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NECK OF FEMUR FRACTURE REGISTRY OF AUSTRALIA (NOffRA) PILOT PROJECT FINAL REPORT

TESTING AND VALIDATING DRAFT OPERATING PRINCIPLES AND TECHNICAL STANDARDS FOR AUSTRALIAN CLINICAL QUALITY REGISTRIES

For the Australian Commission on Safety and Quality in Health Care

MUSCULOSKELETAL RESEARCH GROUP
FLINDERS UNIVERSITY
BEDFORD PARK SOUTH AUSTRALIA

&

DATA MANAGEMENT & ANALYSIS CENTRE
UNIVERSITY OF ADELAIDE
ADELAIDE SOUTH AUSTRALIA

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PROJECT MANAGEMENT COMMITTEE MEMBERS

Flinders Musculoskeletal Research Group
Flinders University

Associate Professor Ruurd Jaarsma
Professor Stephen Graves
Professor Jegan Krishnan

Data Management & Analysis Centre
University of Adelaide

Professor Philip Ryan
Ms Liddy Griffith
Mr Brian McDermott

Research Centre for Injury Studies
Flinders University

Associate Professor James Harrison

Flinders Medical Centre
Ms Vanessa Wells

SITE MEMBERS

Flinders Medical Centre
Associate Professor Ruurd Jaarsma
Ms Vanessa Wells

Epworth Richmond
Mr Richard de Steiger
Ms Lenore Beddoes

Goulburn Valley Health
Mr Ian Critchley

School of Rural Health
University of Melbourne
Dr Jennifer Critchley

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1. EXECUTIVE SUMMARY

Hip fractures are a major clinical issue which is becoming increasingly important as the population ages. A national Hip Fracture Registry will improve the quality and safety of care for patients following hip fracture by developing an efficient mechanism to compare and improve the effectiveness of acute health care delivery by all hospitals involved in the management of hip fractures. There are already a number of examples internationally where considerable benefit has been obtained from Hip Fracture Registries.

This pilot project aimed to assess the feasibility of establishing NOffRA (Neck of Femur Fracture Registry of Australia). A registry similar to the Standardised Audit of Hip Fractures in Europe model was established at three sites within Australia; Flinders Medical Centre, Adelaide - a large metropolitan hospital, Epworth Richmond, Melbourne - a metropolitan private hospital, and Goulburn Valley Health, Shepparton - a rural referral hospital. The data collection included initial hospital admission data, four-month post-surgery outcome data, re-operation and mortality data. A registry data base was built that contained the study data and the registry management data.

For a national hip fracture registry we propose the hospital data collection methods to include the capture of fracture and surgical details in theatre (the primary data source) by trained theatre staff with a surgeon responsible for each hospital using a similar method to the successful Australian Orthopaedic Association National Joint Replacement Registry. Any further hospital data would be obtained from individual jurisdictional separation data. Assessment of outcomes four months post surgery can provide unique and potentially valuable information, but was time-consuming in the pilot. It would add materially to the cost of a national registry. The value of this information should be assessed in relation to expected cost, and the assessment should consider the option of following-up a sample of cases rather than all of them.

As the result of testing the *Operating Principles and Technical Standards for Australian Clinical Registries* NOffRA **recommends**:

- 'Opt-out' consent as the recruitment strategy and the inclusion of an Operating Principle proposing 'opt-out' consent as a guideline for the operation of Australian Clinical Quality Registries.

- Including the primary carer as well as the next of kin as a person who can be made aware of the collection of registry data in the situation where a patient is unable to give consent.

- Including an Operating Principle encouraging the establishment of Registries by groups or organisations with appropriate technical infrastructure and technical support.

NOffRA **does not recommend**:

- Registries releasing patient contact details or contacting patients for third parties for the purpose of publishing findings.

2. INTRODUCTION

The working title for the project is the *National Hip Fracture Registry: Pilot Project*.

Background

Registries can be a valuable tool for improving clinical practice and health outcomes, but in Australia there is no single standard or shared methodology for the development, establishment and ongoing management of clinical quality registries. The Australian Clinical Quality Registries project is aimed at testing and validating the draft 'Operating Principles and Technical Standards for Australian Clinical Quality Registries' developed by the Australian Commission on Safety and Quality in Health Care and its partners. These will form a best practice model for national registries that are primarily focused on supporting improvement in clinical practice, specifically, clinical safety and quality. This will apply to new and existing registries and enable the Commission to lead and coordinate improvement in the quality, consistency and use of clinical registry information so it is better able to improve the safety and quality of Australian healthcare.

This pilot project, aimed to test the feasibility of implementing a National Hip Fracture Registry is a response to the Australian Commission on Safety and Quality in Health Care's tender and was initiated by the Flinders Musculoskeletal Health Research Group in collaboration with the Data Management & Analysis Centre (DMAC) at the University of Adelaide, Epworth Richmond and Goulburn Valley Health (GVH).

The reasons for considering a Registry in this area include:

1. Hip factures are a major clinical issue which is becoming increasingly important as the population ages. It is not only important in Australia but also internationally.

2. There are a number of examples internationally where considerable benefit has been obtained from Hip Fracture Registries.

3. A Hip fracture is a sentinel diagnosis *par excellence* that enables effective assessment and comparison of hospital specific outcomes.

4. A Hip Fracture Registry will establish and monitor the implementation of best practice, and will be important in assisting the development of preventive strategies.

