**



# Findings and themes from stakeholder interviews relating to the Minimum standards overall

This Chapter reports on the findings and themes relating to the Minimum standards overall, based on interviews with stakeholders. These included interviews with stakeholders involved in the development of the Minimum standards or governance processes established by the ACI as well as the study sites.

## **Overall views on the Minimum standards**

Awareness of the Minimum standards was variable amongst stakeholders interviewed. Where stakeholders were aware of them, they were mostly supportive.

## **Strengthening the Minimum standards**

Stakeholders were asked whether there was anything missing in the Minimum standards, whether there were any redundancies, and/or whether the Minimum standards could be strengthened in any way.

Views on gaps in the existing Minimum standards are provided in the next Chapter, by Standard. Overall, the need for only one additional Standard was mentioned by one of the study sites (Port Macquarie), which is about nutrition. Stakeholders who proposed this did so due to the observation that many of the patients with hip fracture are already malnourished when they come to hospital, and when they fast almost immediately for surgery, this can have adverse effects. All of these stakeholders supported the need for timely surgery, but they also thought that more could be done to provide better nutrition for patients prior to surgery, and especially post-surgery.

Although nutrition is also part of Standard 4: Patient's surgery is not cancelled, stakeholders raising the need for this additional Standard thought that issues with nutrition were broader than issues around unnecessary or prolonged fasting.

No stakeholders reported any redundancies in the Minimum standards.

In terms of strengthening the Minimum standards, a few stakeholders mentioned the need to attach urgency or priority to them, such as making them key performance indicators. However, some warned against this due to the 'single-mindedness' that this might create. That is, by focussing on, for example, 48 hour surgery, everything else might become a lower priority.

## **Priorities going forward**

A few stakeholders expressed views around future priorities regarding the Minimum standards. Several thought that further raising of awareness was necessary, and it was commented that this might be done with more of a sense of urgency.

It was stipulated however that the effort to achieve the standards needs to be combined across departments. In this way it becomes a shared goal rather than expecting one specialty to drive the change.

Stakeholders that were aware of the *Hip Fracture Care Clinical Care Standard* currently being developed by the Australian Commission on Safety and Quality in Healthcare (ACSQHC) also thought that there needs to be a process to provide clarity to hospitals on the differences between the ACSQHC and ACI standards and implications for practice.

#### **Adequacy of governance processes around Minimum standards**

Stakeholders were asked about the adequacy of governance processes around the Minimum standards. They were asked to comment on the ACI governance around the development and/or management of the Minimum standards, dissemination of the Minimum standards and tools developed by the ACI.

Stakeholders that were aware of and/or active in the ACI governance processes around the Minimum standards were generally supportive of them. However, there were concerns raised about the lack of alignment between the ACI and other national processes in this area, namely the *Australian and New Zealand Guideline for Hip Fracture Care* developed by the Australian and New Zealand Hip Fracture Registry Steering Group and the *Hip Fracture Care Clinical Care Standard* currently being developed by the Australian Commission on Safety and Quality in Health Care. (It is acknowledged that these initiatives are new. For example, the Commission's Clinical Care Standard is currently draft, and the work of the Australian and New Zealand Hip Fracture Registry Guideline was only finalised in late 2014.) Stakeholders called for the ACI to provide clarity on the similarities and differences between the different sets of guidelines and standards that could apply to NSW hospitals, and the implications for practice. (See comment on this under 'Priorities going forward' above.)

Stakeholders that had opinions about the ACI's promotion and/or dissemination of the Minimum standards had variable views. Some thought that the ACI has done a good job in raising the awareness around the Minimum standards. The provision of funding (albeit a small amount) helped to launch the implementation of the Minimum standards within some sites (e.g. by providing a dedicated resource for this for a short period and/or an opportunity for the hospital to review its current practices through an audit). Hospitals with more established implementation of the Minimum standards thought that the ACI should focus its efforts on hospitals that have not implemented an orthogeriatric model of care.

The need to engage clinicians in efforts to disseminate and/or promote the Minimum standards was highlighted, recognising that what brings about change are clinical (not administrative) processes.

Some stakeholders felt that despite the ACI's best efforts, information is not always filtered down to the people that need to take action. For example, at one of the study sites, information about the Minimum standards was available in the emergency department (e.g. posters raising staff awareness), but had not reached the orthopaedics department. Therefore, dissemination/ promotion processes need to ensure that the information reaches all key players in a hospital.

Many stakeholders interviewed were not aware of the tools that the ACI has developed and made available around the Minimum standards. Where they were aware, generally it was reported that they had not been used much. Some difficulties were reported with some of the tools, namely that tools were taken from other systems and had not been sufficiently adapted for local use.



Also, some stakeholders reported that it was difficult to navigate the ACI website to find the actual Minimum standards document amongst supporting documentation and tools on this topic that are available on the website for download.

### **How to effect change**

Several stakeholders commented on how they managed to achieve changes in practice that helped to implement the Minimum standards and improve hip fracture management.

Several interviewees commented on the concept, and value of, a hip fracture/Minimum standards 'champion' – a member of staff (in some cases a clinical nurse consultant, program manager or physician) that was particularly involved with the Minimum standards and proactive in their implementation.

Other enablers of change in practice included: having the volumes of activity where change would make a big difference; having a dedicated position(s) to drive the change; using variation in practice as a motivator; bottom-up and top-down support within the organisation; ownership of the Minimum standards at an organisational level; education about the Minimum standards amongst key players; and potentially performance measures.

Funding and support from the ACI was also seen as a major driver for change amongst the study sites. Stakeholders were of the view that the \$30,000 provided by the ACI signalled that the Minimum standards were important, and 'kick-started' the project. These funds were used in various ways by the sites. For example, two hospitals used the funds to employ a project officer (Wagga Wagga Base and Port Macquarie), and one used it to conduct an audit (RNSH).

### **Value of clinical pathways**

The issue of clinical pathways was not directly raised with stakeholders but many offered their views as it was assumed that the Minimum standards, in some instances, 'prescribed' particular practices (e.g. the statement on use of non-steroidal anti-inflammatory drugs) and also the Minimum standards would be accompanied locally by clinical pathways.

Stakeholders had mixed views about the value of clinical pathways. Stakeholders who were 'pro' pathways gave the following reasons:

- A pathway helps to provide staff with a 'coordinated story' about a patient.
- Recording is by exception; thereby saving time and allowing key people to see the information required. One stakeholder suggested that documenting on a pathway is about 60% quicker compared with writing narrative.
- A pathway decreases omissions in care.

Some stakeholders commented on the need for a standardised hip fracture management pathway across hospitals. Others thought that a pathway on when to operate on a patient versus not (i.e. conservative management) could help to standardise across clinicians and sites.

Stakeholders who were not supportive of pathways also gave several reasons for this. These included factors such as pathways being useful for some staff groups but less so for others (e.g. good for junior doctors but not good for experienced specialists), and the difficulties in trying to develop one pathway to suit patients with different needs and different sites.

Some stakeholders suggested that pathways limited clinicians' flexibility and stopped people thinking.

### **Barriers to implementing the Minimum standards**

Stakeholders reported a range of barriers to implementing the Minimum standards. These are listed below.

#### **Competing priorities and coordination of various initiatives**

A key barrier to implementing the Minimum standards was competing priorities. Examples given included accreditation, competing priorities amongst different ACI initiatives, and also initiatives by other NSW agencies, such as the Clinical Excellence Commission (CEC).

#### **VMO orientation of services**

Several stakeholders commented on the lack of staff specialist positions for orthopaedic surgeons being a main barrier to implementation of the Minimum standards. This is because many senior orthopaedic surgeons are VMOs. A commonly held view was that VMOs are more focussed on 'their rooms' rather than what is happening within the hospital, and that staff specialists have a greater commitment to 'public health' (i.e. investment in activities that have an impact for patients further down the track).

#### **Funding and resource issues**

Lack of funding was frequently mentioned as a barrier to implementation of the Minimum standards. It was thought that lack of funding leads to cutting back and not being able to do things 'properly' and/ or doing something at the expense of something else.

The current activity based funding arrangements were seen as particularly problematic. It was commented that diagnosis related groups (DRGs) allocate funding to the specialty associated with the problem that the patient presents with to hospital, and disregards the fact some patients have multiple inputs to care. For example, funding for hip fracture is against orthopaedics, and not geriatrics or other medical input. The system also compartmentalises acute and sub-acute care, which for hip fracture patients, needs to work in tandem.

#### **What would be helpful?**

Stakeholders were asked what the ACI could do to further assist implementation of the Minimum standards. Several suggestions were made.

One was that the ACI needs to manage implementation of different priority issues, as hospitals may get bombarded with the various initiatives. This is especially an issue with smaller facilities. That is, the ACI needs to have a coordinated implementation of different initiatives.

Other suggestions included: continue to facilitate forums/ mechanisms through which hospitals can share ideas, feedback to hospitals about how they compare with other hospitals, the creation of a repository for all of the different resources available in this area, and the availability of an audit tool with suggested solutions to take action locally and immediately as problems are identified.

### Tools used by sites

A number of the study sites had implemented innovative tools to assist with achieving one or more aspects of the Minimum standards. These were as follows:

- All of the hospitals had implemented, or were in the process of implementing a hip fracture pathway. Gosford Hospital had also developed checklists to be used with the pathway (a separate one for the emergency department and the orthopaedic ward), to ensure that the pathway is being followed.
- Port Macquarie Hospital staff make up a pack for use with hip fracture patients presenting to the emergency department. The pack contains the pathway for hip fracture patients, all of the materials needed for administration of a continuous nerve block, drinks that can be given at different times prior to surgery to avoid malnourishment/dehydration, and other materials/information to facilitate adherence to the pathway for hip fracture patients.
- Port Macquarie Hospital has also introduced a fasting clock. This is a laminated clock picture placed on the wall above the bed of a hip fracture patient, indicating the time at which they began fasting. This helps nursing staff ensure that the patient does not fast for a prolonged period, and that they remain hydrated.
- Gosford Hospital credits the introduction of a 'hip fracture theatre board' in helping to improve communication between staff involved in hip fracture surgery. This is a whiteboard, clearly visible to everyone in the operating theatres, that lists all hip fracture patients due to be operated on as well as other key information such as complications and comorbidities, pain management medication, planned procedure etc. The whiteboard offers an opportunity for clinicians to review, update and question information about a patient and their planned procedure, and also to monitor progress with surgery.
- Gosford Hospital has also developed a template for a standardised orthogeriatric review. This guides the review process and presents information in a structured format to other clinicians. The information is uploaded onto the patient's electronic medical record, and so is widely available. It is used by the orthopaedic surgeon in preparing the patient's discharge summary to include relevant information for follow-up by the patient's GP (e.g. re-fracture prevention medication).

### Summary

#### Key issues

- Lack of clarity on the relationship between the Minimum standards and national processes in this area, such as the work by the Australian and New Zealand Hip Fracture Registry Steering Group in relation to the Hip Fracture Registry, and the Australian Commission on Safety and Quality, in relation to the Hip Fracture Care Clinical Care Standard. (Note that this potentially reflects the fact that the Australian and New Zealand Hip Fracture Registry Steering Group's Guidelines were only recently finalised (late 2014), and the Commission's Hip Fracture Care Clinical Care Standard was also only recently drafted (2014), and has not as yet been finalised.)
- Minimum standards document difficult to find on the ACI's website amongst other supporting tools and other documentation.

### **What the ACI can do**

- Review the website containing the Minimum standards document and tools, to ensure that the Minimum standards are easy to differentiate from supporting tools and other documentation.
- Manage implementation of the various priority initiatives more effectively, and also coordinate initiatives with the CEC and other agencies.
- Provide clarity on how the Minimum standards fit into other similar national initiatives and the implications for practice.
- Build on the tools and processes that have already commenced (e.g. STARS and data linkage processes) to provide information on how hospitals are performing using key indicators related to the Minimum standards (e.g. achievement of surgery within 48 hours, 30 day mortality), and relevant contextual information to assist in interpreting the results.
- Continue to facilitate forums where hospitals can share information and tools with each other.

# Findings and themes from stakeholder interviews relating to each Standard

This Chapter reports on the findings and themes relating to each Standard. These are based on interviews with stakeholders from the study sites.

## Standard 1: Orthogeriatric model

### Overview of the achievement of this Standard

**Table 16 – Overview of achievement of Standard 1 by study site**

Study site	Level of achievement	Findings
Concord Hospital	Fully implemented	<ul style="list-style-type: none"> <li>• Collaborative model: patient is admitted under orthopaedics but medical issues are dealt with by geriatricians.</li> <li>• There is one geriatrician and one advanced trainee providing coverage five days a week. There is ad hoc geriatric cover on weekends.</li> <li>• Geriatricians always see the patient post-operatively, and the majority of the time pre-operatively.</li> </ul>
Gosford Hospital	Partial	<ul style="list-style-type: none"> <li>• Orthogeriatrician embedded into orthopaedic team, sometimes occupied by an advanced trainee.</li> </ul>
Prince of Wales Hospital	Fully implemented	<ul style="list-style-type: none"> <li>• A shared-care model is in place. The orthopaedic and geriatric departments have a very good working relationship.</li> <li>• Orthogeriatric input is provided by a senior consultant and an advanced trainee.</li> </ul>
Port Macquarie Base Hospital	Partial	<ul style="list-style-type: none"> <li>• Orthogeriatric support is provided by a geriatrician and an advanced trainee. Both see the patients regularly (ward rounds), and the advanced trainee works especially closely with the orthopaedic team (e.g. participates in their morbidity and mortality meetings).</li> <li>• The hospital has also employed a Transitional Nurse Practitioner whose role it is to review hip fracture patients within 24 hours of admission and follows up patients post operatively (e.g. at risk of or confirmed delirium/cognitive impairment).</li> </ul>
Royal North Shore Hospital	Fully implemented	<ul style="list-style-type: none"> <li>• An advanced trainee occupies the orthogeriatric role, and geriatricians also provide consultation.</li> <li>• Staff describe the model as a shared-care model, with patients admitted under the orthopaedic surgeon but all medical issues attended to by the geriatricians.</li> </ul>
Wagga Wagga Base Hospital	Partial	<ul style="list-style-type: none"> <li>• Consultation liaison model.</li> </ul>

### Arrangements by site

The sites studied had a range of models in place for the provision of orthogeriatric care. Features of these models are shown in Table 17.

**Table 17 – Arrangements for orthogeriatric care by study site**

Study site	Orthogeriatric arrangement	Patients seen pre-operatively?	Patients seen post-operatively?	Coverage on weekends and after-hours
Concord Hospital	Geriatrician plus advanced trainee.	Many	All	Geriatrician on call
Gosford Hospital	Orthogeriatrician (often an advanced trainee) embedded into orthopaedic ward.  Geriatrician also sees some patients, but this is limited to about 4 hours per week.	Limited	Most	Geriatrician and medical registrar on call
Prince of Wales Hospital	Geriatrician plus advanced trainee.	Most	Most	Geriatrician and/or advanced trainee
Port Macquarie Base Hospital	Occupied by an advanced trainee.  Geriatrician also sees patients, but this is limited.	Most	Most	Geriatrician on call
Royal North Shore Hospital	Geriatrician plus half time advanced trainee.	Most	All	Geriatrician on call, else general physician (registrar)
Wagga Wagga Base Hospital	No dedicated role. Patients seen by medical physician.	Just under one-third (medical stabilisation prior to surgery is mainly managed by the orthopaedic interns)	Just over one-third	Registrar only. No medical consultant on call.

Three of the six sites have a model whereby a senior geriatrician and an advanced trainee have joint responsibility for orthogeriatric care. These were Prince of Wales, Concord and Royal North Shore. At Gosford and Port Macquarie, the orthogeriatrics role is undertaken by an advanced trainee. Wagga Wagga Base does not have a dedicated orthogeriatric-specific role and this component of care is provided by a medical physician. Factors preventing Wagga Wagga Base and other similar hospitals (mainly rural) in the state from having a dedicated orthogeriatric role are the low volumes of hip fracture patients and the inability to recruit a geriatrician.

Pre-operative geriatric assessment was mostly achieved by the study sites, although only one hospital reported that this occurs all of the time. Two hospitals reported limited pre-operative assessment.

Post-operative geriatric review was reported for all or most patients by almost all of the case study sites except for one, which reported that just over one-third of patients are seen post-operatively.

Out of hours/weekend orthogeriatric/geriatric coverage was patchy or poor amongst most of the sites. This limited coverage means that there is not an adequate medical review of patients presenting outside of hours (particularly weekends) prior to surgery. This can lead to inadequate optimisation of patients prior to surgery or may cause a delay surgery for some patients.

In all of the study sites, there was a 'blanket' referral for hip fracture patients for consultation by an orthogeriatrician (or in the case of Wagga Wagga Base, a medical physician). Hip fracture patients were identified in a variety of ways, such as notification by emergency department staff of the arrival of a hip fracture patient to the orthogeriatrician/medical physician or review by the orthogeriatrician of presentations/admissions for hip fracture each morning. However, patients were not always seen pre-operatively due to timing of their arrival (e.g. at one hospital, any patient not on the medical physician's list by 9 am would not be seen that day, and if surgery occurs on that day or the following morning, the patients will not be seen pre-operatively) or due to high volumes preventing all patients being seen.

#### **Is there an ideal orthogeriatric model?**

The Minimum standards identify a three-tiered orthogeriatric clinical management model, with Tier 1 being the gold standard. Tier 1 involves the integration of a geriatrician into the orthopaedic team, and daily collaborative care of hip fracture patients by both the geriatrician and the orthopaedic surgeon, from admission through to discharge. Tier 2 involves shared care between the orthopaedic surgeon and the geriatrician, and Tier 3 is the provision of geriatric/medical input on a needs basis.

Stakeholders' views were that the type of model is not the most important factor in providing orthogeriatric care. More important is the relationship between the departments, particularly that there is collaboration between the orthopaedic team and the geriatric (or medical) team in the delivery of care to hip fracture patients.

Also, it was pointed out that the Minimum standards emphasise pre-operative and post-operative medical management of the patient, when the emphasis should instead be on medical case management of the patient. This is critical. In particular, it is about a senior medical physician (geriatrician or general physician) taking responsibility for managing the patient through their entire care pathway in hospital, rather than this being left to a junior medical officer or the orthopaedic team.

As documented in the Minimum standards (and other similar standards and guidelines) the orthogeriatric model relies on geriatric input, however it is impractical to require a geriatrician to provide this in all circumstances. As expressed in the *Australian and New Zealand Guideline for Hip Fracture Care* (Australian and New Zealand Hip Fracture Registry Steering Group, 2014), the requirement is for an 'orthogeriatric service'; it is better that the requirements are expressed in terms of skills, competencies and responsibilities rather than a specific role.