A hip fracture is a serious and common health problem among older Australians. Hip fractures are fractures of the proximal femur. This includes fractures of the femoral neck (cervical fracture) and fractures distal to the femoral neck (intertrochanteric). Hip fractures are usually associated with

long, complicated and expensive hospital admissions and subsequent extensive utilisation of rehabilitation services. Hip fracture patients experience significant morbidity, mortality, long-term disability and loss of quality of life. Forty percent of individuals die within 2 years[1], only 50% regain the mobility and independence they had in the year prior to the fracture[2], and up to 29% require admission to residential care.[3] The costs within Australia associated with the acute care of hip fractures and subsequent supportive care are estimated at $5.6 billion a year.[4]

It is anticipated that the number of hospital admissions for a hip fracture will increase significantly as Australia's population ages. Data from the Australian Institute of Health and Welfare (AIHW)[5] indicate that total hospital admissions for either a primary diagnosis of hip fracture (21,886 cases) or secondary diagnosis of hip fracture (2,641 cases) in 2002-2003 totalled 24,627 cases. The admissions for a primary diagnosis of hip fracture increased to 27,519 in 2006-2007. The number of Australians sustaining a hip fracture each year is projected to increase by 15% every 5 years until 2026, then by 10% every 5 years until 2051.[4]

International experience indicates there are many benefits to be gained from establishing a Hip Fracture Registry. The Swedish National Hip Fracture Registry demonstrated that optimising hip fracture treatment significantly influenced the surgical outcome. One example of this was the identification that early surgery (within 24 hours of admission) was associated with a greatly reduced length of stay ($p< 0.001$). Conversely mortality was significantly higher in medically fit patients when surgery was delayed ($p<0.0001$).[6] Although on a much more limited scale, there were similar findings from analysis of data from the Redcliffe Hospital in Queensland.[7]

The recently established National Hip Fracture database in the United Kingdom has identified that it is possible to compare the performance of hospitals with respect to the outcomes of hip fracture management and that there are significant differences in the performance of individual hospitals. A variety of robust and easily validated measures relevant to hospital performance have been identified. These include time to theatre, length of stay, mortality and a number of in-hospital complications such as pressure sores. It is apparent that for optimum management of hip fracture patients there needs to be a coordinated and seamless cooperative approach with many different departments and service areas within a hospital. It is becoming increasingly clear that the outcome of hip fracture management is an excellent measure of hospital performance. It is likely that there is a similar variation in outcome in Australian hospitals. It is therefore also likely that the outcome of hip fracture will also be a very effective measure of comparing hospital performance in this country.

Hip fractures are high-cost items in the Australian health care budget and place considerable demands on the limited resources of the health care system. The high number of patients with hip fractures and the cost of treatment increase the need for prevention as well as optimization of acute hospital management, surgical intervention and appropriate discharge to achieve the best possible outcomes for patients. Identifying best practice for

elderly hip fracture patients, to enable the use of health resources effectively and efficiently, is paramount. A National Hip Fracture Registry will not only improve the quality and safety of care for these patients but may also prove to be a very efficient mechanism to compare the effectiveness of individual hospitals at providing complex acute health care.

Significance of a Hip Fracture Registry

Improving outcomes of Hip Fracture Management

It is apparent that hip fracture is a major health issue. There is strong evidence that the establishment of a National Hip Fracture Register will significantly improve the clinical outcome. This evidence is based largely on the success of internationally based national hip fracture registers. Sweden established a national register of hip fractures, the *RIKSHÖFT*, in 1988.[8] The registry was implemented by Swedish orthopaedic surgeons with the purpose of improving the quality of health care delivery. Annual reports present the outcome of quality improvement during the previous year. *RIKSHÖFT* has been validated several times. As a consequence of its effectiveness the European Commission in 1995 funded an ongoing Europe-wide project referred to as Standardised Audit of Hip fractures in Europe (SAHFE). This enabled individual hospitals throughout Europe to undertake effective audits with comparative data, within Europe. The Scottish Hip Fracture Audit has reported on the process and outcomes of hip fracture care since 1993. It now has 100% coverage of acute hip fracture data from all units. Since 2007 the National Hip Fracture Database, a joint venture of the British Orthopaedic Association and the British Geriatrics Society, allows local units to benchmark their performance in hip fracture care against national data. These national programs have been established because of the proven effectiveness of collecting and disseminating data on the management of hip fractures.

Competency Assessment of Hospitals

The Commonwealth has recently informed the States and Territories of the need to develop systems that will enable comparative analysis of hospital performance to be undertaken. Experience from International Hip Fracture Registers indicates that national registries are a cost-effective and very successful approach to achieving this.

The ongoing assessment of quality of care and patient safety are critical to maintaining high levels of health care delivery. The assessment of the outcome of hip fracture management is an excellent assessment of a hospital's competency as it engages and requires the cooperation and coordination of many areas in a hospital including the emergency, pathology and radiology departments, theatre, intensive care units, a wide range of medical specialists (Orthopaedic Surgeons, Physicians, Specialist Physicians, Anaesthetists, Geriatricians, Rehabilitation consultants etc) wards, nursing, allied health care and discharge planning.