Several stakeholders suggested that the skills and competencies of orthogeriatric care can be taught to/taken up by medical physicians. It was flagged that there is some planned work on the identification of the skills and competencies required by non-geriatricians to deliver an orthogeriatric service nationally (by the Australian and New Zealand Society of Geriatric Medicine and/or the Australian and New Zealand Hip Fracture Registry Steering Group). One stakeholder also suggested that the ACI might develop training aimed at medical physicians on the acquisition of these skills and competencies.

#### **Advanced trainee-led orthogeriatric care – strengths and risks**

Port Macquarie and Gosford have an advanced trainee in the orthogeriatric role. Although both hospitals have specialist geriatricians, these are involved in orthogeriatric care in a limited capacity. There are strengths and risks of an advanced trainee-led orthogeriatric model.

The main strength of an advanced trainee-led orthogeriatric model is that:

- There is a dedicated person in the role and thus they offer consistency from day to day.
- They can assist with some of the issues that orthopaedic surgeons are not around to do due to the fact that they are in theatre most of the time. This includes giving families realistic expectations and managing end of life issues.
- They act as a resource for residents and nurses on the orthopaedic ward, as they often do not get access to the orthopaedic surgeons (due to their time in surgery).

The main risk associated with this model that was raised is the potential lack of continuity. Three of the sites reported that, at times, there has not been an advanced trainee in the orthogeriatric role, leading to gaps in the service.

Another problem that was raised is that success in the role is person-dependent (especially where there is limited support from a specialist geriatrician).

#### **Hip fracture patients – medical or surgical?**

At all of the hospitals, hip fracture patients were admitted under an orthopaedic surgeon. No sites admitted patients under a geriatrician or co-admitted them under both an orthopaedic surgeon and a geriatrician.

It was discussed whether hip fracture patients should instead be admitted under the care of a geriatrician/medical physician rather than an orthopaedic surgeon, and there was strong support for this model. Practical issues were raised with this model regarding nursing skills (i.e. nurses on geriatric or medical wards not having the skills to manage post-surgical patients). However, some suggested that the patients can continue to be managed in the orthopaedic ward despite them being under the care of a geriatrician or other medical physician.

Other stakeholders were more cautious about transferring care of hip fracture patients from orthopaedics to geriatrics. Instead, they suggested that care should be shared equally by both specialities. However, it was pointed out that patient administration systems in NSW do not allow admission under more than one attending medical officer, and this would need to be resolved.



### **Limitations of the orthogeriatric model**

Some stakeholders thought that the description of the orthogeriatric model in the Minimum standards (and other national guidelines) was too medically oriented. They suggested that there should be recognition of the role that nurses can play in optimising patients for surgery, identification of goals for rehabilitation, re-fracture prevention and other aspects of orthogeriatric care.

Another criticism was that the orthogeriatric model is too focused on sorting out medical issues for patients, and there is not enough emphasis on rehabilitation for patients at an earlier phase. Early consideration of patients' rehabilitation needs is discussed under Standard 5: early mobilisation.

### **Summary**

#### **Overall achievement of this Standard amongst study sites\***

- Medium

#### **Key issues in achieving this Standard**

- Limited out of hours/weekend coverage by orthogeriatricians/geriatricians.
- Potential lack of continuity with advanced trainee-led orthogeriatric models.
- Advanced trainee-led orthogeriatric models with limited support from a specialist geriatrician.

#### **Changes required to this Standard**

- Re-word to emphasise 'orthogeriatric service' rather than specifying the need for an orthogeriatrician and a geriatric registrar working in conjunction with the orthopaedic team.
- Highlight the requirement for medical case management of patients, which can be provided by a geriatrician or other senior medical physician.
- Include the role of nursing staff in the provision of the orthogeriatric service.

#### **What hospitals can do**

- Address weekend/after-hours coverage issues.
- Explore ways in which continuity can be achieved in the orthogeriatric service when staffed by an advanced trainee.
- Explore means by which advanced trainees in an orthogeriatric role can be better supported by geriatricians.

#### **What the ACI can do**

- Suggestion that the ACI might contribute to national work to identify competencies and skills required to deliver an orthogeriatric service and/or develop training aimed at medical physicians on the acquisition of these skills and competencies.

*\* High = Fully implemented by all sites; Medium = Fully implemented by at least half of the study sites; Low = Fully implemented by fewer than half of the study sites.*

## Standard 2: Optimal pain management

### Overview of the achievement of this Standard

**Table 18 – Overview of achievement of Standard 2 by study site**

Study site	Level of achievement	Findings
Concord Hospital	Partial	<ul style="list-style-type: none"> <li>Femoral nerve blocks are being used increasingly, but there is still a lot of education required for their regular use in the emergency department.</li> <li>Pain management by ambulance officers is sometimes an issue.</li> <li>Post-operative pain management better than pre-operative.</li> </ul>
Gosford Hospital	Partial	<ul style="list-style-type: none"> <li>High use of femoral nerve blocks beginning in the emergency department reported based on most recent review (80-90%).</li> <li>However, barriers are nerve blocks not being used to the extent possible due to lack of experience or time pressures, registrars sometimes being cautious in prescribing pain medication for geriatric patients, and a lack of consistency in prescribing amongst doctors.</li> <li>A guideline has been developed: <i>Hip Fracture Pain Management for Adults Patients</i>, which is in the process of being implemented.</li> </ul>
Prince of Wales Hospital	Partial	<ul style="list-style-type: none"> <li>Blocks are being performed more frequently, but are still not routine.</li> <li>There is opportunity for improvement in pain management, particularly in patients with cognitive impairment and the use of assessment tools.</li> </ul>
Port Macquarie Base Hospital	Fully implemented	<ul style="list-style-type: none"> <li>The hospital is a pioneer in the administration of continuous nerve blocks in the emergency department. There is a cohort of nursing staff that are trained in this and education is provided regularly for new staff.</li> <li>Assessing pain in patients with cognitive impairment continues to be a challenge. Tools based on patients' behaviours are used, and the Transition Nurse Practitioner trains nurses in recognising pain in these patients.</li> </ul>
Royal North Shore Hospital	Partial	<ul style="list-style-type: none"> <li>Pain management is good, but there is room for improvement.</li> <li>Use of nerve blocks is increasing.</li> <li>Problem areas include pain management in cognitively impaired patients, and education and/or a clinical protocol to help standardise pain management amongst staff and clinical departments.</li> </ul>
Wagga Wagga Base Hospital	Partial	<ul style="list-style-type: none"> <li>Issue with coordinating approach to assessing and managing pain for patients transferred from outlying hospitals (i.e. with the transferring hospital and the ambulance service).</li> <li>Issue with adequacy of pain management for patients with dementia.</li> <li>Issue with provision of a pain management plan at discharge.</li> </ul>

### Arrangements by site/support for this Standard

Only one site (Port Macquarie) has fully implemented this Standard, although pain management was recognised as a crucial element of caring for hip fracture patients by all interviewees.

It was commented that this was the hardest of all the standards to achieve. Particular areas of weakness included pain management in patients with cognitive impairment, and pain management within or immediately after transfer from emergency department. Most

hospitals use tools (e.g. pain scales) to assess pain, but some interviewees told us that these were not very well used (i.e. due to lack of training), and/or not completed. Many hospitals also commented on the quality of documentation of pain assessment and handover between departments/post-discharge.

### ***Challenges in pain management of cognitively impaired patients***

Several interviewees commented that pain management in cognitively impaired patients was a challenge due to a range of factors, including the inability of the patient to communicate their pain, and misconceptions about pain/ pain management in cognitively impaired patients. In relation to the latter, two commonly held misconceptions that were identified were as follows:

- If a patient is confused or demented, stronger analgesia will make them more confused.
- If a patient is demented, they suffer less pain.

The other issue that was raised is that pain medication is less likely to be offered on a regular basis if a patient does not complain about pain. This is the case for cognitively impaired patients, as well as older patients generally (who interviewees commented are of a generation that are more 'stoic' and are concerned as coming across as 'whingers' so are less likely to complain about their pain). Therefore, it was recognised that better methods/ tools for regularly assessing the level of pain and provide appropriate medication

### ***Use of multimodal anaesthesia***

Opioids are commonly used in hip fracture pain relief but older patients may struggle to tolerate them. The Minimum standards recommend multimodal analgesia to lower the doses of opioids. Several stakeholders mentioned problems with the use of opioids. For example, it was commented that sometimes patients are given narcotics when picked up by the ambulance service, and sometimes they are given too much, which results in infections and other problems.

All hospitals confirmed use of opioids but most also reported an awareness and effort to reduce it, mainly by use of a nerve block, which is recommended in the Minimum standards when paracetamol and other opioids do not provide sufficient pain relief. A single shot nerve block is administered by a consultant or registrar and should provide 24 hours of analgesia.

Nerve blocks were one of the major themes mentioned when interviewees were asked about pain management. All hospitals reported a recent increase in the use of blocks, and most interviewees were very supportive of their use. Previously nerve blocks were only administered by anaesthetists, but more recently, they are also being administered by interns. This means that nerve blocks can be administered immediately upon patient presentation to the emergency department.

Hospitals receiving patients from other non-operating hospitals (Wagga Wagga Base and Port Macquarie) thought that there was a role in training GPs at the non-operating hospitals in administering nerve block, particularly to help reduce use of narcotics during transfer.

Almost all of the sites also thought that there was a role in training ambulance officers to manage pain better, including the administration of nerve blocks. The Mid North Coast LHD is looking to partner with the local university in the provision of this training. It was also

expressed that the ACI potentially needs to take up the issue of training of ambulance officers in effective pain management with the NSW Ambulance Service.

The main barrier to use of nerve blocks was lack of training and/ or unwillingness of those with minimal training to administer them unsupervised (which was reported to especially be a problem out of hours). Other barriers that were mentioned were the pressure to get patients out of the emergency department within a certain time (nerve blocks are seen as time consuming), and that some consultants were not completely comfortable with the use of blocks due to the evidence base (i.e. they believe that the evidence for their use over other pain management approaches is not sufficiently strong).

Reasons why a block would not be performed on a patient included: patient refusal, medical contraindication (such as the patient being on warfarin), or failure to get the block in properly. Several interviewees said that if a block could not be performed, the reason for this was usually documented.

#### **Need for a protocol and stronger evidence base**

Stakeholders held different views on the best form of pain management.

Regarding blocks, although on the whole supported, interviewees commented that some clinicians were still wary of blocks, and not fully convinced by the evidence base for their use over other approaches to managing pain.

The type of block used – continuous (with a catheter) or single shot – was also an area of contention. One hospital has fully implemented the continuous nerve block for hip fracture patients to good effect.

However, others argued that a single shot was preferable because the continuous block could lead to delays in early mobilisation (it can take 12 hours to wear off and can lead to leg numbness). Also, continuous blocks require greater management (i.e. the pain service or nursing staff must be available to attend to the catheter if a problem developed). This was not necessary with the single shot.

There was also a recurring theme about the evidence base for any particular form of pain management over another. Several interviewees suggested that a protocol (e.g. about picking up agitation in patients), with reasons and evidence, was required.

Gosford Hospital has developed a guideline, 'Hip Fracture Pain Management for Adults Patients' which is now approved and in the process of being introduced into the hospital. This resource could be beneficial to other hospitals.

#### **Areas for improvement**

Four of the six sites reported issues with management of pain by the ambulance service. Analgesics used were often inappropriate (e.g. opioids), over administered, or under administered.

Determining the level of pain and managing pain in patients with cognitive impairment was an issue for all of the sites. Some sites use a tool based on patients' behaviour to more effectively identify pain in this patient group. However, there was a recognition that greater education is required amongst nursing staff about pain in patients with cognitive impairment. For example, it was reported at one of the sites that nurses were reluctant to give pain relief

to patients with dementia and/or delirium thinking that it might exacerbate behavioural issues.

### Summary

#### Overall achievement of this Standard amongst study sites\*

- Low

#### Key issues in achieving this Standard

- There is a need for a stronger evidence base (access to published research and local data) on the most appropriate pain relief.
- Issues with effective pain management (particularly opioid use) by ambulance officers.
- Challenges in pain assessment and effective, regular pain management, particularly in patients with cognitive impairment.
- There is a need for more physicians to be trained in and capable of administering nerve blocks unsupervised.

#### Changes required to this Standard?

- Nil.

#### What hospitals can do

- Implement a tool to assess pain in patients with cognitive impairment and educate staff in the use of this tool.
- Develop a protocol for effective pain management for patients with cognitive impairment and educate staff in the use of this.
- Implement nerve block training for physicians.

#### What the ACI can do

- Develop guidelines re nerve block training for physicians
- Suggestion that the ACI might discuss training of ambulance officers in more effective pain management/use of nerve blocks with the NSW Ambulance Service.

\* High = fully implemented by all sites; medium = fully implemented by at least half of the study sites; low = fully implemented by fewer than half of the study sites.

## Standard 3: Timing of surgery

### Overview of the achievement of this Standard

Standard 3 states that all hip fracture surgery should be performed within 48 hours, and within hours (regardless of inter-hospital transfers). There was strong support for this standard.

All of the sites were achieving surgery within 48 hours for most patients. Two hospitals commented that they struggled to achieve the target for certain patients, namely those transferred in from outlying hospitals, or in certain circumstances (e.g. cluster presentations and patients presenting out-of-hours).

All hospitals tried to perform hip fracture surgery in standards daytime hours. One hospital said they had trialled out-of-hours surgery but it was not working, and another warned that it was too dangerous to do hip fracture surgery on elderly patients out of hours as things could go wrong and support is not as readily available.

**Table 19 – Overview of achievement of Standard 3 by study site**

Study site	Level of achievement	Findings
Concord Hospital	Fully implemented	<ul style="list-style-type: none"> <li>• Most surgery is performed within 48 hours.</li> <li>• There are four dedicated theatre lists per week for hip fracture surgery, but none on weekends, which can cause delays.</li> </ul>
Gosford Hospital	Partial	<ul style="list-style-type: none"> <li>• Mostly achieved except there are some delays caused by a variety of factors: <ul style="list-style-type: none"> <li>• Cluster presentations making it difficult to get all patients operated on within 48 hours.</li> <li>• Presentation after 4 pm, which makes it difficult to obtain an anaesthetic review on the same day, pushing the review onto the next day and potentially delaying surgery.</li> <li>• Availability of intensive care/high dependency beds, which are necessary for some high risk patients.</li> <li>• Requirement for computerized tomography or an echocardiogram.</li> <li>• Patients presenting late in the day or after-hours.</li> <li>• Lack of medical stability of some patients and challenges with newer anticoagulants.</li> </ul> </li> </ul>
Prince of Wales Hospital	Fully implemented	<ul style="list-style-type: none"> <li>• Most patients undergo surgery within 48 hours, unless not medically fit for surgery.</li> <li>• Three dedicated hip fracture surgery operating lists per week have been instrumental in achieving this target.</li> </ul>
Port Macquarie Base Hospital	Fully implemented	<ul style="list-style-type: none"> <li>• The achievement of timely surgery has been assisted by the opening of a new emergency theatre which operates seven days a week, and on which hip fracture patients are prioritised.</li> </ul>
Royal North Shore Hospital	Fully implemented	<ul style="list-style-type: none"> <li>• Most patients receive surgery within 48 hours. This has improved since the introduction of a dedicated orthopaedic trauma theatre in 2013.</li> <li>• Main reasons for delay to surgery include lack of medical stability of some patients, newer anticoagulants, and role of RNSH as a major spinal trauma centre where hip fracture patients might be 'bumped' off the list when such a case arrives.</li> </ul>
Wagga Wagga Base Hospital	Partial	<ul style="list-style-type: none"> <li>• Generally achieved except for patients transferred from outlying hospitals, which make up 50% of total patients.</li> <li>• Trauma list operates half a day Monday to Saturday, and sometimes also on a Sunday. Hip fracture patients are prioritised on this list.</li> </ul>

When asked about Standard 3, and the concept of timely surgery interviewees were generally very supportive, describing the 48 hour time frame as 'reasonable' and 'balanced', and displaying 'maturity' on behalf of the ACI. That is, the perceptions were that surgery does not have to be 'too quick', but 'you can't wait for too long'. Also, it should not be done 'in the middle of the night'.

#### **Dedicated theatre lists**

Dedicated theatre time for hip fracture patients has been a major driver in achieving surgery within 48 hours; one interviewee said that the dedicated NOF list in their hospital was fundamental to them achieving the target. Even where sites do not have a dedicated hip fracture/orthopaedic trauma list, prioritising patients on the hospital's trauma/general list was reported to be as effective.

The arrangements for theatre for hip fracture surgery by study site are shown in Table 20.

**Table 20 – Arrangements for theatre for hip fracture surgery by study site**

Study site	Monday to Friday theatre arrangement	Weekend theatre arrangements
Concord Hospital	Dedicated <b>hip fracture</b> theatre list operating <b>four days a week</b> and starts at 8 am. This was implemented in 2013.	No dedicated list and only one <b>general theatre</b> .
Gosford Hospital	Dedicated <b>orthopaedic trauma list</b> operating 5 and a half days a week (7 days from March 2014).	Dedicated list for half a day only, but will move to two full days on the weekend from March 2014.
Prince of Wales Hospital	Dedicated <b>hip fracture</b> theatre list operating <b>three days</b> a week. Started in 2012.	Dedicated <b>trauma list</b> .
Port Macquarie Base Hospital	Dedicated <b>trauma theatre</b> Monday to Sunday with morning and afternoon sessions. Hip fracture patients are prioritised on this. Started August 2014.	As for weekdays.
Royal North Shore Hospital	Dedicated <b>orthopaedic trauma list</b> operating 9 out of every 10 days and starts at 8 am to 3 pm (although in reality runs until 5 pm). Hip fracture patients are prioritised on this although there are other higher priority categories (especially major spinal trauma). Started mid-2013.	Dedicated <b>orthopaedic trauma list</b> . Hip fracture patients are prioritised on this although there are other higher priority categories (especially major spinal trauma).
Wagga Wagga Base Hospital	<b>General theatre</b> 9 am to 5 pm. Half a day dedicated to <b>trauma</b> . Hip fracture patients are prioritised on this.	<b>General theatre</b> on Saturday, and sometimes on Sunday. Half a day dedicated to <b>trauma</b> . Hip fracture patients are prioritised on this.

Five of the six hospitals told us they had introduced these organisational changes to their lists (or created additional lists) within the last 3 years, and credit these actions with helping to achieve the 48 hour target for hip fracture patients. Prior to these changes, one hospital told us that hip fracture surgery was bundled together with elective, and another said that they were 'running the gauntlet' on the emergency list as there were only two lists per day (adult and paediatric).

Not all of the dedicated/additional lists run over the weekend, and several interviewees said that this was problematic. An issue that came up again when discussing dedicated theatre time was the unfairness in prioritising hip fracture surgery over similar-priority surgeries just because there is a target to meet; the competing priorities and limited resources are problematic.

#### **Alternatives to the 48-hour target**

Alternatives to the 48-hour surgery target, such as 12-, 36- (as used in the UK) and 72-hours, were discussed. Most stakeholders thought that 48 hours was appropriate; more than 48 hours was too late and fewer than 48 hours could lead to patients being 'rushed' to surgery. It was also suggested that some delay to surgery could be beneficial to elderly patients in allowing them to rest and re-establish 'homeostasis' after the trauma associated with the injury.

Although it was agreed by everyone that early surgery was crucial, the pressure to meet surgery targets at the expense of optimising the patient (which could delay surgery) was a concern.



### **Patient optimisation**

The importance of optimising patients for surgery was discussed at length by stakeholders. There was a focus on making effective use of the patients' time in hospital prior to surgery in order to both optimise them and achieve surgery within 48 hours.

However, it was recognised that optimisation may mean delaying surgery for some patients beyond 48 hours. Therefore, the 48 hour target is not relevant for 100% of patients, but something to aim for most patients.

### **Safety issues**

Another issue raised was that achieving surgery within 48 hours potentially translates into orthopaedic registrars performing most of the surgery. This is problematic in cases where the consultants are VMOs rather than staff specialists, which makes access to them more difficult. It was pointed out that as much consultant input is required as possible for orthopaedic surgery, as registrars are still learning. One stakeholder's experience is that in the past, orthopaedic registrars would only call in help if they were struggling in surgery for a long time. However, the hospital subsequently changed its policy, and now has a policy whereby the anaesthetist makes the call to bring in a consultant if they perceive the orthopaedic registrar to be struggling.

### **Common reasons for delay and other barriers to achieving surgery within 48 hours**

Stakeholders were asked about common reasons for delayed surgery. The main reasons for not meeting the 48-hour surgery target were given as:

- Medical instability.
- High volume and/or complex caseload (especially over weekends due to the lower staffing levels).
- Higher priority surgeries pushing hip fracture patients back into a later slot.

These, and other issues noted as barriers to achieving early surgery are discussed below.

### **Medically unfit patients and available support**

When assessing a patient's fitness for surgery, anaesthetists must consider if there is sufficient and adequate ICU/HDU support. One anaesthetist suggested that there should be a perioperative package that offers support from everyone, including ICU/HDU, if it is decided that surgery should go ahead. That is, it is better to provide support from the time that the patient leaves theatre, rather than to make a medical emergency team (MET) call later. Another stakeholder commented that a 'better plan than the ward' is needed for some high risk patients following hip fracture surgery.

To assist in provision of higher intensity peri-operative care, Gosford Hospital has introduced an 'extended recovery' program. Patients on this program are monitored more closely and are under a higher level of nursing observation than they would be on a normal ward.

### **Higher priority surgeries**

Fractured neck of femur is not a high priority surgery. On the emergency category scale of 1 to 4 (where 1 is 'life-threatening/immediate surgery required'), NOF procedures are usually categorised as 3 or even 4. Stakeholders described to us how dedicated NOF theatre lists can help with this. However, they are still sometimes delayed due to higher priority surgeries. This can be more of a problem when major trauma cases come in, or unexpected spinal



surgeries that can take many hours and so cause a significant delay. Another factor is the health of the patient undergoing hip fracture surgery – if they are very sick, their surgery can take significantly longer than normal.

### ***Patients transferred from outlying hospitals***

Three of the study sites receive patients from non-operating hospitals within the region: Port Macquarie, Wagga Wagga Base and Gosford. Gosford receives patients from Wyong; this was generally reported not to be problematic due to the short distance between the two facilities (i.e. half an hour by road). The issues for Port Macquarie and Wagga Wagga Base however are extensive, especially for Wagga Wagga Base, where the distance by road between the hospitals is hours. At both of these facilities, patients often have to be accommodated in the non-operating hospital overnight prior to their transfer to the operating hospital. In the case of Wagga Wagga Base, this causes significant delays in surgery for these patients. Part of the issue is the time waited prior to their transfer, and another part is that medical optimisation does not begin until they get to Wagga Wagga Base. Delays happen because out-of-town patients are usually admitted to a local hospital and then wait to be transferred to Wagga Wagga Base the next day. On arrival they will go straight to emergency department for assessment and most will have surgery the next.

A further suggestion to speed up the process was to create guidelines and educate GPs on what they can do prior to the patient being transferred. For example, they can begin the work-up (basic bloods) and put the information together, which could save time and avoid delays once the patient is transferred.

Stakeholders noted that intra-hospital policy around the transfer process can be very beneficial, however, information can be hard to access if it is not electronic. Concord Hospital has an electronic medical record (eMR) and patient notes online, which have improved their transfer pathway. It was noted that having access to all of the notes for a patient, for example, from emergency department triage nurse and medical review in the emergency department, was very helpful.

### ***Anticoagulants***

Anticoagulants are also responsible for some delays to surgery. Stakeholders told us a particular problem is the novel anticoagulants; sometimes surgery can be delayed for three to five days because staff are unfamiliar with the drugs and need to take extra precautions to ensure the patient is not put at risk. However, stakeholders recognise that the issue with these drugs will be resolved as people become more familiar with them (as it has been with other drugs in the past that are now commonplace). Therefore, the issue is with new medications of any sort that may affect surgery rather than anticoagulants in particular.

A need for best practice guidelines regarding surgery and anticoagulants (especially novel ones, and how to manage people while they are waiting for surgery) was also suggested.

### ***Assessments and investigations***

It was noted that views of anaesthetists have changed in the last 10 years. That is, whereas previously they may have insisted on further tests to be undertaken prior to surgery, now they realise that timely surgery is the most important factor for a good outcome.

However, a few stakeholders called for standardisation of patient assessment amongst all groups assessing prior to surgery (i.e. medical, surgical, anaesthetic etc.). It was suggested that this assessment process also standardise whether or not a patient should be operated on (versus conservative management).

### **Further investigations**

Inconsistency and difference of opinion regarding the need for certain pre-surgical assessments and investigations was mentioned often when interviewees were asked about delays to surgery.

Stakeholders from several hospitals told us that echocardiograms are often requested unnecessarily, usually by junior or inexperienced registrars that were overly cautious. Stakeholders told us that even if a heart problem was found, patients were often operated on safely despite this, and waiting for the echocardiogram could lead to further problems and loss of condition. One suggested solution was to try and request echocardiograms the night before so they were available for the morning.

Another problem mentioned with regard to echocardiograms requests was a lack of consistency in anaesthetists' decisions whether or not a patient needs an echocardiogram. Anaesthetists at one of the hospitals were trying to create a policy within the department to improve consistency.

Stakeholders from another hospital told us echocardiograms were becoming more accessible and timely due to a number of anaesthetic staff becoming accredited and adept in the procedure. It was reported that anaesthetic registrars were also receiving training.

Computerised tomographies (CTs) were also mentioned as a common delay. Stakeholder's commented that junior doctors also often request unnecessary CTs because they prefer to have more information before they call the consultant. One hospital has tried to address this problem but have been unsuccessful.

### **Coordination between staff and handover**

Coordination of staff across shifts and poor handover were reported by some stakeholders to be contributing to surgical delays. For example, two hospitals reported that staff on the night shift do not always undertake the necessary assessments/investigations for patients (leaving it to the person on the following shift). In one other hospital the issue was more about anaesthetists wanting to do their own review prior to a patient's surgery rather than relying on another anaesthetist's review. In some instances, the issue was about documentation, as any assessments that are not written down need to be repeated by staff the next day.

### **Caseload**

Caseload was an issue for Gosford Hospital in particular, but also for RNSH and Concord. While there was agreement that emergency surgery is predictable, the numbers of patients that turn up on any one day is sometimes problematic for these hospitals. For example, although a hospital might get 30 hip fractures in a month, this might be one or two on one day and eight on another. Therefore, it is not predictable from day to day or week to week. Sometimes hospitals get around this by allocating an additional theatre session, but it was

noted that this cannot occur at a moment's notice, and so is not very responsive to spikes in demand.

### **Type of procedure**

There was some discussion by stakeholders on the variability in the type of procedures undertaken by orthopaedic surgeons. For instance, some undertake a total hip replacement when according to other surgeons, a less extensive procedure might have been more appropriate. This was mostly managed well at a hospital level. For example, at Prince of Wales Hospital, the geriatrician and the head of orthopaedics review the planned procedure for each patient at an 'x-ray' meeting. If something appears outside accepted practice, the head of orthopaedics discusses this with the surgeon involved. At Gosford Hospital, there is a white board outside of the theatre that lists the planned operative approach for each patient scheduled for surgery. This is open to all to comment in if there is a view that the procedure is inappropriate.

Sometimes inappropriate decisions are made due to lack of skill by junior orthopaedic surgeons.

To a lesser extent, the concern about variability in practice was to do with cost. For example, it was commented that the public needs to get its mind around what sort of fixation is appropriate for older people – total hip replacement versus fixation. Although the expectation might be for the former a lot of the time, but this is not necessarily appropriate for all patients.

### **Operative versus non operative management of hip fracture patients**

Many stakeholders also commented that guidelines are potentially also required on when not to operate on a patient, and instead, enact an end of life pathway. The views on this amongst physicians and surgeons were variable. Some believe that unless the patient is expected to not live through the operation, surgery should still be offered for palliative purposes, namely pain relief. However, others thought differently, for example, that patients are still in a lot of pain after surgery, and the operation may in fact exacerbate their pain, leading to confusion and delirium.

Some stakeholders called for criteria for a more conservative route to be undertaken where appropriate. It was recognised that enacting an end of life pathway for patients requires education and potentially also a change in culture and mindset amongst clinicians.

It was thought that orthogeriatricians can particularly assist patients and their families with these decisions.

### **Summary**

#### **Overall achievement of this Standard amongst study sites\***

- Medium

#### **Key issues in achieving this Standard**

- Patients presenting to outlying hospitals.
- Lack of peri-operative support services.
- New anticoagulant drugs and other novel medicines.
- Coordination between staff and handover.
- Caseload ('cluster' presentations).
- Appropriateness of procedure undertaken.

- Knowing when not to operate.

#### Changes required to this Standard?

- Nil.

#### What hospitals can do

- For hospitals receiving patients from other ('outlying') hospitals within the region:
  - Develop guidelines together with outlying hospitals on the management of hip fracture patients waiting to be transferred to the operating hospital. For example, a one page 'pathway' that aligns with the pathway at the operating hospital might be used by these hospitals attending to issues such as adequate hydration, pain management, management of comorbidities, and preparation for transfer (e.g. getting basic blood tests done, contacting the operating hospital as soon as the patient presents to prioritise transfer, and not waiting to confirm the fracture with an x-ray).
  - There is a role for GPs in undertaking a medical assessment and managing a patient's comorbidities. However, education will be required towards this. GPs may also be trained in administering nerve blocks prior to the patient's transfer to the operating hospital.
  - Pain management of patients presenting to these hospitals should be coordinated between the outlying hospital, the ambulance service, and the operating hospital.
- For other hospitals:
  - Develop local guidelines for operative versus non operative management of hip fracture patients.
  - Explore local issues leading to delay in surgery and address involving relevant parties. Local protocols/guidelines may need to be developed.

#### What the ACI can do

- No suggestions offered.

\* High = fully implemented by all sites; medium = fully implemented by at least half of the study sites; low = fully implemented by fewer than half of the study sites.

## Standard 4: Patient's surgery not cancelled

Cancellation of surgery can lead to delayed hip fracture treatment, and repeated and prolonged fasting. During hip fracture surgery, patients will receive a general anaesthetic so fasting is required beforehand. In the case of elderly, often frail patients there is a danger that prolonged or repeated fasting can lead to malnourishment and other complications.

### Overview of the achievement of this Standard

Table 21 – Overview of achievement of Standard 4 by study site

Study site	Level of achievement	Comment
Concord Hospital	Fully implemented	<ul style="list-style-type: none"> <li>• Cancellation is rare, and main reasons include patients not being medically stable and higher priority cases.</li> </ul>
Gosford Hospital	Partial	<ul style="list-style-type: none"> <li>• Cancellations do happen.</li> <li>• Unwarranted prolonged fasting has reduced recently largely due to the orthopaedic trauma CNC acting as a liaison between the theatre and the ward, and alerting nursing staff to any delays in theatre.</li> </ul>
Prince of Wales Hospital	Fully implemented	<ul style="list-style-type: none"> <li>• Cancellations are rare.</li> <li>• Communication around fasting is improving, notifications of cancellations are provided earlier.</li> </ul>

Study site	Level of achievement	Comment
Port Macquarie Base Hospital	Fully implemented	<ul style="list-style-type: none"> <li>• Since the opening of the new emergency theatre in late August 2014, there have not been any cancellations for hip fracture surgery</li> <li>• The Hospital has also implemented tools and protocols for managing prolonged fasting, but this has not been an issue since the new emergency theatre and prioritisation of hip fracture patients on this list.</li> </ul>
Royal North Shore Hospital	Partial	<ul style="list-style-type: none"> <li>• Cancellations happen occasionally.</li> <li>• Main reasons for it include patients not being medically stable, theatre case load and unavailability of consultant to do the surgery (including failure to transfer the case to another consultant).</li> </ul>
Wagga Wagga Base Hospital	Partial	<ul style="list-style-type: none"> <li>• Although very few patients are recorded as having their surgery cancelled, surgery is regularly 'bumped' until the following day.</li> </ul>

### Arrangements by site

All the hospitals said that cancellation of surgery was avoided whenever possible but did occur occasionally. The main reasons for cancellation were very similar to those for delay: medical unfitness and high volume and/or complex caseload.

### Capturing cancellations

An issue reported by some of the study sites was the recording of cancellations in the operating theatre system; patients who have had their surgery 'bumped' to the following day are not necessarily recorded as having had surgery cancelled. Therefore, more uniform definitions of cancellation and its recording in operating theatre systems is required.

### Prioritisation process

One stakeholder commented that the Minimum standards focus on surgery within 48 hours, and although this is a good time frame, this needs to be better translated locally. For example, it could be expressed in terms of when this time expires for the particular patient (including taking into consideration the time already waited by patients transferred from other hospitals). The prioritisation should be based on the needs of individual patients, taking into consideration the actual procedure that the patient needs and how quickly they need it.

### Scheduling surgery

The Minimum standards suggest using the *Emergency Surgery Guidelines* (NSW Health, 2009), which include:

- Measuring the generally predictable emergency surgery workload.
- Allocation of operating theatre resources that are matched to the emergency workload.
- Consultant surgeon-led models of emergency surgery care.
- Standard-hours scheduling where clinically appropriate.
- Load balancing of standard-hours operating theatre sessions with emergency surgery demand.

As previously mentioned, out-of-hours surgery was generally avoided by all study sites and the recent changes and additions to theatre lists had helped to avoid cancellation. However several stakeholders told us that predicting general emergency surgery workload could be

very difficult in that the number per month might be predictable, but the numbers by day might fluctuate significantly.

### **Fasting**

Standard 4 states that cancellation of surgery can lead to prolonged pain, increase risk of complications and repeated and/or prolonged preoperative fasting. They suggest that:

- fasting from midnight is unnecessary with most patients
- patients with no specific risk of aspiration may drink clear fluids up to two hours before anaesthesia and avoid solids up to six hours before
- the maximum period of oral fasting should be no greater than 12 hours under any circumstances.

It is particularly important to minimise fasting in elderly, frail patients who could easily become malnourished.

The main problem is the conflict between the surgeons' interest in keeping patients fasted in the hope of being able to perform surgery that day, whilst nurses push for a decision to be made so that they can feed the patients.

### **Fasting tools**

The Minimum standards recommend use of a hunger or fasting clock, which is usually a laminated picture of clock (so that it can be re-used) above the patient's bed indicating the time at which the patient began fasting. This was not commonly used amongst the study hospitals, but several interviewees said that it would be a positive introduction.

One of the interviewees mentioned a variation of a fasting clock system they had seen at a conference whereby after 4 hours of fasting, a call was made from the ward to theatre to check if things are on schedule, and at 8 hours the patient is fed regardless.

Other strategies the sites employed to reduce unnecessary/prolonged fasting:

- Orthopaedic trauma CNC acting as a liaison between the theatre and the ward, and alerting nursing staff to any delays in theatre (Gosford).
- Staff education on issues with prolonged fasting and strategies to reduce this (Gosford).
- Pack for use with hip fracture patients presenting to the emergency department containing drinks that can be given to the patient while fasting, amongst other information and materials required for this group of patients (Port Macquarie)
- Administration of intravenous (IV) fluids to keep patients hydrated (Concord and RNSH).
- Patients scheduled for surgery later in the day given an early breakfast (RNSH).

### **Notifying the ward**

Notification of cancelled surgery was also variable between hospitals. One hospital reported good communication between the theatre and ward with regards to delayed and cancelled surgery due to one of the CNCs acting as a liaison, and another hospital said that surgeons and registrars would give the ward a theatre list and try to keep nurses aware of the likelihood of patients getting to surgery. One hospital said that their orthogeriatric team let the ward NUM know immediately if a patient is declared unfit for surgery after their review. The theatre NUM also can play a role in negotiating which patients go to surgery, for example, they will push for surgery for patients that have been cancelled previously, or have

been fasting the longest. Several hospitals said that theatre would call the ward to notify them of a cancellation but this was often quite late.

A further problem of late notification is that if the patient's surgery is cancelled (and fasting ceased) after meal times, the kitchen is closed and there are only sandwiches available for the patients to eat – they do not receive a hot meal.

Efforts to keep patients hydrated and nourished included use of an IV drip, giving patients protein shakes or energy drinks to keep energy levels up, and because solid food fasting is only necessary for six hours, some patients were able to have an early breakfast – fasting from midnight is not necessary. One hospital has been focussing on early nutritional interventions for people on prolonged fasting, working on solutions that were acceptable to the anaesthetists.

The need for a fasting guideline/ protocol that was approved and well-publicised, and education about it, was evident. Some sites said they did not have a guideline around fasting. Others said that although they had one, it was not easily accessible, or staff awareness of it was low.

Another benefit of having a well-known guideline or a protocol would be in improving areas of inconsistency. For example, different clinicians have different views about pre-operative drinks. It was thought that a protocol might smooth out these differences in opinion.