There is now good evidence to indicate that the optimisation of hip fracture treatment influences patient outcome and this can be for up to one year after surgery. Emergency department, radiology, pathology and theatre efficiency is important to limit time to theatre as surgical delay has been associated with an increase in adverse outcomes.[9,10,11,12] A number of complications have been identified that may affect hip fracture patients, including acute confusion, pressure ulcers, cardiopulmonary events, thromboembolism, bleeding, infections and death. Length of surgical delay has a gradual effect on increasing mortality up to one year after admission even when adjusting for background morbidity.[13] Early surgical intervention has been shown to significantly reduce major medical complications in the patients rated as most ill on hospital admission. [11, 14] Even in the healthier patients, American Society of Anaesthesiologist (ASA) classification class I and II, surgery beyond one day from admission was associated with an increased risk of one year mortality and more post-operative complications. [14]

After adjusting for several possible confounders, other benefits of early (within 24 hours) compared with late operative treatment of patients with hip fracture include an improved ability to return to independent living, a reduced risk for development of pressure ulcers, and a shortened hospital stay.[15] Pressure ulcers are common following hip fracture with a reported post-fracture incidence of 10 – 40%.[16,17,18] Pressure ulcers are a significant complication as they adversely affect recovery and prolong hospitalization.[16] The prevention of pressure ulcers is an important outcome indicator of the quality of organization and monitoring of nursing care within hospitals.[19]

For optimum management of hip fracture patients there needs to be a coordinated and seamless cooperative approach involving many different departments and service areas within a hospital. Therefore the outcome of hip fracture management is an excellent measure of hospital performance. Identifying best practice for elderly hip fracture patients to enable the use of health resources effectively and efficiently is paramount. A National Hip Fracture Registry will not only improve the quality and safety of care for these patients, but also prove to be a very efficient mechanism to compare and improve the effectiveness of acute health care delivery by all hospitals involved in the management of hip fractures.

Objectives

Flinders Musculoskeletal Health Research Group in collaboration with DMAC, Epworth Richmond and GVH objectively tested and validated the draft 'Operating Principles and Technical Standards for Australian Clinical Quality Registries' through the pilot implementation of a Hip Fracture Registry at three sites within South Australia (SA) and Victoria.

Australian Commission on Safety and Quality's Objectives

The chief purposes:

1. Informing the development of Australian Clinical Quality Registry Operating Principles and Technical Standards through the application of the draft standards against an existing national registry or to the development of a new registry.

2. Identifying any issues or barriers relating to the draft standards which would limit uptake by registries.

3. Providing recommendations which will maximise benefit and knowledge gained, thus promoting best practise and optimal information for Government and other key stakeholders to make decisions on the final principles and standards to be adopted.

Flinders Musculoskeletal Research Group's Objectives

The objectives of the Flinders Musculoskeletal Health Research Group in collaboration with DMAC, Epworth Richmond and GVH include:

1. Assessing the feasibility of establishing a Hip Fracture Registry at three sites (a large metropolitan hospital, a metropolitan private hospital and a country hospital) within SA and Victoria.

2. Determining the priority, accuracy and timing of collection of the proposed data elements.

3. Exploring what is available for verification of the data.

4. Identifying any problem areas and strategies to overcome them.

Outcomes

The broad outcome for a National Hip Fracture Registry is to improve the quality and safety of care of patients following hip fracture by developing an efficient mechanism to compare and improve the effectiveness of acute health care delivery by all hospitals involved in the management of hip fractures.

The target outcome for the Hip Fracture Pilot Project is the testing and validating the draft 'Operating Principles and Technical Standards for Australian Clinical Quality Registries' through the implementation of the model of a Hip Fracture Registry at three sites (Flinders Medical Centre (FMC) – a large metropolitan hospital, Epworth Richmond – a metropolitan private hospital, and GVH – a rural referral hospital).

3. METHODOLOGY

This pilot evaluated the feasibility of establishing a National Hip Fracture Registry by assessing the development, implementation and trial protocols,

systems and data collection methods specific to the proposed registry at three sites.

Registry Data Collection

The pilot trialled the practicability of collecting a minimum data set on every patient being treated for hip fracture at each site, establishing and implementing a simple and effective method to determine the outcome at four months after surgery, and recording re-operations and mortality. State hospital discharge data were used to validate the completeness of the data set.

The Registry model developed was implemented at the following three sites:

1. a large metropolitan public hospital - FMC, Adelaide, SA
2. a large metropolitan private hospital - Epworth Richmond, Melbourne, Victoria
3. a regional referral hospital GVH, Shepparton, Victoria

The Registry model included data collection at two and for some patients three or more time points. The time points included:

1. discharge from the initial hospital admission
2. four months after hip surgery and
3. discharge if a re-operation was necessary on the initial hip fracture
4. death.

Data capture for time points 1. and 3. took place at the point of patient discharge, as it captured data across the spectrum of patient care and included multiple time frames.

The initial hospital admission data included identifying patient information, and sufficient demographic data collected to enable a four-month telephone contact, ascertainment of re-operation and or admission to hospital and linkage to the AIHW's National Death Index (NDI). These data include name, gender, date of birth, address and telephone contact details (patient and/or nominee and patient's doctor). Data relating to the fracture include date of fracture, side of fracture, type of fracture, date and time of admission to hospital, residential status, mobility, measure of health status (ASA grade), date and time of operation, type of operation, implant type (name and manufacturer), pressure ulcer classification (European Pressure Advisory Panel 1999, Grade I-IV) mortality status and discharge date and destination (Appendix 1).