### Summary

#### Overall achievement of this Standard amongst study sites\*

- Medium

#### Key issues in achieving this Standard

- Higher prioritisation given to other cases means that sometimes hip fracture patients are 'bumped off'.
- High theatre case load means that not all patients on the list for a session are operated on.
- If the surgeon scheduled to do a patient's surgery is unavailable on the day, the patient is less likely to have their surgery done by another consultant.
- Difficulty in understanding the exact rate of cancellations due to issues in recording them in operating theatre systems.

#### Changes required to this Standard?

- Nil

#### What hospitals can do

- Ensure that cancellations are captured properly in the operating theatre system so that they can be effectively monitored.
- Explore issues leading to cancellations and engage relevant parties to address them.
- Explore issues leading to unnecessary/prolonged fasting and engage relevant parties to address them.
- Educate nursing staff about issues with prolonged fasting, and the need for a nutritious meal after prolonged fasting.
- Implement protocols and tools to reduce minimise unnecessary/prolonged fasting and educate staff in the use of these

## What the ACI can do

- Create a repository for pathways and tools developed by hospitals to minimise unnecessary/prolonged fasting for access by hospitals looking for such tools

\* High = fully implemented by all sites; Medium = fully implemented by at least half of the study sites; Low = fully implemented by fewer than half of the study sites.

## Standard 5: Early mobilisation

### Overview of the achievement of this Standard

Table 22 – Overview of achievement of Standard 5 by study site

Study site	Level of achievement	Comment
Concord Hospital	Fully implemented	<ul style="list-style-type: none"><li>• Most patients are mobilised within 24 hours.</li><li>• Physiotherapists are on the ward seven days a week, but weekend coverage is only half-time, so patients need to be prioritised.</li><li>• Nurses help with mobility.</li><li>• There are a range of public and private facilities to which patients might be referred for rehabilitation, but public facilities often have limited beds and there are no appropriate places for non-weight bearing patients.</li></ul>
Gosford Hospital	Fully implemented	<ul style="list-style-type: none"><li>• Most patients are mobilised within 24 hours.</li><li>• Barriers to early mobilisation include insufficient weekend physiotherapist coverage and hip fracture patients moved to non-orthopaedic wards.</li><li>• Other reasons that patients are not mobilised within 24 hours are dementia, severe delirium, heart failure or shortness of breath, inadequate pain relief and patient refusal. These reasons are documented in the patient's medical record.</li><li>• There are barriers to timely rehabilitation for some patients and limited options for frail and/or non-weight bearing patients.</li></ul>
Prince of Wales Hospital	Fully implemented	<ul style="list-style-type: none"><li>• Most patients are mobilised within 24 hours.</li><li>• Reduced physiotherapy cover at the weekend is a challenge.</li></ul>
Port Macquarie Base Hospital	Fully implemented	<ul style="list-style-type: none"><li>• The hospital has implemented a Mobility Enhancement Program whereby nurses assist with mobilising patients.</li><li>• There is physiotherapy coverage at the hospital weekdays and weekends, although this resource was stretched recently with the increased number of elective orthopaedic patients being operated on as a result of there being extra theatre capacity.</li></ul>
Royal North Shore Hospital	Fully implemented	<ul style="list-style-type: none"><li>• Patients are always mobilised in 24 hours if medically stable.</li><li>• Issues with mobilisation include waiting a long time for blood test results (to identify low haemoglobin), and patients in outlying wards.</li><li>• Physiotherapists and nurses work well together, and experienced nurses assist patients with mobilisation on weekends.</li></ul>
Wagga Wagga Base Hospital	Partial	<ul style="list-style-type: none"><li>• More than half of patients are mobilised within 24 hours.</li><li>• The main reasons for not mobilising are medical and limited physiotherapy coverage on weekends in particular. The latter can be overcome through educating nurses about mobilising patients early and what this involves (e.g. sitting out of bed).</li><li>• Mobilisation is an issue for dementia patients.</li></ul>

### Arrangements by site

All but one of the study sites have fully implemented this Standard. The site that has not fully implemented it reported the lack of physiotherapist coverage as one of the key issues. Other hospitals have overcome this through training nurses in how to mobilise.



Almost all of the study sites reported issues with mobilising patients with cognitive impairment.

### ***Role of physiotherapists and nurses in mobilisation***

To begin early mobilisation, the physiotherapist will usually see the patient the morning after hip fracture surgery, and will assess and try to mobilise them. Depending on their health and weight-bearing ability, mobilisation can range from helping the patient to get up and walk a short distance, helping them transfer to a nearby chair, or for immobile patients, helping them to sit up and perform breathing exercises. Physiotherapists will see the patients daily but will also communicate the mobilisation plan to nurses who will try to keep the patients mobilising regularly but this can be difficult. Mobilisation can also be complicated by conditions such as delirium and dementia, heart problems or breathing problems, and some patients are prone to syncope, for example but if mobilisation can be done safely, then it is attempted. Mobilising complex patients are the physiotherapist's responsibility but nurses, if suitably skilled and confident, will assist with others.

It was universally agreed across all of the study sites that nurses can play a vital role in mobilising patients, especially when there is limited physiotherapy coverage (e.g. weekends). Some stakeholders were of the view that nurses are sometimes 'old school', and do not believe in moving patients quickly following surgery. However, they believed that this can be overcome through education, and making clear in the pathway for hip fracture patients that they are to be mobilised day one post-surgery (including by nurses as well as physiotherapists).

Several hospitals commented that nurse involvement in mobilisation had improved in recent years; previously they tended to wait for the physiotherapist. Several hospital also said that in-house training was taking place, with physiotherapists teaching nurses how to mobilise the patients.

Another successful initiative was the implementation of a 'no breakfast in bed' policy by one hospital. This meant that hip fracture patients must be helped to sit out of bed for breakfast, prompting nurses to mobilise patients when physiotherapists were not around.

### ***Barriers to early mobilisation***

#### ***Lack of weekend physiotherapy coverage***

One of the most commonly mentioned barriers to achieving early and regular mobilisation was a lack of, or reduced, physiotherapy cover at weekends. However, some hospitals said that depending on workload, experienced nursing staff were able to help keep patients mobilised.

#### ***Patients on outlying wards***

Mobilisation of patients on non-orthopaedic wards was also said to be problematic. Due to bed shortages, not all hip fracture patients are able to stay on orthopaedic wards and so may be admitted to 'outlying' wards. Nurses from these non-orthopaedic wards may not have the same level of skill as orthopaedic nurses in mobilising hip fracture patients, and/or may not be sufficiently experienced to understand the importance of early mobilisation post-surgery for hip fracture patients in particular.

This can lead to reluctance in attempting to mobilise a patient – nurses will wait for the physiotherapist which can delay mobilisation or prevent it from happening regularly.

Patients on outlying wards are also often seen less frequently by the physiotherapists than those on orthopaedic wards, and some can even be missed altogether; one physiotherapist commented that there is a blanket referral to see patients on orthopaedic and trauma wards but on the outlying wards, nurses need to make a referral which doesn't always happen.

### **Waiting for blood test results**

There can be delays in mobilisation due to waiting for test results. For example, blood results taken for a patient in the morning are rarely available until after midday, by which stage the physiotherapists will have finished their round. However it was also mentioned that having an orthogeriatric involved in hip fracture management is beneficial in monitoring patients and helping with these medical problems. (It was commented that due to time spent in theatre, orthopaedics surgeons are rarely available for nurses to raise these issues with.)

### **Inadequate pain relief**

For patients to be able to mobilise, they must have sufficient analgesia. Some physiotherapists commented that this could delay early mobilisation, especially in patients who were unable to communicate well, such as those with cognitive impairment. However, good communication between the physiotherapist and nurses helped to ensure that the patient had their regular pain relief in sufficient time before their physiotherapy session to get the most out of the session.

### **Non-weight-bearing patients**

Non-weight-bearing patients sometimes stay on acute hospital wards for an unnecessarily long time, which is inappropriate for their needs and expensive to the system. There is currently a lack of places for respite or transitional care, which provide low nursing intensity but help to keep patients conditioned during this phase.

Another issue was the terminology used to describe weight-bearing status. One interviewee said that surgeons used to say a patient was 'full-', 'partial-' (i.e. can handle 50% of their body weight), 'touch-' (balance only), or non-weight-bearing but now terms such as 'protected-' and 'shadow-' weight bearing are being used. These terms are ambiguous and can be confusing to staff and patients, so a clearer classification of weight bearing status could be useful.

### **Access to rehabilitation**

A barrier to achieving full recovery for some patients is access to rehabilitation. Some places reported to have limited rehabilitation services, especially for some subgroups such as elderly frail patients unable to weight bear for a period (as mentioned above). Therefore, patients are sometimes inappropriately placed following surgery, either staying in an acute bed due to lack of alternatives, or sent back to a nursing home where the only rehabilitation available is by an assistant in nursing.

Criteria for intake for rehabilitation was also reported to be 'harsh', with many rehabilitation physicians/services not accepting patients with acute co-morbidities (which is the norm in this patient population rather than the exception).

Another issue reported with rehabilitation is that often it takes a lot of coordination to get a patient to an appropriate place (and there is often a wait for a rehabilitation review in the

first instance and the availability of a bed). Therefore, rehabilitation should be planned at admission rather than after surgery.

Stakeholders expressed that acute care and rehabilitation should not be separated out as different functions and/ or in separate areas of the hospital. It was thought that a plan for rehabilitation be developed on the day that the patient is admitted to hospital, and the plan is enacted while the patient is still acute. It was thought that this may assist patients being able to go home earlier.

### **Nursing home residents and rehabilitation**

Stakeholders commented on the often substandard care provided to residents of nursing homes following a hip fracture. It was reported that often these patients are discharged back to the nursing home with very little support for mobilisation and rehabilitation.

### **Summary**

#### **Overall achievement of this Standard amongst study sites\***

- Medium

#### **Key issues in achieving this Standard**

- Physiotherapy coverage, especially on weekends.
- Waiting on orders from orthopaedic surgeon on patients' weight bearing status.
- Waiting on results of blood tests to mobilise patients suspected to have low haemoglobin.
- Extent of involvement of nursing staff towards mobilization.
- Patients accommodated outside of the orthopedic ward post-surgery.
- Limited options for non-weight bearing patients.
- Lack of standardisation of terminology for weight bearing.
- Access to rehabilitation following hospital stay.
- Mobilisation and rehabilitation of nursing home residents.

#### **Changes required to this Standard?**

- Nil

#### **What hospitals can do**

- Begin plans for rehabilitation early, at admission where possible.
- Limit accommodation of hip fracture patients on non orthopaedic wards.
- Provide education to nurses, both in orthopaedic wards and in other wards in which hip fracture patients might be accommodated, on the importance of early mobilisation and how to achieve this.

#### **What the ACI can do**

- No suggestions offered.

*\* High = fully implemented by all sites; Medium = fully implemented by at least half of the study sites; Low = fully implemented by fewer than half of the study sites.*

## **Standard 6: Re-fracture prevention**

### **Overview of the achievement of this Standard**

**Table 23 – Overview of achievement of Standard 6 by study site**

Study site	Level of achievement	Comment
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Study site	Level of achievement	Comment
Concord Hospital	Fully implemented	<ul style="list-style-type: none"> <li>• Patients are assessed for issues likely to cause re-fracture whilst still in hospital. This may include starting them on appropriate medication and/or referring them to the re-fracture clinic, which is run by the endocrine services.</li> <li>• A challenge is re-fracture prevention for patients from residential aged care facilities.</li> </ul>
Gosford Hospital	Partial	<ul style="list-style-type: none"> <li>• Orthogeriatric advanced trainee prescribes/ initiates re-fracture prevention medication/supplements and ensures that they are included in the patient's discharge summary. However, these are rarely continued following discharge by patient's themselves (in the case of calcium and vitamin D) or by GPs. There is limited capacity for orthogeriatric follow up of patients discharged following a hip fracture.</li> <li>• The orthogeriatric advanced trainee undertakes an assessment of the patient and includes all pertinent information in the patient's electronic medical record, which is used by the orthopaedic surgeons to prepare a patient's discharge summary. It includes information such as what triggered the fall, investigations undertaken, and follow up required (including medications).</li> </ul>
Prince of Wales Hospital	Fully implemented	<ul style="list-style-type: none"> <li>• Re-fracture prevention care is provided by the orthogeriatric team and includes falls assessment, bone assessment and provision of anti-osteoporotic medications.</li> </ul>
Port Macquarie Base Hospital	Partial	<ul style="list-style-type: none"> <li>• Patients are reviewed for medical risk factors for further falls on admission (i.e. through blood test). Also, re-fracture prevention medications are prescribed to them on discharge for follow up by their GP.</li> <li>• Patients are given a pamphlet - <i>I have a broken bone and I'm over 50</i>.</li> </ul>
Royal North Shore Hospital	Partial	<ul style="list-style-type: none"> <li>• Orthogeriatric team screen patients and suggest appropriate medication. This is included in the patient's discharge summary, to be followed up by their GP.</li> <li>• Osteoporosis is well managed by the GP.</li> <li>• 'Stepping On' programme will begin in March 2015.</li> </ul>
Wagga Wagga Base Hospital	Not implemented	<ul style="list-style-type: none"> <li>• No services available except for referring patients back to their GP.</li> <li>• An issue for the Hospital is patient load – small patient numbers prohibit the establishment of a comprehensive re-fracture prevention program (the clinic that was part of the Medicare Local has been closed down due to small patient numbers).</li> </ul>

### Arrangements by site

Two study sites (POW and Concord) have fully implemented this Standard. Geriatricians at both sites undertake falls assessment, bone assessment and provision of calcium, Vitamin D and other treatments (drugs, and intravenous or subcutaneous injections) if necessary. Both sites have an outpatient clinic to which patients can be referred for re-fracture prevention, else patients are managed in the community by their GP. In the latter instance, GPs are provided with information on re-fracture prevention for the patient specifically.

Two of the sites (Gosford and Port Macquarie) reported providing written information (e.g. a standard pamphlet or booklet) to patients about re-fracture prevention.

The provision of comprehensive information to the patient's GP for follow-up was stressed by three of the study sites (POW, Concord and Gosford). Concord sends out a standard letter to patients' GPs as part of the care plan about osteoporotic treatment. The letter provides more information on this than the discharge summary. The orthogeriatric advanced trainee

at Gosford has developed a template for information gathered on hip fracture patients to prevent a further fall. This is incorporated into the patient's electronic medical record, and is used by orthopaedic surgeons writing up patients' discharge summaries to include pertinent information about the patient to be followed up by rehabilitation physician and/or the patient's GP. Information such as what triggered the fall, investigations undertaken, and follow up required (including medications) is included.

### **Representation of re-fracture prevention in the Minimum standards**

There was a concern by some stakeholders that Standard 6 is too focussed on the drug therapy for improving bone strength, and not so much on other factors that may have led to the patient falling, such as other medical issues (e.g. eyesight), environmental and social factors.

### **Availability of services for re-fracture prevention**

The biggest barrier in achieving this Standard identified by the four study sites that had not met or only partially met it was availability of a re-fracture prevention service to refer patients to. In the case of Wagga Wagga Base, a clinic that had been there previously had closed down due to low volumes. In the case of Gosford, the very high volumes of patients means that re-fracture prevention is a lower priority in outpatient clinics than fracture follow up.

It was also reported by stakeholders that re-fracture prevention was particularly poor for nursing home residents, and is an area requiring attention.

### **Timing of assessment for refracture prevention**

Although refracture prevention is important at any stage, it would potentially be more useful for hip fracture prior to an actual hip fracture. There are more minor fractures that are predictive of hip fracture (e.g. Colles' fracture, due to the patient being osteoporotic or having a tendency to fall), and prevention strategies at this stage would be more effective in preventing a hip fracture. The *Osteoporotic Re-fracture Prevention Model of Care* (Agency for Clinical Innovation, 2011) provides clear guidance on the prevention of secondary fractures.

### **Suggestions for improving re-fracture prevention**

One geriatrician suggested that although orthogeriatrics is responsible for re-fracture prevention, nurses could do more to help in this area. For example, they might provide information to patients and carers. It was pointed out that there is a lot of information available, and more could be done to ensure people receive it.

A geriatrician at another site suggested that an orthogeriatric nurse might provide continuity of support for patients into community following discharge. Re-fracture prevention would also be part of this role.

### **Summary**

#### **Overall achievement of this Standard amongst study sites\***

- Low

#### **Key issues in achieving this Standard**

- Lack of follow up services for patients once they leave hospital.
- Focus on bone strengthening medication rather than investigating other issues, such as other medical issues, environmental and social factors.

### Changes required to this Standard?

- Look at wording in the Standard to ensure that a comprehensive falls assessment includes other factors other than assessment and drug therapy for osteoporosis.

### What hospitals can do

- Investigate opportunities for nursing staff to provide information to patients and families/carers.
- Ensure that comprehensive information is provided to patients' GPs for effective follow up post hospitalization.
- Ensure that handover/documentation provided to nursing homes for residents returning there post hospitalisation includes information on re-fracture prevention.

### What the ACI can do

- Nil.

\* High = fully implemented by all sites; medium = fully implemented by at least half of the study sites; low = fully implemented by fewer than half of the study sites.

## Standard 7: Local ownership of data systems

### Overview of the achievement of this Standard

Table 24 – Overview of achievement of Standard 7 by study site

Study site	Level of achievement	Comment
Concord Hospital	Partial	<ul style="list-style-type: none"><li>• The orthopaedics department has kept a database for eight years.</li><li>• Data from the database and issues it raises are discussed at weekly meetings.</li></ul>
Gosford Hospital	Partial	<ul style="list-style-type: none"><li>• The Hospital has begun looking at data on hip fracture patients regularly since mid-2014, and the reports are evolving over time</li><li>• However, there are problems with aligning data between systems, and data collected through various audits is not readily available.</li></ul>
Prince of Wales Hospital	Partial	<ul style="list-style-type: none"><li>• The ANZHFR data set has been collected since 2010</li><li>• Data are used to investigate and address issues</li></ul>
Port Macquarie Base Hospital	Partial	<ul style="list-style-type: none"><li>• Data collected in different forms over a six year period. However, it is a highly manual collection and is not supported by all disciplines within the hospital (e.g. geriatrician view versus orthopaedic view).</li></ul>
Royal North Shore Hospital	Partial	<ul style="list-style-type: none"><li>• Several departments had previously set up databases.</li><li>• Current initiatives include an audit undertaken in the emergency department and collection of information on hip fracture patients by the nurse educator.</li><li>• ANZHFR data collection being set up in electronic medical record.</li></ul>
Wagga Wagga Base Hospital	Not implemented	<ul style="list-style-type: none"><li>• Local Fractured NOF Implementation Working Group established but no systematic collection of data on an ongoing basis to monitor implementation.</li></ul>

### Arrangements by site

This was the most challenging standard for sites to achieve amongst all of the Minimum standards. No site has fully implemented this Standard. Where sites are collecting data, this is often within a particular clinical department and not shared across the hospital. The exception were Concord and Prince of Wales, where the data collected is used to raise and discuss issues at multidisciplinary meetings). There was also duplication at some sites, with

more than one area of the hospital collecting data, but this data not necessarily being brought together to provide a comprehensive picture.

#### **Person dependent**

It was pointed out by many stakeholders that data collection is often person dependent. Therefore, when the person who has been enthusiastic re data collection and/or has the responsibility for it leaves, data collection 'falls over'.

#### **Onerous nature of data collection**

Many stakeholders were of the opinion that data collection in the area of hip fracture is onerous. This is because very little of the data is collected in routine hospital information systems, and has to be collected manually.

The outcome of this is that data collection by hospitals has not been sustained.

#### **STARS**

STARS has been commissioned by the ACI. It is being developed by Sydney LHD. It is a data visualisation tool, which means that it takes data from various sources and displays it in pre-defined tables and charts, with the ability of the user to zoom into statistics of interest and examine them further. In this way, it is flexible and interactive. Some of the data towards the Minimum standards can be sourced from routine hospital information systems (e.g. time to surgery can be calculated based on the patient's date of admission from the patient administration system, and time of the procedure is from the operating theatre system). However, other data are required to be collected manually, such as status of mobilisation post-surgery.

The tool is not yet complete; data are being gathered from each of the sites studied for the formative evaluation to set up the tool for testing its usefulness and feasibility. The three study sites not currently collecting the ANZHFR data (Gosford, Port Macquarie and Wagga Wagga Base) are waiting to trial the STARS system. However, they are not clear about where the data for some of the measures will come from. They are also not sure about the relationship between STARS and the ANZHFR.

#### **Australia and New Zealand Hip Fracture Registry (ANZHFR)**

One study site (POW) reported that they are already collecting the ANZHFR data. However, this was being collected locally and not yet transferred to the Registry. (Note that transfer to the Registry was due to occur within a few weeks after the interviews with stakeholders at this site, which were in December 2014.) It was reported that the Registry is almost operational; NSW University is hosting the server.

In NSW, ethics approval has been obtained for data entry, but site specific assessment (SSAs) are yet to be obtained for some hospitals. POW reported that they would be able to enter data into the national registry in January 2015.

Two other sites (RNSH and Gosford) indicated their intention to collect the ANZHFR data in the near future. RNSH is building the data collection form into their electronic medical record, which will be available to all other sites in the state using the same system.

The geriatricians that have been involved in the development of the ANZHFR believe that all sites undertaking hip fracture surgery should participate in the hip fracture registry to give highest quality of data.



### **Type of data/measures**

One stakeholder mentioned that there has been a lot of emphasis on quantitative data in relation to the Minimum standards, but that qualitative data, particularly data on patient experience, is just as important.

Also, it is important that outcome data, such as 30 day mortality, is included in analysis and review, as there is a danger that efforts will be focussed on process and/or efficiency measures and outcomes will be overlooked.

### **Summary**

#### **Overall achievement of this Standard amongst study sites\***

- Low

#### **Key issues in achieving this Standard**

- Data collection is person-dependent and onerous, and therefore not sustained.
- 'Pockets' of data collection across different clinical departments/individuals that do not come together to provide the full picture.
- Confusion around where data for STARS system will come from without an associated underlying data collection.

#### **Changes required to this Standard?**

- Nil

#### **What hospitals can do**

- Consolidate data collection efforts across the hospital.
- Establish processes for data collection that are not person-dependent.
- Routinely analyse data and provide feedback to clinicians to improve the quality of the data and maintain interest in its collection.
- Ensure a multidisciplinary approach to data collection and review.

#### **What the ACI can do**

- Provide further information about STARS, and how data collated by the hospital (through data collection in relation to the ANZHFR or other local collection) can be used to populate the system.

*\* High = fully implemented by all sites; medium = fully implemented by at least half of the study sites; low = fully implemented by fewer than half of the study sites.*



# Summary and recommendations

## *Findings from the literature review*

A literature review was undertaken and found a strong evidence base for the Minimum standards, particularly:

- orthogeriatric clinical management (as covered in Standard 1)
- pain management (Standard 2)
- avoidance of delay to surgery (Standards 3 and 4)
- early post-operative mobilisation (Standard 5) and
- re-fracture prevention (Standard 6).

Standard 4: Patient's surgery is not cancelled and Standard 7: Local ownership of data systems were less prominent in the literature. Standard 4 was usually part of Standard 3, and Standard 7 only featured in one other international guideline on hip fracture management.

## *Findings from the quantitative data*

Analysis of available data was undertaken to provide an overview of trends and patterns of the management of patients with hip fracture across all of NSW, and specifically within the study sites. Key findings include:

- In 2013-14 there were an estimated 5,244 people aged 65 years and older admitted for hip fracture across NSW, representing close to 13.5 admissions per day.
- The six study hospitals for this evaluation represent just over 20% of all admissions for hip fracture across NSW. The volumes of patients managed was highest for Gosford Hospital followed by Royal North Shore. The lowest volume of patients was observed for Port Macquarie Hospital. The other three hospitals experienced similar volumes.
- There is evidence of growth in admissions over the period for Gosford Hospital. Growth in admissions for the other study hospitals was mixed, but generally shows a downward trend.
- Mean ages of patients in the study hospitals were slightly above the state average of 84.2 years, and ranged from 85.8 (Royal North Shore Hospital) to 84.0 years (Port Macquarie Hospital).
- The proportion of patients who are female ranged from 74.7% (Royal North Shore Hospital) to 71.6% years (Gosford Hospital). With the exception of Gosford Hospital, the proportions of female patient patients in the study hospitals were slightly above the state average of 72.0%.
- The proportion of patients for whom a fall was recorded as an external cause diagnosis ranged from 94.9% (Concord Hospital) to 97.7% (Wagga Wagga Base Hospital), compared with 95.8% across the state. The proportion of patients for whom a fall was recorded as an external cause diagnosis with a place of occurrence in a

residential care setting ranged from 22.3% (Prince of Wales Hospital) to 33.9% (Port Macquarie Hospital). The state proportion was 29.7%.

- The data used were linked to analyse pathways for individuals in addition to examining episodes of admission. A 'main episode' was identified, representing the episode in which a patient received definitive treatment for their hip fracture. In some instances this may have been preceded by a prior episode, where the patient presented to a hospital at which surgery was not provided (either because the hospital does not offer this surgery or because the patient elected to be transferred to a private hospital for treatment). Subsequent episodes, which often involved rehabilitation of patients following hip fracture, were also identified.
- The mean length of stay for the main episode was 10.9 days, ranging from 8.1 days (Wagga Wagga Base Hospital) to 13.3 days (Concord Hospital). This compared with 11.6 days for the state. However, when contiguous episodes<sup>5</sup> are considered, the average length of stay was 29.1 days, ranging from 30.7 days (Gosford Hospital) to 24.2 days (Port Macquarie Hospital). Comparisons with the state level estimates for contiguous episodes are not valid, as the data were not extracted for related episodes for non-study hospitals.
- The proportion of main episodes with a prior episode ranged from 1.7% (Prince of Wales Hospital) to 54.3% (Wagga Wagga Base Hospital). Gosford (19.3%) and Port Macquarie (19.3%) also have higher proportions of prior episodes. However, all the Sydney metropolitan hospitals have less than 3% of patients with a main episode with a prior episode.
- The proportion of main episodes with subsequent subacute episodes ranged from 50.1% (Prince of Wales Hospital) to 67.9% (Wagga Wagga Base Hospital). The average number of days in subsequent episodes ranged from 15.2 to 19.9 days.
- There were some differences between hospitals as to whether patients undergo internal fixation, hemiarthroplasty or total arthroplasty for their hip fracture.
- Some patients initially present to one hospital with a hip fracture, and are then transferred to another to have surgery. This is particularly the case in rural and regional areas. Measures of the time between presentation and surgery can be based on the time patients presents to the hospital in which they receive their surgery, or the time they presented to the initial hospital prior to being transferred to receive surgery. Estimates of both these measures are presented in this report. An examination of trends found:
  - Overall, the mean time from when the patient arrived to the hospital where the surgery was undertaken to the actual surgery has fallen from 46.6 hours in 2009-10 to 42.1 hours in 2013-14. The range of mean times for each hospital have also reduced over this time period.
  - The proportion of patients receiving surgery with 48 hours has increased over the period from 68% in 2009-10 to 73% in 2013-14.

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<sup>5</sup> The phrase 'contiguous episode' is used to refer to an unbroken episode of care where the patient is transferred between two or more hospitals.

- When the July 2009 to June 2012 is compared with the July 2012 to June 2014, there has been a significant improvement in time to surgery for in the hospitals identified as 'late adopters' of the orthogeriatric model. The late adopter group have caught up to achieve a level of performance similar to the early adopters in the July 2009-June 2012 period. There have also been further improvements in time to surgery for the early adopter group in the July 2012 to June 2014 period.
- Modelling of patient survival indicates that at six month post admission, around 20% of patients admitted for hip fracture have died, at one year 26%, and at 2 years 36%. There was no clear evidence of improved survival over the period observed. However, patients treated within the late adopter hospitals had an increased risk of death of 26.7% compared with those treated in the early adopter hospitals. The differences persisted after controlling for various patient characteristics. It was also found that patients receiving surgery within 48 hours of admission had reduced risks of death of around 18.6% controlling for patient characteristics.

### ***Findings from the qualitative analysis – Minimum standards overall***

The findings and themes relating to the Minimum standards overall, based on interviews with stakeholders, were as follows:

- There was strong support for the Minimum standards. Where stakeholders were aware of them, they had very positive things to say, including that they are at the 'right level' (i.e. not too many or too little) and sensible. Where stakeholders were not specifically aware of the Minimum standards, they were aware of the evidence base for them and/or similar initiatives internationally, and were very supportive.
- Some stakeholders reported that implementation of the Minimum standards was being hindered by competing priorities, including other ACI and other NSW agency initiatives.
- A lack of clarity on the relationship between the Minimum standards and national processes in this area was reported (such as the work by the Australian and New Zealand Hip Fracture Registry Steering Group in relation to the Hip Fracture Registry, and the Australian Commission on Safety and Quality, in relation to the Hip Fracture Clinical Care Standard). However, this potentially reflects the fact that the Australian and New Zealand Hip Fracture Registry Steering Group's Guidelines were only recently finalised (late 2014), and the Commission's Hip Fracture Care Clinical Care Standard is still in draft.

### ***Findings from the qualitative data – Individual Standards***

Individual standards have been implemented to varying degrees by the sites studied. Standards 3 and 4 were the most widely implemented. Standard 2 was mixed amongst sites, with some doing very well on this, and others not so. This Standards was rarely met for patients with cognitive impairment. Standards 6 and 7 were the most problematic for sites. Table 25 provides a summary of the level of implementation of each Standard amongst the study sites and the key issues reported in achieving the Standard.

**Table 25 – Summary of achievement of individual standards across study sites**

Minimum standard	Level of implementation amongst study sites	Key issues in achieving the Standard
1 Orthogeriatric clinical management	Medium	<ul style="list-style-type: none"> <li>• Limited out of hours/weekend coverage by orthogeriatricians/ geriatricians.</li> <li>• Potential lack of continuity with advanced trainee led orthogeriatric models.</li> <li>• Advanced trainee led orthogeriatric models with limited support from a specialist geriatrician.</li> </ul>
2 Pain management	Low	<ul style="list-style-type: none"> <li>• Stakeholders have conflicting views about the type of pain relief that is most appropriate/effective, including whether single shot versus continuous nerve block should be used.</li> <li>• Issues with effective pain management by ambulance services.</li> <li>• Challenges with determining the level of pain and effective pain management in patients with cognitive impairment.</li> </ul>
3 Timing of surgery	Medium	<ul style="list-style-type: none"> <li>• Patients presenting to outlying hospitals.</li> <li>• Lack of peri-operative support services.</li> <li>• New anticoagulant drugs and other novel medicines.</li> <li>• Coordination between staff and handover.</li> <li>• Caseload ('cluster' presentations).</li> <li>• Appropriateness of procedure undertaken.</li> <li>• Knowing when not to operate.</li> </ul>
4 Patient's surgery is not cancelled	Medium	<ul style="list-style-type: none"> <li>• Implementation of dedicated emergency orthopaedic/ hip fracture lists significantly reduced delays in surgery and conversely, contribute to cancellations when hospitals do not have dedicated lists.</li> <li>• Higher prioritisation given to other cases means that sometimes hip fracture patients are 'bumped off'.</li> <li>• High theatre case load means that not all patients on the list for a session are operated on.</li> <li>• If the surgeon scheduled to do a patient's surgery is unavailable on the day, the patient is less likely to have their surgery done by another consultant.</li> <li>• Difficulty in understanding the exact rate of cancellations due to issues in recording them in operating theatre systems.</li> </ul>
5 Early mobilisation	Medium	<ul style="list-style-type: none"> <li>• Physiotherapy coverage, especially on weekends.</li> <li>• Waiting on orders from orthopaedic surgeon on patient's weight bearing status.</li> <li>• Waiting on results of blood tests to mobilise patients suspected to have low haemoglobin.</li> <li>• Extent of involvement of nursing staff in mobilization of patients.</li> <li>• Patients accommodated outside of the orthopedic ward post-surgery.</li> <li>• Limited options for non-weight bearing patients.</li> <li>• Lack of standardisation of terminology for weight bearing.</li> <li>• Access to rehabilitation following hospital stay.</li> <li>• Mobilisation and rehabilitation of nursing home residents.</li> </ul>
6 Re-fracture prevention	Low	<ul style="list-style-type: none"> <li>• Lack of follow up services for patients once they leave hospital.</li> <li>• Focus on bone strengthening medication rather than investigating other issues, such as other medical issues, environmental and social factors.</li> </ul>

Minimum standard	Level of implementation amongst study sites	Key issues in achieving the Standard
7 Local ownership of data systems	Low	<ul style="list-style-type: none"> <li>• Data collection is person-dependent and onerous, and therefore not sustained.</li> <li>• 'Pockets' of data collection across different clinical departments/individuals that do not come together to provide the full picture.</li> </ul>

\* High = fully implemented by all sites; medium = fully implemented by at least half of the study sites; low = fully implemented by fewer than half of the study sites.

### Implications and recommendations

This formative evaluation of the *Minimum standards for the management of hip fracture in the older person* found strong support for the Minimum standards amongst clinicians. In particular, the Minimum standards were thought to be pitched at the right level; not too prescriptive or too narrow. Mostly, it was thought that they lead to improvements in patient outcomes and experience. The analysis of patient survival showed that the hospitals that had implemented the Minimum standards earlier showed better survival of patients compared with hospitals that had implemented the Minimum standards later. Also, receiving surgery within 48 hours (Standard 2) is associated with a reduction in the risk of death of 18.6%, controlling for a range of factors.

The Minimum standards were also thought to be comprehensive. Some enhancements that were suggested were as follows:

- Standard 2 Pain Management: Greater emphasis on the need to measure pain levels more effectively, especially in patients with cognitive impairment and other patients who cannot adequately communicate their level of pain.
- Standard 4 Patient's surgery is not cancelled. Give more emphasis to nutrition, or separate it out into a separate standard. The latter is more desirable as good nutrition is fundamental to the patient being able to physically cope with their injury, and is important in their recovery.

Given the positive early impacts of the Minimum standards, the first recommendation arising from this formative evaluation is for all hospitals undertaking hip fracture surgery within NSW to implement the Standards.

Recommendations for refinement of the Minimum standards are as follows:

- Standard 2 Pain Management: Greater emphasis on the need to measure pain levels more effectively, especially in patients with cognitive impairment and other patients who cannot adequately communicate their level of pain.
- Standard 4 Patient's surgery is not cancelled: Give more emphasis to nutrition, or separate it out into a separate standard. The latter is more desirable as nutrition is associated with all aspects of the patient's pathway for hip fracture care. Not just cancelled surgery.

Most of the work required for further implementation of the Minimum standards rests with individual hospitals. Stakeholders acknowledged that for successful implementation of any change process, hospitals need to embrace the change. Importantly, the change needs to

be clinically driven, and involve multiple departments within hospitals rather than being promoted by one area/ clinician only. The ACI can assist hospitals by:

- Achieving roll-out of the *Osteoporotic Re-fracture Prevention Model of Care* (Agency for Clinical Innovation, 2011) across all hospitals.
- More effectively managing the implementation of various (state level) priority initiatives, and coordinating initiatives with the CEC and other agencies.
- Together with the Reducing Unwarranted Clinical Variation Taskforce, further investigating variation in practice amongst hospitals in the management of older people with hip fracture (i.e. an extension to the work undertaken within this formative evaluation) to identify the potential to streamline aspects of care.
- Providing clarity on how the Minimum standards fit into other similar national initiatives, and the implications for practice.
- Collaborating with the NSW Ambulance Service to discuss strategies for more effective pain management for hip fracture patients, including when transferring patients between hospitals to receive hip fracture surgery.
- Build on the tools and processes that have already commenced (e.g. STARS and data linkage processes) to provide information on how hospitals are performing using key indicators related to the Minimum standards (e.g. achievement of surgery within 48 hours, 30 day mortality), and relevant contextual information to assist in interpreting the results. The ACI is planning a summative evaluation of the implementation of the Minimum standards amongst all NSW hospitals undertaking hip fracture surgery, which will provide a comprehensive state-wide assessment of the performance against key indicators.
- Continue to facilitate forums (face to face meetings and online) where hospitals can share information and tools with each other.

# Appendix A: Program logic and evaluation framework

For the purposes of the evaluation, the *Minimum standards for the management of hip fracture in the older person* are referred to as a 'program'. This acknowledges that it is not only the Minimum standards themselves that are being evaluated, but the governance process around the Minimum standards, arrangement for their maintenance, the tools supporting implementation, and the processes for implementing the Minimum standards at the sites at which the evaluation will take place.

## Program logic model

The ACI advocates the use of program logic as a means of illustrating a program and defining what should be measured (Agency for Clinical Innovation, 2013b). Program logic represents, usually in one page, the logical relationships between the problem(s) that the program is designed to address, the resources that go into the program (i.e. 'inputs'), the activities carried out by the program, the outputs that are expected to be produced by undertaking the activities, and the changes or benefits that are expected to result from the project (outcomes), which can be expressed for the short, medium and long terms.