Follow-up was undertaken four months after surgery to ascertain the outcome of the hip fracture. The patient or one of the patient's close relatives or carers was interviewed by telephone to establish residential status, level of mobility, hip pain, and any hospital readmissions or re-operations and mortality status. The *Extended Glasgow Outcome Scale* (GOSE), a functional outcome measure, was also administered to compare pre and post-fracture level of

function (Appendix 2). This follow-up was undertaken centrally to ensure uniform data collection.

Re-operation data were collected from patients requiring another operation on the initial hip fracture. The data collected included identifying information, so the patient could be matched with their initial hospital admission data, side and date of initial hip fracture, date of current admission, residential status, date and type of re-operation, reason for re-operation, discharge date and destination and mortality status (Appendix 3).

The approach adopted to recruit participants and collect the data differed between sites. The Registrars, Resident Medical Officers (RMO) and Interns were utilised for recruitment in the public hospitals, FMC and GVH. This approach was not possible for Epworth Richmond as the private hospital system is consultant-driven and does not have the hierarchy of junior doctors. A Research Assistant was employed to recruit and collect the data at Epworth Richmond.

In the two public hospitals consent of participants was gained by the Orthopaedic Registrars and RMOs when obtaining surgical consent. The Interns at FMC recorded the inpatient and surgical data from the medical records at time of discharge. At GVH the surgical data were recorded by the Registrars in theatre and the inpatient data were recorded from the medical records at discharge by the Intern. At Epworth Richmond the participants were consented by the Research Assistant after surgery and the inpatient and surgical data were collected from the medical records once the patient was discharged.

At four months after surgery participants were phoned by the Project Coordinator to assess the outcome of hip surgery. The phone call took an average 10 minutes to complete (ranging from 5 to 30 minutes) and covered the questions outlined in Appendix 2. These data were entered directly into the web-based NOffRA Registry data management system. If another operation was required on the initial hip fracture a re-operation form (Appendix 3) was completed by an Intern or Research Assistant at patient discharge using medical records. The initial hospital data and the re-operation data were initially recorded on paper forms and these data were entered into the web-based NOffRA Registry data management system by the Project Coordinator.

State Health Department Data

Data verification was undertaken using state separation data from the relevant states to validate the completeness of the data. Separate requests were made to SA Health and Victorian Health for data items. This process required a ‘mapping’ process to ensure linkage of data items.

Information and Communications Technology (ICT)

Description of the IMS Architecture used for the NOffRA

Figure 1 is a representation of the architecture of the Information Management system (IMS) used for the NOffRA data. This architecture is employed in all projects where DMAC has responsibility for data management. As a result the NOffRA is able to utilise a proven approach using proven technologies, facilities and software. There is a central master database and a range of facilities for adding, amending and analysing that data. It is important to understand that the database contains not only the registry data, but also registry management data. Individual components of the Figure 1 are described in detail in the following section.