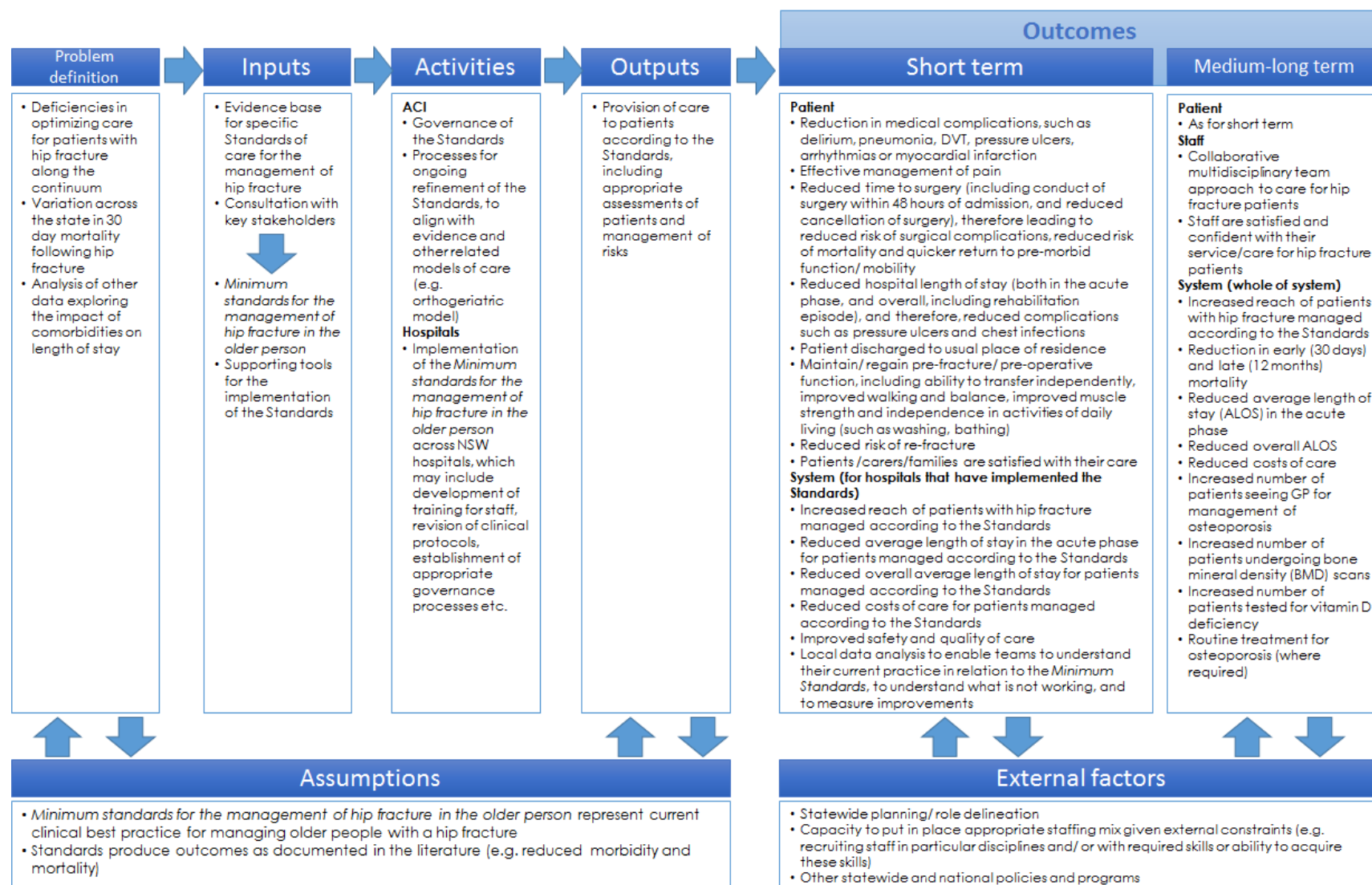
A program logic for the *Minimum standards for the management of hip fracture in the older person* is shown in Figure 37 below.

## Focus of evaluation

The ACI specified a formative evaluation of the *Minimum standards for the management of hip fracture in the older person*. In addition to assessing the early impacts of the implementation of the Minimum standards, formative evaluations have a role in strengthening or improving the program or initiative being evaluated, which in this instance, are the Minimum standards themselves and supporting tools and processes (i.e. the 'program'). It is proposed that some dimensions of process also be evaluated, to determine the extent to which the Minimum standards have been implemented in the study sites, and potentially more broadly across the NSW health system.

A summative evaluation will be required at a later stage, to examine the outcomes of the implementation of the Minimum standards. In the meantime, this is out of scope. The formative evaluation will identify some of the early impacts of the Minimum standards, and extrapolate these findings to the wider health care system. However, this will be for indicative purposes only, mostly for guiding the next stages of implementation and/or making any necessary improvements to the Minimum standards rather than as a definitive summary of the impact or outcomes of the program.

Figure 37 – Logic model for the *Minimum standards for the management of hip fracture in the older person*





## Evaluation questions

The questions for this evaluation were necessarily those associated with a formative approach, which are in relation to:

- assessing the early impacts of implementation of the Minimum standards
- assessing any gaps in the Minimum standards make recommendations to strengthen them
- articulate barriers and success factors for implementation.

In addition to questions about the overall program, there are also questions relating to each Standard. Questions about the overall program are in Table 26, and questions relating to each individual Minimum standards are in Table 27.

## Key methods for answering the evaluation questions

The evaluation used a mix of quantitative and qualitative data to respond to the questions.

### Quantitative analysis

The quantitative analysis used data extracted from the NSW Ministry of Health population health data warehouse, analysis and reporting system - the Secure Analytics for Population Health Research and Intelligence (SAPHaRI), as well as from local sites (i.e. extracts from operating theatre information systems). The approach used was an interrupted time series analysis, over a period of five years (2009-10 to 2013-14), combined with comparison between sites based on a qualitative assessment of the level of implementation of the Minimum standards.

The analysis was focussed on the key measures that the ACI had specified for each of the Minimum standards, with some modifications. Some of the ACI measures have been identified as relevant for the short term (and therefore appropriate for this evaluation). Others are more relevant for a summative evaluation and/or refer to issues for which there is currently no data collection or consistency of data collection across sites. In addition to the key measures identified by the ACI for each Standard, other measures were also required for evaluation of the program as a whole, and some aspects of process. The full set of proposed measures are detailed in Appendix B, although not all were used in the end due to limitations with data.

### Qualitative data collection/analysis

Qualitative data collection and analysis was undertaken, principally involving the following:

- document analysis
- discussions with steering committee (the committee is comprised of clinicians with expertise in the Minimum standards, some of whom may have implemented the Minimum standards at sites that they are working/have worked at)
- site interviews.

A set of interviews were conducted with key informants at each site. These included:

- Medical staff/VMOs directly involved with the implementation of the Minimum standards, including geriatricians, orthopaedic surgeons, emergency physicians, radiologists and others.

- Nursing staff directly involved with the implementation of the Minimum standards.
- Allied health staff directly involved with implementation of the Minimum standards.
- Other clinical and non-clinical management staff.

The interviews were guided by a structured questionnaire that was designed to obtain perspectives on:

- the overall program
- the Minimum standards and supporting tools, including their clarity and utility
- the extent of implementation of the Minimum standards at the site
- impacts of implementation, including benefits and any drawbacks
- factors that assisted the implementation
- challenges faced in implementation
- plans for further implementation.

The questions used to guide the structured interviews are at Appendix C.

**Table 26 – Evaluation questions – Overall ‘program’**

Evaluation component	Evaluation questions	Data sources/methods			
		Document analysis	Stakeholder interviews	Site interviews	Quant. Data
Inputs	<ol style="list-style-type: none"> <li>1. How clearly are the objectives of the Minimum standards defined?</li> <li>2. Do the Minimum standards adequately reflect the objectives (e.g. are the objectives sufficiently operationalised by the Minimum standards from a clinical perspective; Are there any gaps or redundancies)?</li> <li>3. Was ‘ownership’ of the objectives and the Minimum standards achieved amongst service providers and other key stakeholders?</li> <li>4. Are there any diverging views about the Minimum standards amongst clinicians? If so, what are they?</li> </ol>	•	•	•	
Activities/processes	<ol style="list-style-type: none"> <li>5. How appropriate are the state level governance arrangements for the Minimum standards?</li> <li>6. How adequate are the processes are in place for the maintenance of the Minimum standards (i.e. to keep up with best practice)?</li> <li>7. How effective have the tools developed by the ACI been to support the implementation of the Minimum standards? How could they be improved? What is missing?</li> <li>8. What steps did study sites take in implementation of the Minimum standards, e.g.:               <ol style="list-style-type: none"> <li>a. Investigation of pathways and/or outcomes for patients to make a case for change.</li> <li>b. Review of and changes to clinical protocols.</li> <li>c. Changes to governance processes.</li> <li>d. Changes to staffing.</li> <li>e. Training provided to staff/processes for ongoing training.</li> <li>f. Development of tools/resources.</li> <li>g. Changes to/establishment of information systems.</li> </ol>               (See walk around tool for specific changes recommended)             </li> <li>9. What are the key changes that have been implemented at the site compared with</li> </ol>	•	•	•	

Evaluation component	Evaluation questions	Data sources/methods			
		Document analysis	Stakeholder interviews	Site interviews	Quant. Data
	<p>previous arrangements?</p> <p>10. Which Minimum standards have been fully implemented by the study sites and when was this achieved. Which Minimum standards have only been partially implemented and when was this achieved? Which Minimum standards have not been progressed?</p> <p>11. To what extent has the implementation of the Minimum standards 'matured' over time in the implementing organisations?</p> <p>12. What have been the key barriers and promoters to implementation of the Minimum standards?</p> <p>13. How widely have the Minimum standards been implemented in other sites across NSW?</p>				
Outputs	<p>14. How many patients aged over 65 years are admitted to NSW hospitals associated with an emergency/acute hip fracture per year and what is the associated level of activity measured in terms of National Weighted Activity Units (NWAUs)?</p> <p>15. What are the characteristics of these admissions in terms of DRGs, length of stay, age and sex of patient and discharge destination?</p> <p>16. What have been the trends in these admissions over time, including length of stay, and what is the projected level of activity for future years?</p> <p>17. How many emergency department presentations, sub-acute admissions and subsequent admissions occur related to these admissions?</p>				•
Early impacts	<p>18. What proportion of older people with hip fractures targeted by the Minimum standards have been managed according to the Minimum standards within study sites?</p> <p>19. What impact have the Minimum standards had on length of stay of older people with hip fracture? (Include both acute and overall length of stay.)</p> <p>20. How does this translate to cost savings?</p> <p>21. What are the system-wide impacts in terms of length of stay and cost if the Minimum standards were implemented across all eligible patients in NSW public hospitals?</p>		•	•	•

**Table 27 – Evaluation questions and measures relating to individual Minimum standards**

Type of measure	Evaluation questions/measures	Proposed data sources/methods		
		Document analysis	Site interviews	Quant. Data
<b>Standard 1: Orthogeriatric clinical management of each patient</b>				
Activities/ processes	1. To what extent are older people with a hip fracture admitted under the joint responsibility of an orthopaedic surgeon and a geriatrician (i.e. which Tier of the orthogeriatric clinical management model has been implemented?)	•	•	
	2. For sites adopting Tier 2 or 3 orthogeriatric clinical management model, to what extent are they able to move up a Tier (i.e. do they have the required staffing configuration to enable movement to the next highest Tier). What are the factors that would prevent a change in the model to a more integrated approach?	•	•	
	3. What proportion of patients receive a comprehensive geriatric assessment prior to surgery? Does this include assessment and treatment for correctable co-morbidities? Does this include behavioural assessments undertaken for patients with significant cognitive impairment, noting aggression, agitation, guarding etc.?		•	•
	4. What proportion of patients receive post-operative geriatric input?		•	•
	5. Are systems /clinical decision support tools/policies/pathways in place to ensure that best practice for assessment, prevention and management of: <ul style="list-style-type: none"> <li>• pressure ulcers,</li> <li>• urinary tract infections (UTIs)</li> <li>• deep vein thrombosis (DVT)</li> <li>• chest infections?</li> </ul>	•	•	
	6. Are systems /clinical decision support tools are in place outlining prevention, treatment and referral options for hip fracture patients who have delirium, undiagnosed dementia or confusion	•	•	
Early impacts	7. What have been the changes in the rate of medical complications, such as delirium, pneumonia, DVT, thromboembolism, pressure ulcers, UTI, wound infections, chest infections, arrhythmias, myocardial infarction, following implementation of the model?			•
	8. What changes have occurred in the average length of stay of patient following implementation of the model (controlling for fracture type, patient age and sex, comorbidities etc.)?			•
	9. What changes have occurred in the post-discharge destination for patients following implementation of the model?			•
<b>Standard 2: Optimal pain management</b>				

Type of measure	Evaluation questions/measures	Proposed data sources/methods		
		Document analysis	Site interviews	Quant. Data
Activities/ processes	10. To what extent are patients being assessed for pain as per the Standard?	•	•	
	11. To what extent is the pre-operative pain regime implemented?	•	•	
	12. To what extent are patients' pain levels measured using pain scoring systems, taking into consideration visual and hearing and cognitive impairments?	•	•	
Early impacts	Nil for formative evaluation			
<b>Standard 3: Surgery within 48 hours and in hours (regardless of inter-hospital transfers)</b>				
Activities/ processes	13. What processes are in place to determine as quickly as possible following presentation whether patients are ready for surgery?	•	•	
	14. What processes are in place for Coordination between the emergency department, orthopaedic, anaesthetic and geriatric services to optimise time to surgery for patients with hip fracture?	•	•	
	15. What processes are in place to assess, document and communicate perioperative risk to patients, carers and clinicians?	•	•	
	16. What barriers (if any) prevent optimising time to surgery for patients with a hip fracture (e.g. staff training, availability of theatre space)? What arrangements are in place to ensure the standard is met for patients presenting immediately prior to weekend? What are the arrangements for surgery on weekends?		•	
Early impacts	17. Proportion of patients deemed medically ready for surgery within 48 hours of admission. Mean time to surgery following admission.  Note: Definition of patients 'ready for surgery' is unlikely to be able to be implemented. Therefore the measure is likely to be 'Proportion of patients undergoing surgery within 48 hours after admission'.			•
	18. Proportion of patients whose surgery is undertaken within normal working hours.  See Measure 6: What changes have occurred in the average length of stay of patient following implementation of the model (controlling for fracture type, patient age and sex, comorbidities etc.)?			•
<b>Other aspects of surgery</b>				
Activities/ processes	19. How do peri-operative protocols address: <ul style="list-style-type: none"> <li>• use of indwelling urinary catheters</li> <li>• thromboprophylaxis</li> <li>• prophylactic antibiotics?</li> </ul>		•	

Type of measure	Evaluation questions/measures	Proposed data sources/methods		
		Document analysis	Site interviews	Quant. Data
	20. Are fasting rates of each patient monitored?		•	
<b>Standard 4: Surgery is not cancelled</b>				
Activities/ processes	21. To what extent has the hospital implemented the Emergency Surgery Guidelines (NSW Health, 2009) to plan for their predictable surgery workload and/or implemented other processes to ensure that surgery for hip fracture patients is not cancelled?	•	•	
	22. What processes are in place to quantify perioperative risk, and align post-operative resources such as HDU/ICU appropriately, based on patient risk and need?	•	•	
	23. What processes and tools are in place to ensure that patients are not subject to prolonged fasting prior to operation for a hip fracture?	•	•	
Early impacts	24. Cancellation rate for surgery for patients with a hip fracture. Note: 'Cancelled' will need to be clearly defined. For example, sometimes staff on wards think that a patient is 'booked', but theatre staff know nothing about this. Need to define scheduled/booked/agreed etc. Maybe best done in terms of fasting episode not followed by procedure.			•
	25. When hip surgery is cancelled, what are the main reasons for this? (See note re definition of 'cancelled' surgery above.)		•	•
<b>Standard 5: Commencement of mobilisation within 24 hours of surgery</b>				
Activities/ processes	26. Is there a clinical protocol in place for mobilisation of patients? Does this aim to achieve mobilisation within 24 hours of surgery or 48 hours of surgery? Does this include repetition of mobilisation at least once daily?	•	•	
	27. Is there a clinical protocol in place for early assessment of patients for rehabilitation?	•	•	
	28. Where do patients requiring rehabilitation receive rehabilitation? Is there a home based alternative to hospital based rehabilitation? What is the extent of multidisciplinary input to rehabilitation programs available for patients (i.e. inclusion of the following staff types in the multidisciplinary teams: geriatrician, rehabilitation specialist, physiotherapy, occupational therapy, dietetics, speech therapy and pharmacy).	•	•	
Early impacts	29. Proportion of patients mobilised within 24 hours of surgery/Proportion of patients mobilised within 48 hours of surgery. Note: This will rely of availability of local data, including data on where mobilisation is contraindicated.			•
	30. Proportion of patients where mobilisation is repeated at least once per day. Note: This will rely of availability of local data			•

Type of measure	Evaluation questions/measures	Proposed data sources/methods		
		Document analysis	Site interviews	Quant. Data
	31. Proportion of patients where an early assessment of the need for rehabilitation has been conducted. Note: This will rely of availability of local data. There is a need to define 'early'.			•
<b>Standard 6: re-fracture prevention</b>				
Activities/ processes	32. Has the <i>Osteoporotic Re-fracture Prevention Model of Care</i> (Agency for Clinical Innovation, 2011) been adopted?	•	•	
Early impacts	33. Proportion of patients receiving a bone density study.			•
<b>Other aspects of post-operative care</b>				
Activities/ processes	34. How is care for a patient managed/coordinated following surgery? Is there a single person identified as the coordinator of the treatment program post-surgery?		•	
	35. What processes are in place to assist with discharge planning? To what extent are patients requiring rehabilitation/further care transferred to another treatment setting, and what criteria are used to refer patients to these settings?		•	•
	36. What follow-up care is provided to patients following discharge back to home? Is there are protocol that involves a home visit for example by an occupational therapist? Are patients able to obtain adaptive equipment when discharged to home (e.g. toilet, surround, toiler raiser, shower chair)?		•	
<b>Standard 7: Local ownership of data systems/processes to drive improvements in care</b>				
Activities/ processes	37. Extent of implementation of local data and monitoring systems and audit/processes tools for measuring achievement of outcomes of the Minimum standards. This included assessment of the following: <ul style="list-style-type: none"> <li>A local register of patients with hip fracture has been established</li> <li>Whether the register included data, or there are other data sources acquired which are relevant to: <ul style="list-style-type: none"> <li>Standard 1</li> <li>Standard 2</li> <li>Standard 3</li> <li>Standard 4</li> <li>Standard 5</li> <li>Standard 6</li> </ul> </li> <li>Evidence that measures related to the Minimum standards have been audited and reviewed in the last 3, 6 or 12 months.</li> </ul>	•	•	
Early impacts	Nil for formative evaluation.			