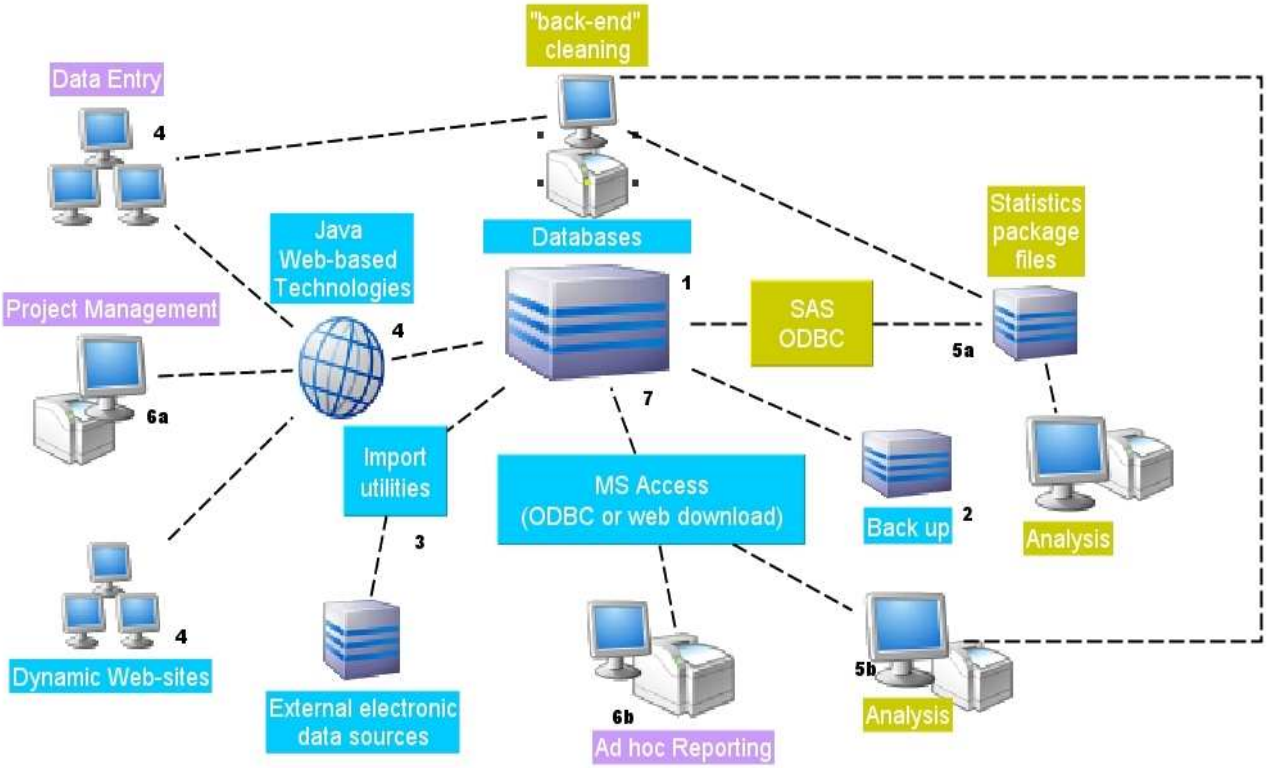

Figure 1. IMS Architecture

Database

The database (Fig 1 [1]) is implemented in Microsoft (MS) SQL Server, a platform that has proven extremely stable and reliable over many years and for many different types of projects at DMAC. The hardware on which this resides is, currently, a Dell server, running MS Windows Server. The server is set-up with RAID 1 on the boot drive – a mirrored drive – and the other storage is set to RAID 5 – data are distributed across the remaining hard drives. All the hard drives are hot-swappable. The Dell server also has two hot-

swappable power supplies. All DMAC servers are connected to uninterruptible power supplies. The NOffRA database is continuously backed up, using MS SQL Server facilities to a backup server (Fig 1 [2]) that is housed in another, geographically distant, campus of the Discipline of Public Health.

The general structure of all records in the master database is as follows:

ID	ObjID	SrceID	Registry Data	Created By	DateCreated	Discarded By	DateDiscarded

Figure 2. General Record Structure

An important feature of the way data are stored in the database is that, once stored, no data are deleted. If a record is updated, a copy of the record as it was before update is taken and flagged as "discarded" and the new updated record becomes the "current" record. Further each record has within it fields that record who created the record, the date and time it was created and, if it is a discarded record, who discarded it and the date and time it was discarded. This provides a comprehensive data change audit trail (see Appendix 4 for a screen shot example of the general record structure).

The ID/ObjID fields are an important part of a mechanism for maintaining the audit trail. Every record within a table has a unique ID. The ObjID is the ID a record keeps as it undergoes change. There will be only one "current" record with a particular ObjID. Any other records with that ObjID will be "discarded" records. A unique index on each table is used to ensure there is only ever one "current' record: that is, a record with a unique combination of an ObjID and null values in the DateDscd field.

The SrceID points to the "source" of the data in a record. The source could be a paper form or a web session or an electronic file imported from an external source.

CreatedBy/Date Created records who created the record and when; when includes date and time. Similarly, Discarded By/Date Discarded records who discarded the record and when.

The structure above is supported by the application code within any applications that can add or modify the master database. Initial data entry and subsequent changes to data need to be made through these applications to ensure the audit trail is complete.

We contend that without a data audit trail of this nature the authenticity and integrity of the data in a registry will be less than optimal.

Identity Management Subsystem

As described below, there are several entry paths to the database. These are:

1. Direct access (DMAC system administrators only).
2. Access for data entry staff (via web-based applications).

3. Access for DMAC statisticians (via ODBC; access is read-only, via views).
4. Access for NOffRA staff (via web to reports/data sets etc; access is read-only, via views).

All access to the secure facilities of the IMS requires a login and password.

The level and extent of access is determined by the role assigned or attached to a login. For example, there are NOffRA Coordinators, DMAC Data Managers, DMAC Administrators and DMAC Statisticians. The data pertaining to user roles as well as logins and passwords reside in the IMS database. The tables with these data have the same general structure and hence audit trail features as the study data tables.

Maintaining this Access Management Subsystem can be done using facilities in the IMS.

Backup

The backing up of databases to a geographically distant server has been mentioned. This happens at regular intervals during the day. In addition, each night the database is backed up to tape (Fig 1 [2]) by the University of Adelaide's Information Technology Services (ITS). The tapes are DMAC-dedicated tapes and are kept in secure storage under a commercial contract with ITS. This arrangement is quite separate from the standard backup service ITS offers to University staff and students.

Data Import

Data from almost any existing electronic source can be imported into the database (Fig 1 [3]). This can be done using MS SQL Server's Data Transformation Services (DTS), although sometimes the data will require an intervening transformation facility. DMAC uses MS Access to create these facilities.

Data Entry

Data entry (Fig 1 [4]) is done using a web-based browser application that is incorporated into the IMS. The web-based browser applications are written using Java, JSP, and simple HTML combined with Javascript. JSP allows the application to interact with the study database. The advantage of browser applications is their accessibility: they can be accessed using any computer with a suitable web browser (typically Internet Explorer 5 or later, or Firefox 5 or later) and an internet connection. As with the other IMS modules, access to the data entry facility is controlled by the IMS's Identity Management facilities.