# Appendix B: Key quantitative measures

Standard	Measure name	Measure calculation	Modelling approach including risk adjustment	Data sources	Comments
All	Reach of Minimum standards across NSW public hospitals	<p><i>Numerator:</i> No. of NSW public hospitals at which the Minimum standards have been implemented</p> <p><i>Denominator:</i> No. of NSW public hospitals managing patients with hip fracture</p>		<p>ACI</p> <p>Admitted patients care (APC) data collection</p>	
All	Reach of Minimum standards within implementation hospitals	No. of patients that have been admitted under the orthogeriatric model within study sites	No. of patients admitted with hip fracture	<p>Study sites</p> <p>APC data</p>	
All	<p>Length of stay – acute</p> <p>Length of stay – acute+ rehabilitation days</p>	Acute episode days for patients admitted with hip fracture.	<p>Regression model with length of stay as independent variable</p> <p><i>Risk adjustment variables:</i></p> <ul style="list-style-type: none"> <li>• Type of fracture (principal diagnosis)</li> <li>• Australian Refined Diagnosis Related Group (AR-DRG) Patient Clinical Complexity Level (PCCL) and/or Charlson Index</li> <li>• Age</li> <li>• Sex</li> </ul>	APC data over a five year period.	This will be modelled through a regression model in which the length of stay for the individual patient episode is explained by a range of risk adjustment/control variables and variables reflecting the relevant comparisons (pre/post implementation and comparisons between sites at different levels of implementation.

Standard	Measure name	Measure calculation	Modelling approach including risk adjustment	Data sources	Comments
			<ul style="list-style-type: none"> <li>National Surgical Quality Improvement Program (NSQIP)</li> </ul> <p>Comparison variables:</p> <ul style="list-style-type: none"> <li>Dummy variable reflecting post implementation period</li> <li>Dummy Variables reflecting extent of implementation</li> </ul>		An additional model including acute and rehabilitation days for an individual episode will also be modelled.
All	<p>Average length of stay for site – acute</p> <p>Average length of stay for site – acute+ rehabilitation days</p>	<p>Acute 1 – Unadjusted</p> $\frac{Beddays_{site}}{Episodes_{site}}$ <p>Where <math>Beddays_{site}</math> is the number of acute episode bed days for patients admitted with hip fracture at a particular site and</p> <p><math>Episodes_{site}</math> is the number of acute episodes for patients admitted with hip fracture at that site.</p> <p>Acute 1 – Risk adjusted</p> $ALOS_{state} * \frac{ActualALOS_{site}}{PredictedALOS_{site}}$	<p>Average length of stay and risk adjusted average length of stay will be compared for a site pre and post implementation of Minimum standards and between sites classified to different level of implementation of the Minimum standards</p> <p>For the risk adjusted ALOS the following procedure will be adopted. The regression model discussed with respect to the previous measure will be estimated with just the risk adjustment variables included. These variables will then be applied to each site to estimate the predicted average length of stay. This will be included as the denominator in a ratio in which</p>	APC data over a five year period.	<p>This approach will provide a means of comparing average lengths of stays for sites, rather than interpreting the estimated coefficients discussed for the model above.</p> <p>Unadjusted and Risk adjusted measures will provide a basis for understanding the extent to which the casemix of different hospitals impacts the measures of average length of stay.</p> <p>In the modelling the impact of including bed days</p>

Standard	Measure name	Measure calculation	Modelling approach including risk adjustment	Data sources	Comments
		<p>Where <math>ALOS_{State}</math> is the average length of stay for patients admitted with hip fracture across NSW. <math>ActualALOS_{site}</math> is the actual average length is stay for a particular site.</p> <p><math>PredictedALOS_{site}</math> is the predicted average length is stay for a particular site, applying the risk parameters of the model estimated for the previous measure.</p> <p>Equivalent measures for acute plus rehabilitation days will be calculated.</p>	<p>the actual length of stay for the site will be numerator. This will yield a standardized ratios reflecting the extent to which the average length of stay varies from the state average. The ratio will be multiples with the state average LOS to estimate a risk adjusted average length of stay for the site.</p>		<p>associated service categories other than acute and rehabilitation will be explored (e.g. maintenance, GEM, psychogeriatric episodes etc.)</p>
All	Cost impact of implementing Minimum standards (acute episodes only)	[Reduction in patient days associated with the implementation of the Minimum standards] times [estimate of the average cost per bed day for acute patients with hip fracture]	Costs will be derived from the National Hospital Cost Data Collection. Cost per bed day will need to be adjusted to remove a range of costs that are unlikely to be reflected in longer lengths of stay (e.g. emergency department costs, operating theatre costs etc.).		This may be applied to the six sites investigated in the study and the broader set of sites.

Standard	Measure name	Measure calculation	Modelling approach including risk adjustment	Data sources	Comments
All	System-wide impacts in terms of LOS and cost if the Minimum standards were implemented across all NSW public hospitals	Acute LOS savings expressed as a % of total acute bed days at the implementation sites, multiplied for all other NSW public hospitals eligible to implement the Minimum standards	N/A	APC data over a five year period.	<p>Approach considers differences in LOS across hospitals, and therefore, expresses savings as a % of current acute LOS for patients with a hip fracture.</p> <p>The results will be projected to estimate the impact of full implementation of the Minimum standards.</p>
All	Post-discharge destination of patients	<p>[No patients discharged home]/</p> <p>[No. of patients being managed for hip fracture]</p> <p>[No patients discharged to residential care]/</p> <p>[No. of patients being managed for hip fracture]</p>	May include risk adjustment to reflect age, sex, comorbidities and [if available] previous residence in a residential care facility	APC data over a five year period.	Relies on whether or not the patient resided in a residential care facility prior to hospital admission being recorded.

Standard	Measure name	Measure calculation	Modelling approach including risk adjustment	Data sources	Comments
1	Change in rate of medical complications, such as delirium, pneumonia, DVT, pressure ulcers, arrhythmias or myocardial infarction.	[No. of patients with selected medical complications]/[No. of patients being managed for hip fracture]	The regression model discussed above will be adapted to examine rates of complications.	APC data over a five year period.	<p>Exact complications will need to be defined by clinicians. Should also be complications that arise during the hospital admission rather than ones that were present on admission. The condition onset flag could be used if available.</p> <p>N.B. Main post-operative medical complications given in Fisher et al., 2006 were:</p> <ul style="list-style-type: none"> <li>• Sepsis</li> <li>• Delirium</li> <li>• Venous thromboembolism (DVT and PE)</li> <li>• Pneumonia</li> <li>• UTI</li> <li>• Pressure sores and blisters</li> <li>• Anaemia</li> <li>• Gastrointestinal bleeding</li> <li>• Acute cerebrovascular syndromes</li> <li>• Acute coronary syndromes</li> </ul>

Standard	Measure name	Measure calculation	Modelling approach including risk adjustment	Data sources	Comments
3	Proportion of patients undergoing surgery within 48 hours after admission  Mean time between admission and surgery	[No of patients undergoing surgery for hip fracture within 48 hours of admission]/  [No. of patients undergoing surgery for hip fracture]	This will be compared for a site pre and post implementation of Minimum standards and between sites classified to different level of implementation of Minimum standards.	Local Operating Theatre system  APC data.	This Standard applies to patients who are 'ready for surgery'. This is not easily quantified through available data. It could be assumed that sites have a similar proportion of patients who are not ready for surgery. This issue will also be explored qualitatively.
3	Proportion of patients whose surgery is undertaken within 'usual hours'	[No. of patients whose hip surgery is undertaken within 'normal' hours]/[No. of patients undergoing surgery for hip fracture]	This will be compared for a site pre and post implementation of Minimum standards and between sites classified to different level of implementation of Minimum standards.	Local Operating Theatre system  APC data.	'Usual' hours needs to be defined for this study. Will vary at individual hospitals, therefore, need to ask individual hospitals about their usual hours.
Other surgery measures	Proportion of patients by surgical treatment type (fixation, total/hemi replacement, non-surgical)	[No. of patients receiving different types of surgery]/[No. of patients undergoing surgery for hip fracture]	This will be compared for a site pre and post implementation of Minimum standards and between sites classified to different level of implementation of the Minimum standards.  May be further sub classified to reflect type of fracture	APC data over a five year period.	

Standard	Measure name	Measure calculation	Modelling approach including risk adjustment	Data sources	Comments
4	Cancellation rate for surgery for patients with a hip fracture	No. of patients whose surgery has been cancelled at least once  [No. of patients whose surgery has been cancelled at least once]/[No. of patients undergoing surgery for hip fracture]	This will be compared for a site pre and post implementation of Minimum standards and between sites classified to different level of implementation of the Minimum standards.	Local Operating Theatre system  APC data.	'Cancelled' will need to be clearly defined. For example, sometimes staff on wards think that a patient is 'booked', but theatre staff know nothing about this. Need to define scheduled/booked/agreed etc. Maybe best done in terms of fasting episode not followed by procedure.
5	Rate of mobilisation occurring within 24 hours of surgery	[No. of patients mobilised within 24 hours post-surgery] /[No. of patients undergoing surgery for hip fracture]	This will be compared for a site pre and post implementation of Minimum standards and between sites classified to different level of implementation of the Minimum standards.	Local data sources	Mobilisation is contraindicated in some cases, but data may not be available for this. It could be assumed that sites have a similar proportion of patients where mobilisation is contraindicated
5	Impact of implementation of a mobilisation protocol on length of stay.	Average length of stay for units in which a mobilization protocol has been implemented compared with units where there is no protocol.	This would be explore through including a dummy variable in the length of stay model discussed above, reflecting that a site had implemented a mobilisation protocol.	APC data over a five year period.	

Standard	Measure name	Measure calculation	Modelling approach including risk adjustment	Data sources	Comments
5	Rate of early assessment of the patient for rehabilitation.	[No. of patients receiving 'early' assessment for rehabilitation]/[No. of patients being managed for hip fracture]	No. of patients undergoing surgery for hip fracture	Local data sources	'Early assessment' needs to be defined and operationalised. Suggestion that it may be: Assessment occurring before the patient is ready for rehabilitation.



# Appendix C: Structured interview questions

## Formative Evaluation of *Minimum standards for the management of hip fracture in the older person*

### Questions for interviews with stakeholders – Overall program

#### Questions for the team in the ACI managing the Minimum standards

1. What has been the process adopted for developing the Minimum standards in relation to:
  - a. The assessment of evidence regarding the management of hip fracture
  - b. The process through which clinical advisory groups have been engaged in/lead the development of the Minimum standards.
2. Were there any groups that were not adequately represented in this process?
3. What steps have been taken to promote awareness and uptake of the Minimum standards by clinicians and managers across NSW? How successful have these steps been? Are there ways in which these could be improved?
4. What tools have been developed to support the implementation of the Minimum standards? Are they effective? What additional support might be provided to sites to implement the Minimum standards? In what ways could the ACI further assist health services that are implementing the Minimum standards?
5. What are the governance arrangements for the Minimum standards? How adequate are these? (E.g. are there any stakeholders that are not represented? What is the mode/frequency of meetings and is this adequate?)
6. What processes are in place for the maintenance of the Minimum standards (i.e. to keep up with best practice)?
7. What are the key priorities for the next phase of refinement of the Minimum standards? Are there any ways in which the Minimum standards could be improved in the short term? Are there any gaps or redundancies in the Minimum standards?

#### Questions for other stakeholders re the Minimum standards<sup>6</sup>

8. From your perspective, how adequate and appropriate are the Minimum standards? Do they operationalise the key issues considered important in improving clinical care and outcomes for hip fracture patients? Are there any gaps or redundancies? Are there any diverging views on the Minimum standards clinically? If so, what are they?
9. To what extent has the development and promotion of the Minimum standards fostered 'ownership' amongst clinicians and other key stakeholders? In what ways could 'ownership' be further fostered? Were there any groups that were not adequately represented in the process of developing the Minimum standards?

<sup>6</sup> Other stakeholders include other clinicians/managers with an interest or involvement in the Minimum standards. They may be clinicians/managers from sites where the Minimum standards are being implemented, but are not one of the six sites that are focus of the detailed evaluation. Members of the Steering Committee who will not be involved in site interviews will be prioritised for interview.

10. How effective are the tools developed to support the implementation of the Minimum standards? What additional support might be provided to sites to implement the Minimum standards?
11. How adequate and effective are the governance arrangements for the Minimum standards? Could these be improved?
12. From your perspective, what should be the key priorities for the next phase of refinement of the Minimum standards?

## Formative Evaluation of *Minimum standards for the management of hip fracture in the older person*

### Questions for interviews with sites

#### **General views about the Minimum standards**

1. From your perspective, how adequate and appropriate are the Minimum standards? Do the Minimum standards operationalise the key issues considered important in improving clinical care and outcomes for hip fracture patients? Are there any gaps or redundancies? Are there any diverging views on the Minimum standards clinically? If so, what are they?
2. To what extent has the development and promotion of the Minimum standards fostered 'ownership' amongst clinicians and other key stakeholders at this hospital? In what ways could 'ownership' be further fostered?
3. From your perspective, what should be the key priorities for the next phase of refinement of the Minimum standards?

#### **Site implementation general**

4. What was the process for implementation at this hospital? What prompted the site to commence implementation? What investigations were undertaken prior to implementation? What governance processes were established? When did the implementation begin? How far into it are you currently? What is there left to do?
5. To what extent has the awareness level amongst clinical staff increased about the need for pathways/protocols for patients with a hip fracture? Is there strong support locally for the implementation of the Minimum standards? Have there been any specific concerns raised by clinical staff. If so, what are these?
6. To what extent have the tools developed by the ACI to support the implementation of the Minimum standards been useful in implementation? How could these be improved? What additional support might be provided to sites to implement the Minimum standards? In what ways could the ACI further assist health services that are implementing the Minimum standards?
7. How did you use the \$30K that was provided by the ACI towards the implementation of the Minimum standards? Was it valuable?

#### **Standard 1: Orthogeriatric clinical management of each patient**

8. What is your assessment of the extent to which this standard been implemented at this hospital: Implementation has not commenced, partial implementation, full implementation?
9. Which model of care best describes how most patients with hip fracture aged 65 years were managed in this hospital, prior to the implementation of the Minimum standards and post-implementation?

Model	Pre	Post

<p><b>Model A</b></p> <ul style="list-style-type: none"> <li>• The patient is admitted under the orthopaedic surgeon, and a geriatric registrar (or general physician) is integrated into the orthopaedic team.</li> <li>• Both the orthopaedic surgeon and the geriatrician (or general physician) manage the patient's care collaboratively on a daily basis. This includes participation in case conferencing, weekly to twice weekly multidisciplinary ward rounds and daily ward rounds.</li> <li>• Collaborative care begins at admission and continues through the pre- and post-operative period, onto referral to rehabilitation, including secondary fracture prevention and discharge planning.</li> </ul> <p>Please state if there are any deviations on the extent of collaboration and the reasons for these.</p>		
<p><b>Model B</b></p> <ul style="list-style-type: none"> <li>• The patient is under the care of an orthopaedic surgeon and a geriatrician (or general physician).</li> <li>• Both services take responsibility for pre- and post-operative multidisciplinary care.</li> <li>• Please state the regularity of exchange of information between these specialists in relation to the patients that they manage: <ul style="list-style-type: none"> <li>a. Daily</li> <li>b. At other regular, pre-determined intervals</li> <li>c. As required/unscheduled</li> <li>d. Other (please specify).</li> </ul> </li> </ul>		
<p><b>Model C</b></p> <ul style="list-style-type: none"> <li>• The patient under the care of the orthopaedic surgeon/team.</li> <li>• When issues arise, input is provided by a geriatrician (or a general physician where a geriatric service is unavailable), on a consultation and liaison basis.</li> <li>• Please state at what points in the care pathway geriatrician input is usually sought: <ul style="list-style-type: none"> <li>a. On admission</li> <li>b. Pre-operatively</li> <li>c. Post-operatively</li> <li>d. Prior to discharge</li> <li>e. All the above.</li> </ul> </li> </ul>		
<p><b>Model D</b></p> <ul style="list-style-type: none"> <li>• There has been a mix of models either prior to the implementation of the Minimum standards, post, or both.</li> </ul> <p>If so, please state what the mix was/is, and what proportion of patients were/are treated under one model versus another.</p>		

10. Approximately what proportion of older patients with hip fracture receive a comprehensive geriatric assessment prior to surgery? Who conducts the assessment (e.g. geriatric registrar, geriatrician)? Does this include assessment and treatment for correctable co-morbidities? If so, which ones? Does this assessment include cognitive impairment assessments? Does this include behavioural assessments? How is pre-surgery geriatric assessment undertaken during the weekends?
11. Approximately what proportion of patients receive post-operative geriatric input? How is this referral triggered? How is the input provided?
12. In what ways does the model at this hospital (post-implementation) differ from the descriptions provided above?

13. Approximately when was the new arrangement implemented? (month/year)
14. What factors were the most challenging in implementing this model? What factors were the most helpful in implementing this model?
15. Is the implementation of a more integrated approach (e.g. Model A over Model B/C, Model B over Model C) being considered for this hospital? Are there any barriers to implementing a more integrated model?

**Standard 2: Optimal pain management**

16. What is your assessment of the extent to which this standard been implemented at this hospital:  
Implementation has not commenced, partial implementation, full implementation?
17. Has the site implemented a protocol for pain management, including for assessment, pre-operative pain management and post-operative pain management? When was the protocol implemented? Is this protocol consistent with Standard 2, and if not, in what ways does it vary?
18. How does the service assess the extent to which this protocol is followed?
19. Approximately what proportion of patients (older people with hip fracture) are assessed for pain as per the Standard (i.e. upon presentation, within 30 minutes of administering initial analgesia, hourly until settled on the ward and regularly as part of routine nursing observations throughout admission)?
20. Are patients' pain levels measured using pain scoring systems? What system(s) is used?
21. How is pain in cognitively impaired patients assessed?
22. Are the results of pain assessment recorded? What specifically is recorded? (e.g. results of numerical scale, time of assessment, behavioural/non-verbal cues)
23. Is multimodal analgesia used? Please describe the pain regime in terms of analgesics provided to patients. Who administers pain relief?
24. How is pain relief continued post-discharge? How is information relayed to the GP?