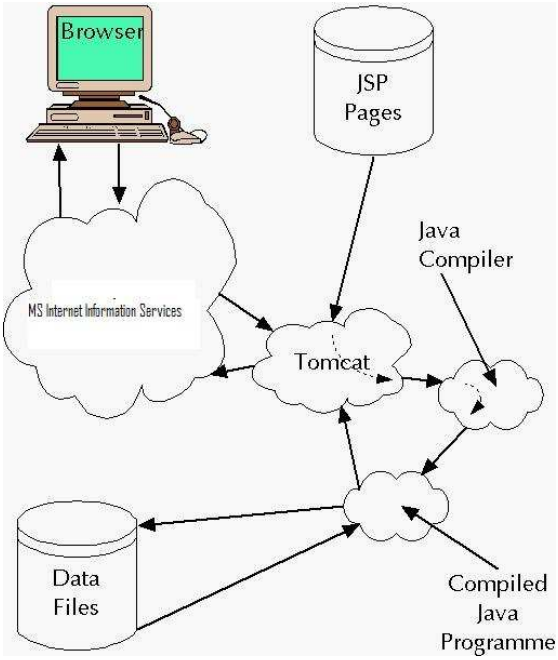

Figure 3. Web-based Browser Applications Architecture

Internet Information Services (IIS) is Microsoft's web-server software. Tomcat has been written by Apache and is an add-on to IIS to allow the use of Sun's Java Server Page (JSP) where the Apache web-server is employed. JSP enables interaction with databases and hence the serving of what are called dynamic or data-based, as opposed to static, web pages (see Figure 3).

The browser applications will be served from hardware – web servers – that are part of DMAC's infrastructure. DMAC's web servers are Dell servers, utilising RAID and, as with the database server, have redundant hot-swappable hard drives and power supplies. IIS, like SQL Server, can only run on an MS Windows Server Operating System.

4. RESULTS/DISCUSSION

During the NOffRA pilot project 190 patients were recruited to the Registry, 96 at FMC, 62 at the Epworth Richmond and 32 at GVH. The recruitment period varied from 3.5 months to 6 months because of the differential time taken to gain ethics approval at each centre. Recruitment rates varied between the hospitals; 91% at GVH, 85% at Epworth Richmond and 83% at FMC.

Table 1: NOffRA Recruitment Period and Recruitment

Centre	Recruitment Period		Fractures N	Consented N (%)
FMC	25/02/2009	21/08/2009	115	96 (83)
EHC	11/04/2009	21/08/2009	73	62 (85)
GVH	07/05/2009	21/08/2009	35	32 (91)

The 4-month follow-up is continuing with 120 (63%) completed by 30 October 2009. An additional 13 are due for follow-up with 2 patients overdue for follow-up completion. The four-month follow-up is a lengthy process involving repeated calls of varying duration ranging from 5 to 30 minutes. (See discussion in Section 6.)

Demographics

Overall the majority of the Registry participants were female (74%) with 69% at FMC, 74% at Epworth Richmond and 84% at GVH. Median age at fracture was 83, mean age 82.7, range 44–101, mean time from fracture to admission was 14.4 hours and mean time to surgery was 1.6 days. There were 90 left-sided fractures and 100 right-sided fractures and no bilateral fractures during the study period.

Residential Status on Admission

Variations between hospitals in residential status on admission was demonstrated (Appendix 5, Table A5 (6)) reflecting differences in patient populations and the type of accommodation services available. GVH had approximately 80% (25) of patients admitted from home compared to approximately 70% (42) at Epworth Richmond and 50% (49) at FMC. FMC had the highest nursing home population 27% (26), GVH had 12% (4) and Epworth Richmond 8% (5). There were no admissions to GVH from hostel accommodation or other acute hospitals.

Fractures and Surgery

Over 78% of hip fractures came from two sites. Displaced intracapsular (Garden 3 & 4) fractures (40%) were most commonly classified followed by trochanteric fractures (38.4%). There was some variation of hip fracture classification between hospitals (Appendix 5, Table A5 (12)). For example 17% of FMC's hip fractures were undisplaced intracapsular (Garden 1 & 2), and only 8.1% of Epworth Richmond's and 6.3% of GVH fractures. This difference

may be due to small numbers of hip fractures at Epworth Richmond and GVH, but may also be due to a degree of disagreement on classification between observers. For a national registry the hip fracture classification could be simplified to overcome this.

Approximately 70% of patients received a dynamic hip screw (DHS) (24.2 %), intramedullary nail (24.2%) or a cemented arthroplasty (21.1%). A comparison of the type of primary hip surgery used (Appendix 5, Table A5 (14)) highlights variation in practice between hospitals. Distinct differences exist in the use of the DHS and intramedullary nail. FMC used the DHS in 4.2% of hip surgeries compared to GVH, 53% and Epworth Richmond, 40.3%. Intramedullary Nail fixation was used in 35.4% of FMC's hip surgeries and only 16.1% by Epworth Richmond and 6.3% by GVH. A national registry would have the capacity to analyse the best type of surgery for each type of hip fracture.

Time from Admission to Surgery

The British Orthopaedic Association proposes standards for hip fracture care[20] including Standard 2: *All patients with hip fracture who are medically fit should have surgery within 48 hours of admission, and during normal working hours.*

Overall approximately 35% of patients admitted for hip fracture had surgery within the first 24 hours and 67% had surgery within 48 hours. This is consistent with the findings of the UK National Hip Fracture Database.[21] Variations between the individual hospitals exist with 44% of patients at FMC having surgery within the first 24 hours compared to 26% at Epworth Richmond and 28% at GVH. FMC's difference may be due to a change in practice resulting from a recent quality assurance project.

Time of Surgery

Differences exist between hospitals in relation to the timing of hip fracture surgery (Appendix 5, Table A5 (25)). Approximately 90% of patients at FMC had surgery between 9am and 5pm compared to 32% at Epworth Richmond. This difference in time of surgery reflects inherent differences between the public and private health systems.

Pressure Ulcers

Pressure ulcer data were poorly captured. There were differences between hospitals in recording the presence or absence of pressure ulcers with missing data ranging from 3% (GVH) to 29% (FMC) on admission (Appendix 5, Table A5 (15)) and 9% (GVH) to 32% (FMC) on discharge (Appendix 5, Table A5 (16)). We are unable to comment on any differences with regards to pressure ulcer management between hospitals due to the large amount of missing data.

Discharge destination

Over sixty percent of patients (116) came from their own home, however only 8 returned directly to home, with the majority 79 (83.2%) being discharged to a rehabilitation unit.

Variations also existed in discharge destinations between hospitals (Appendix 5, Table A5 (19)). Only 32% (31) patients from FMC were discharged to a rehabilitation unit compared to 65% (40) at Epworth Richmond and 75% (24) at GVH. Other differences included 27% (26) of FMC patients discharged to a nursing home compared to 11% (7) at Epworth Richmond and 3% (1) at GVH. These results are not surprising considering the differences existing between hospitals in residential status at admission already discussed.

Mortality

Overall, 11 patients (5.8%) died prior to discharge, 3 at Epworth Richmond, 7 at FMC and 1 at GVH (Appendix 5, Table A5 (17)).

Re-Operation Data

Six re-operations were identified during the pilot, 2 occurred at FMC and 4 at Epworth Richmond. The details of the re-operations are outlined in Appendix 5, Table A5 (49).

More detailed results, overall and with hospital comparisons are available in Appendix 5.

Data Verification

South Australia and Victoria provided separation data for the period of the pilot project (South Australia from 25/2/2009 and Victoria from 11/4/2009). As the data collection period was very limited there was only a small number of records available for comparison with the data collected in hospital by NOffRA (54 from FMC and 7 from Epworth). However, in the small sample available there was good agreement between the datasets. Hospital, gender, dates of birth, admission dates and death prior to discharge as collected by NOffRA were matched in all cases in the separation data sets.

NOffRA collected more detailed information on pre-fracture residential status and source of referral or admission, but when aggregated there was again good agreement with the state data. There was excellent concordance in the recording of appropriate Diagnosis Related Groups (DRG).

State data on principal diagnosis had few discrepancies when compared to NOffRA data. As discussed previously NOffRA collected quite detailed fracture information, and this would not be continued if nationally implemented. Data on pressure ulcers was poorly recorded in NOffRA, but the data that were collected were verified in 50% of cases.

Separation data provides additional information related to hip fractures, specifically the external cause, place of occurrence and activity during which

the fracture occurred. Falls caused by tripping were the predominant cause of NOffRA fractures. Details available using these data could help to evaluate falls prevention programs, particularly in the institutional setting.

As well understood, the majority of fractures occur in the home or the aged care setting. The separation data provides this level of data. Activity codes provide valuable additional data to that collected by NOffRA, for example fractures sustained whilst skiing or playing table tennis. However, this level of detail is poorly recorded in separation data, in approximately 25% in our sample. The separation data have also provided valuable additional data, namely the unknown dates of discharge.

This pilot has shown that it is feasible to obtain essential hospital data not available at time of surgery from state separation data.

5. DISCUSSION OF THE DRAFT 'OPERATING PRINCIPLES AND TECHNICAL STANDARDS'

Summary of Operating Principles

1. Australian Clinical Quality Registries should be developed with clear and precisely defined purposes.

This is an essential operating principle for any registry and requires identification of the problem that needs resolving. NOffRA has been designed with clearly defined purposes. These are:

1. Optimising outcomes of hip fracture management
2. Competency assessment of hospitals.

Hip facture is a major clinical issue, which is becoming increasingly important as the population ages. Hip fractures are usually associated with long, complicated and expensive hospital admissions and subsequent extensive utilisation of rehabilitation services. Hip fracture patients experience significant morbidity, mortality, long-term disability and loss of quality of life.[2, 3] The costs associated with the acute care of hip fractures and subsequent supportive care is estimated at $5.6 billion a year within Australia.[4]

There is strong evidence to suggest the establishment of a National Hip Fracture Register will significantly improve the clinical outcome for hip fracture patients. This is based on the success of internationally based national hip fracture registers. These include the Swedish National Hip Fracture Register (*RIKSHÖFT)* established in 1988 and SAHFE, the Europe-wide project established in 1995. These Registries have enabled individual hospitals throughout Europe to undertake effective audits with comparative data. With the assessment of a range of metrics across the hip fracture patient pathway such as time to theatre, pressure ulcers, length of stay and mortality, it is possible to rank hospital performance. There is also good evidence to indicate that the optimisation of hip fracture treatment influences patient outcome and this can be for up to one year after surgery. NOffRA has a similar design to these international registries for the purpose of not only establishing evidence relevant to local circumstances to improve clinical outcome and hospital performance for hip fracture patients, but provide international comparisons.

A National Hip Fracture Registry will not only improve the quality and safety of care for these patients but may prove to be a very efficient mechanism to compare the effectiveness of individual hospitals at providing complex acute health care.

2. For Australian Clinical Quality Registries to provide the maximum value to the health system they should focus their core data collection on the essential elements required to serve their main purposes.

This is an important operating principle for registries for practical and economic reasons to reduce the burden of ongoing data collection. NOffRA is

designed to collect a core minimum data set to achieve its objectives. This includes sufficient data to identify patients so they can be contacted by phone for assessment of outcomes four months after surgery. To facilitate the success of this phone review contact information about the patient's GP and their closest relative/friend are recorded in addition to their own contact details. The phone interview includes the GOSE. Other outcomes are collected if a re-operation is required or the patient dies.