**Standard 3: Surgery within 48 hours and is within usual hours (regardless of inter-hospital transfers)**

25. What is your assessment of the extent to which this standard has been implemented at this hospital:  
Implementation has not commenced, partial implementation, full implementation?
26. Does the service regularly monitor the proportion of patients receiving surgery within 48 hours and also within usual hours? How has this changed over time?
27. What are 'usual' surgery hours at this hospital?
28. What processes are in place to determine whether patients are ready for surgery? What form of risk assessment/stratification is involved? Where is pre-assessment undertaken?
29. What are the processes involved to assess patients for the presence of correctable co-morbidities immediately following presentation? What is the protocol for optimisation of patients on anticoagulants?
30. What processes are in place for coordination between the emergency department, orthopaedic, anaesthetic and geriatric services to optimise time to surgery for patients with hip fracture?
31. What processes are in place to assess, document and communicate perioperative risk to patients, carers and clinicians
32. What factors have assisted in reducing the time to surgery within the hospital? What barriers are there impacting further improvement in time to surgery in this hospital?
33. What would you consider to be the three most frequent reasons for delay to surgery (in order)?

**Other surgery issues**

34. What processes are in place to quantify perioperative risk, and align post-operative resources

such as HDU/ICU appropriately, based on patient risk and need?

35. What proportion of patients receive a blood transfusion intra or post-operatively?

36. Are there any protocols addressing:

- use of indwelling urinary catheters
- thromboprophylaxis
- prophylactic antibiotics
- patients requiring blood transfusion intra or post-operatively?

**Standard 4: Surgery is not cancelled**

37. What is your assessment of the extent to which this standard been implemented at this hospital:

Implementation has not commenced, partial implementation, full implementation?

38. Does the service regularly monitor surgery cancellations for older patients with hip fracture and reasons for cancellation? How has this changed over time? When surgery has been delayed, what are the major reasons for the cancellations?

39. To what extent has the hospital implemented the Emergency Surgery Guidelines and/or implemented other processes to ensure that surgery for hip fracture patients is not cancelled?

40. If surgery is cancelled, how is it rescheduled (by whom, do they become a priority, are other patients delayed in order to make time for them)? Is there a dedicated hip fracture surgery list?

41. What protocols are in place to ensure that patients are not subject to prolonged fasting prior to operation for a hip fracture (e.g. hunger clock)?

42. What would you consider to be the three most frequent reasons for cancellation (in order)?

**Standard 5: Commencement of mobilisation within 24 hours of surgery**

43. What is your assessment of the extent to which this standard been implemented at this hospital:

Implementation has not commenced, partial implementation, full implementation?

44. Does the service regularly monitor the extent to which patients are mobilised within 24 hours of surgery? How has this changed over time?

45. Has a clinical protocol been implemented to achieve mobilisation of patients within 24 hours of surgery and repetition of mobilisation at least once daily? Who supervises mobilisation? How is mobilisation measured/assessed and recorded (e.g. walking 10 metres)? When was the protocol implemented? Can we have a copy?

46. Is a clinical protocol in place for early assessment of patients for rehabilitation? When was the protocol implemented? Who undertakes the assessment? Does this involve assessment by/consultation with a rehabilitation physician? How is a rehabilitation referral triggered? Can we have a copy of the protocol?

47. Where do patients requiring rehabilitation receive rehabilitation? Is there a home-based alternative to hospital-based rehabilitation? Approximately what proportion of older patients with hip fracture are referred to this program/service? What is the extent of multidisciplinary input to rehabilitation programs available for patients (i.e. inclusion of the following staff types in the multidisciplinary teams: geriatrician, rehabilitation specialist, physiotherapy, occupational therapy, dietetics, speech therapy and pharmacy). What is the follow-up process to ensure a patient has received rehabilitation?

**Standard 6: Re-fracture prevention**

48. What is your assessment of the extent to which this standard been implemented at this hospital:

Implementation has not commenced, partial implementation, full implementation?

49. Has a re-fracture prevention protocol been implemented? When was the protocol implemented? Does this vary from the Osteoporotic Re-fracture Prevention Model of Care? If so in what ways does the local protocol vary? Has the Osteoporotic Re-fracture Prevention Model of Care been implemented at your hospital?

50. How are patients at risk of re-fracture identified/assessed? Does the assessment involve:

- a. Checking the patient's history of previous fractures
- b. Assessing calcium and Vitamin D deficiency
- c. Other diagnostic test (e.g. bone density scan)

51. Does the hospital have a re-fracture liaison team and/or a case manager involved with patients identified as being at risk of re-fracture?

- a. If yes, in the last 12 months approximately what proportion of older patients with hip fracture have been referred to the team/assigned a case manager?
- b. If no, how are patients that were identified as being at risk of re-fracture followed-up?

**Other aspects of post-operative care**

52. How is care for a patient managed/coordinated following surgery? Is there a single person identified as the coordinator of the treatment program post-surgery? How is the GP kept informed of the pathway?

53. What processes are in place to assist with discharge planning? To what extent are patients requiring rehabilitation/further care transferred to another treatment setting, and what criteria are used to refer patients to these settings?

54. What follow-up care is provided to patients following discharge back to home? Is there a protocol that involves a home visit for example by an occupational therapist? Are patients able to obtain adaptive equipment when discharged to home (e.g. toilet surround, toilet raiser, shower chair)?

55. What support and/or information is provided to family and carers?

**Standard 7: Local ownership of data systems/processes to drive improvements in care**

56. What is your assessment of the extent to which this standard been implemented at this hospital:

Implementation has not commenced, partial implementation, full implementation?

57. What local data and monitoring systems and audit/processes tools for measuring achievement of outcomes of the Minimum standards/adherence to protocols have been implemented? Which committee/group reviews the Minimum standards? How regularly are the Minimum standards audited/monitored? When was performance against the Minimum standards last reviewed/audited?

58. Is there a local register/database of hip fracture patients through which characteristics of patients, care processes and outcomes can be recorded and regularly monitored, including some of the Minimum standards can be monitored?

59. Is there a local register/database of patients receiving hip replacements, through which characteristics of patients, care processes and outcomes can be recorded and regularly monitored?

60. Are trends in any of the following regularly analysed and reviewed for hip fracture patients:

- a. Length of stay
- b. Readmissions
- c. Infection rates
- d. Other complications
- e. Mortality?

61. What have been the enablers/barriers to establishing effective local monitoring of the Minimum standards?

**Overall perspectives on implementation and next stages**

62. Overall what have been the key enablers and barriers to implementing the Minimum standards at your site?

63. To what extent has the implementation of the Minimum standards 'matured' over time at your site? What is the evidence towards this?

64. Has anything occurred at this site (over the implementation period) that will affect the outcomes we are measuring, and that we should be aware of?

65. In this study, we will be looking at quantitative data to measure some early impacts of the implementation of the Minimum standards (e.g. achievement of surgery within 48 hours, impact on length of stay). What would you say are some of the positive impacts of the program that we will not be easily able to pick up from our analysis of data? Are there any negative aspects that we will not be able to measure easily using data? What are these?

66. What are the key priorities for further implementation of the Minimum standards at this hospital?

# References

- Adunsky, A., Lusky, A., Arad, M., & Heruti, R. J. (2003). A comparative study of rehabilitation outcomes of elderly hip fracture patients: the advantage of a comprehensive orthogeriatric approach. *J Gerontol A Biol Sci Med Sci*, 58(6), 542-547
- Agency for Clinical Innovation. (2011). Osteoporotic Re-fracture Prevention Model of Care Sydney: Agency for Clinical Innovation.
- Agency for Clinical Innovation. (2012). Formative Evaluation of the Osteoporotic Re-fracture Prevention Project: FINAL EVALUATION REPORT.
- Agency for Clinical Innovation. (2013a). Minimum standards for the Management of Hip Fracture in the Older Person. Sydney: ACI.
- Agency for Clinical Innovation. (2013b). Understanding Program Evaluation An ACI Framework. Sydney: ACI.
- American Academy of Orthopaedic Surgeons. (2014). MANAGEMENT OF HIP FRACTURES IN THE ELDERLY: SUMMARY.
- Association of Anaesthetists of Great Britain and Ireland. (2011). AAGBI SAFETY GUIDELINE: Management of Proximal Femoral Fractures.
- Australian and New Zealand Hip Fracture Registry Steering Group. (2014). Australian and New Zealand Guideline for Hip Fracture Care: Improving Outcomes in Hip Fracture Management of Adults. Sydney: Australian and New Zealand Hip Fracture Registry Steering Group.
- Australian Commission on Safety and Quality in Health Care. (2014). Consultation Draft Hip Fracture Care Clinical Care Standard. Sydney: ACSQHC.
- Bitsch, M., Foss, N., Kristensen, B., & Kehlet, H. (2004). Pathogenesis of and management strategies for postoperative delirium after hip fracture: a review. *Acta Orthop Scand*, 75(4), 378-389
- Bosma, E., de Jongh, M. A., & Verhofstad, M. H. (2010). Operative treatment of patients with pertrochanteric femoral fractures outside working hours is not associated with a higher incidence of complications or higher mortality. *J Bone Joint Surg Br*, 92(1), 110-115
- Boutefnouchet, T., Budair, B., Qadri, Q., & (2013). HIP FRACTURE SURGERY DELAY AND CANCELLATION: THE IMPACT OF BEST PRACTICE TARIFFS. *Bone Joint J*, vol. 95-B( no. SUPP 13 63 )
- Cameron, I. D. (2005). Coordinated multidisciplinary rehabilitation after hip fracture. *Disabil Rehabil*, 27(18-19), 1081-1090
- De Rui, M., Veronese, N., Manzano, E., & Sergi, G. (2013). Role of comprehensive geriatric assessment in the management of osteoporotic hip fracture in the elderly: an overview. *Disabil Rehabil*, 35(9), 758-765
- Deane, G., & Smith, H. S. (2008). Overview of Pain Management in Older Persons. *Clinics in Geriatric Medicine*, 24(2), 185-201
- Della Rocca, G. J., & Crist, B. D. (2013). Hip fracture protocols: what have we changed? *Orthop Clin North Am*, 44(2), 163-182
- Deschodt, M., Braes, T., Broos, P., Sermon, A., Boonen, S., Flamaing, J., & Milisen, K. (2011). Effect of an inpatient geriatric consultation team on functional outcome, mortality, institutionalization, and readmission rate in older adults with hip fracture: a controlled trial. *J Am Geriatr Soc*, 59(7), 1299-1308
- Fisher, A. A., Davis, M. W., Rubenach, S. E., Sivakumaran, S., Smith, P. N., & Budge, M. M. (2006). Outcomes for older patients with hip fractures: the impact of orthopedic and geriatric medicine cocare. *J Orthop Trauma*, 20(3), 172-178; discussion 179-180
- Health Quality Ontario; Ministry of Health and Long-Term Care. (2013). Quality-based procedures: clinical handbook for hip fractures. Toronto, ON: .
- Herr, K., Coyne, P., Key, T., Manworren, R., McCaffery, M., Merkel, S., . . . Wild, L. (2006). Pain assessment in the nonverbal patient: position statement with clinical practice recommendations. *Pain Management Nursing*, 7(2), 44-52



- Herr, K., Spratt, K., Mobily, P. R., & Richardson, G. (2004). Pain intensity assessment in older adults: use of experimental pain to compare psychometric properties and usability of selected pain scales with younger adults. *Clin J Pain*, 20(4), 207-219
- Herr, K., & Titler, M. (2009). Acute pain assessment and pharmacological management practices for the older adult with a hip fracture: review of ED trends. *J Emerg Nurs*, 35(4), 312-320
- Holdgate, A., Shepherd, S. A., & Huckson, S. (2010). Patterns of analgesia for fractured neck of femur in Australian emergency departments. *Emerg Med Australas*, 22(1), 3-8
- Kalson, N. S., Mulgrew, E., Cook, G., & Lovell, M. E. (2009). Does the number of trauma lists provided affect care and outcome of patients with fractured neck of femur? *Ann R Coll Surg Engl*, 91(4), 292-295
- Kammerlander, C., Roth, T., Friedman, S. M., Suhm, N., Luger, T. J., Kammerlander-Knauer, U., . . . Blauth, M. (2010). Ortho-geriatric service--a literature review comparing different models. *Osteoporos Int*, 21(Suppl 4), S637-646
- Kang, H., Ha, Y. C., Kim, J. Y., Woo, Y. C., Lee, J. S., & Jang, E. C. (2013). Effectiveness of multimodal pain management after bipolar hemiarthroplasty for hip fracture: a randomized, controlled study. *J Bone Joint Surg Am*, 95(4), 291-296
- Keene, G. S., Parker, M. J., & Pryor, G. A. (1993). Mortality and morbidity after hip fractures. *Bmj*, 307(6914), 1248-1250
- Khan, R., Fernandez, C., Kashif, F., Shedden, R., & Diggory, P. (2002). Combined orthogeriatric care in the management of hip fractures: a prospective study. *Ann R Coll Surg Engl*, 84(2), 122-124
- Khan, S., Weusten, A., Bonczek, S., Tate, A., & Port, A. (2013). The Best Practice Tariff helps improve management of neck of femur fractures: a completed audit loop. *Br J Hosp Med (Lond)*, 74(11), 644-647
- Kosy, J. D., Blackshaw, R., Swart, M., Fordyce, A., & Lofthouse, R. A. (2013). Fractured neck of femur patient care improved by simulated fast-track system. *J Orthop Traumatol*, 14(3), 165-170
- Kunz, M., Mylius, V., Scharmann, S., Schepelman, K., & Lautenbacher, S. (2009). Influence of dementia on multiple components of pain. *Eur J Pain*, 13(3), 317-325
- Leung, A. H., Lam, T. P., Cheung, W. H., Chan, T., Sze, P. C., Lau, T., & Leung, K. S. (2011). An orthogeriatric collaborative intervention program for fragility fractures: a retrospective cohort study. *J Trauma*, 71(5), 1390-1394
- Li, L.-L., Gan, Y.-Y., Zhang, L.-N., Wang, Y.-B., Zhang, F., & Qi, J.-M. (2014). The effect of post-discharge telephone intervention on rehabilitation following total hip replacement surgery. *International Journal of Nursing Sciences*, 1(2), 207-211
- Magaziner, J., Lydick, E., Hawkes, W., Fox, K. M., Zimmerman, S. I., Epstein, R. S., & Hebel, J. R. (1997). Excess mortality attributable to hip fracture in white women aged 70 years and older. *Am J Public Health*, 87(10), 1630-1636
- Mak, J., Wong, E., & Cameron, I. (2011). Australian and New Zealand Society for Geriatric Medicine. Position statement--orthogeriatric care. *Australas J Ageing*, 30(3), 162-169
- Mallick, E., Gulihar, A., Taylor, G., Furlong, A., & Pandey, R. (2011). Impact of organisational changes on fracture neck of femur management. *Ann R Coll Surg Engl*, 93(1), 61-66
- Marsland, D., & Chadwick, C. (2010). Prospective study of surgical delay for hip fractures: impact of an orthogeriatrician and increased trauma capacity. *Int Orthop*, 34(8), 1277-1284
- Moja, L., Piatti, A., Pecoraro, V., Ricci, C., Virgili, G., Salanti, G., . . . Banfi, G. (2012). Timing matters in hip fracture surgery: patients operated within 48 hours have better outcomes. A meta-analysis and meta-regression of over 190,000 patients. *PLoS One*, 7(10), e46175
- Moran, C. G., Wenn, R. T., Sikand, M., & Taylor, A. M. (2005). Early mortality after hip fracture: is delay before surgery important? *J Bone Joint Surg Am*, 87(3), 483-489
- National Institute for Health and Care Excellence. (2014). The management of hip fracture in adults: NICE clinical guideline 124
- NSW Health. (2009). Emergency Surgery Guidelines.
- NSW Health. (2013). Rehabilitation Redesign Project: NSW Rehabilitation Model of Care

- O'Malley, N. T., Blauth, M., Suhm, N., & Kates, S. L. (2011). Hip fracture management, before and beyond surgery and medication: a synthesis of the evidence. *Arch Orthop Trauma Surg*, 131(11), 1519-1527
- Parker, M., Griffiths, R., & Appadu, B. (2002). Nerve blocks (subcostal, lateral cutaneous, femoral, triple, psoas) for hip fractures (Review). *Cochrane Database of Systematic Reviews*, Art. No.: CD001159. DOI: 10.1002/14651858.CD001159. (1)
- Physicians, R. C. o. (1989). Fractured neck of femur. Prevention and management. Summary and recommendations of a report of the Royal College of Physicians. *J R Coll Physicians Lond*, 23(1), 8-12
- Pioli, G., Giusti, A., & Barone, A. (2008). Orthogeriatric care for the elderly with hip fractures: where are we? *Aging Clin Exp Res*, 20(2), 113-122
- Piziak, V. K., & Rajab, M. H. (2011). An effective team approach to improve postoperative hip fracture care. *J Orthop Trauma*, 25(2), 72-75
- Robinson, T., & Eiseman, B. (2008). Postoperative delirium in the elderly: diagnosis and management. *Clin Interv Aging*, 3(2)
- Royal Australian College of General Practitioners. (2010). Clinical guideline for the prevention and treatment of osteoporosis in postmenopausal women and older men. Melbourne: RACGP.
- Scottish Intercollegiate Guidelines Network (SIGN). (2009). Management of Hip Fracture in Older People: A National Guideline: NHS Quality Improvement Scotland (NHS QIS).
- Shyu, Y. I., Liang, J., Wu, C. C., Su, J. Y., Cheng, H. S., Chou, S. W., . . . Yang, C. T. (2008). Interdisciplinary intervention for hip fracture in older Taiwanese: benefits last for 1 year. *J Gerontol A Biol Sci Med Sci*, 63(1), 92-97
- Siegmeth, A. W., Gurusamy, K., & Parker, M. J. (2005). Delay to surgery prolongs hospital stay in patients with fractures of the proximal femur. *J Bone Joint Surg Br*, 87(8), 1123-1126
- Taraldsen, K., Sletvold, O., Thingstad, P., Saltvedt, I., Granat, M. H., Lydersen, S., & Helbostad, J. L. (2014). Physical behavior and function early after hip fracture surgery in patients receiving comprehensive geriatric care or orthopedic care--a randomized controlled trial. *J Gerontol A Biol Sci Med Sci*, 69(3), 338-345
- Zeltzer, J., Mitchell, R. J., Toson, B., Harris, I. A., Ahmad, L., & Close, J. (2014). Orthogeriatric services associated with lower 30-day mortality for older patients who undergo surgery for hip fracture. *Med J Aust*, 201(7), 409-411