These core data are sufficient for possible matching/linkage to different databases. Data matching has been tested in this pilot study by validating the data collected for the Registry from the participating sites against jurisdictional Health Department data. Data linkage with other databases and Registries including the NDI and the Australian Orthopaedic Association National Joint Replacement Registry (AOA NJRR) is planned if the pilot is successful and NOffRA is implemented nationally.

3. Data collected by Australian Clinical Quality Registries should be confined to items which are epidemiologically sound, i.e. simple, objective, and reproducible.

This is central to the success of a registry. This pilot uses data elements that are simple, objective and reproducible, such as date of hip fracture, side of fracture, time and date of admission, fracture type, implant used, ASA grade, pressure ulcer classification (European Pressure Advisory Panel, 1999), date of discharge and date of death.

The GOSE, originally designed for outcomes after brain injury was administered four months post-surgery. The GOSE has been used in the Victorian Orthopaedic Trauma Outcomes Registry for major trauma patients including non-head injured patients and has been validated by Monash University for fractured neck of femur patients. It takes into account pre-injury level of function and can be administered by proxy over the phone. These are essential characteristics for an outcome measure for this group of patients as they are trauma patients with a high percentage suffering from dementia.

4. Methods used to collect data in Australian Clinical Quality Registries should be systematic, with identical approaches used at the different institutions contributing information.

The pilot project collected the initial data elements at discharge using the patient's medical records, including case notes, electronic records and X-rays. This approach was employed at two pilot sites: FMC and Epworth Richmond. GVH completed the fracture details and surgical information data elements in theatre at time of surgery, and the remaining data elements were recorded at discharge. The advantages and disadvantages of these methods, barriers to implementation and strategies to overcome these are discussed later.

The 4-month phone review was conducted systematically using the same interviewer with an identical approach for each of the three pilot sites.

The pilot recommends a national hip fracture registry collect the essential hospital inpatient data elements from the electronic jurisdictional data. The fracture and surgical details not collected by the jurisdictions should be collected at time of surgery using the same methods as the successful AOA NJRR.

5. Outcome determination should be undertaken at a time when the clinical condition has stabilised and the outcome can therefore be reasonably ascertained.

NOffRA outcome determination was undertaken at a number of time frames. The initial outcome of surgery was assessed at discharge and short-term follow-up is at four months after surgery. The 4-month follow-up included functional and quality of life outcomes. This time frame and method is in keeping with international hip fracture registries. Four months is considered an appropriate time frame to assess the outcomes for hip fractures.[22] Due to the high mortality and deterioration of function as a result of old age it is proposed that no steady state in function is ever attained after a hip fracture and a follow-up at four months is justified as the most feasible alternative.[23]

Long-term follow-up was undertaken with additional data elements collected if the patient required a re-operation on any hip fracture recorded by the Registry. The long-term follow-up continues until death. If this pilot is successful and a National Hip Fracture Registry is established, linkage with the NDI is planned.

6. In determining the time to outcome assessment, Australian Clinical Quality Registries must consider the burden and cost of data collection together with the likelihood of loss to follow-up.

The assessment of the short-term outcomes at four months by phone was employed for the pilot as it was considered appropriate for the patient population. Phone review is an economical means of follow-up as the essential outcome information can be obtained quite quickly and is more likely to be effective in contacting the highest proportion of patients. Consideration for the four-month follow-up takes into account the requirement for clinical stability and the length of time before follow-up. The longer the time lapse the greater the cumulative loss to follow-up. This method of outcome assessment assists in limiting selection bias.

The longer term follow-up of re-operation/revision continues until the patient dies. As discussed similar methods to the AOA NJRR will be adopted for re-operation and revision if NOffRA becomes a national registry. Death will be determined by linkage to the NDI.

7. Australian Clinical Quality Registries must ensure that complete registry data are collected from the eligible population.

To ensure good quality data Australian Clinical Quality Registries must ensure that complete registry data are collected from all patients and that all eligible patients within a defined clinical population are included in the register. Case

ascertainment and an appropriate method of consent are essential to establishing the completeness of registry data from the eligible population for a registry. The NOffRA pilot case ascertainment was determined by each participating hospital.

If a national hip fracture registry is established case ascertainment will be determined from State and Territory Health Department separation data, similar to the AOA NJRR. Hospital separation data for all hip fracture cases, including any re-operations and revisions (determined by ICD-10-AM code) from each state and territory will be matched against the Registry data. Registry data will also be linked to the NDI to ensure complete capture of the eligible population with regards to mortality as an outcome measure.

An incomplete set of patient data from a clinical unit may lead to selection biases. Case inclusion is liable to be influenced – potentially to a large degree – by details of the case recruitment strategy employed. It important to adopt a case recruitment strategy that introduces as little bias as possible, preferably by choosing one that results in inclusion of all, or almost all, cases that are in-scope for the registry. The approach used to obtain informed consent for inclusion of a case in the register is particularly important.

Informed consent may mean 'opt-in' or 'opt-out' consent. 'Opt-out' consent is a passive process and assumes most people are willing to participate. The eligible patient will receive information regarding the data collection for the registry and given the opportunity at no cost to them to 'opt-out' of the Registry if they wish. It is considered technically simpler than 'opt-in' consent - an active process. 'Opt-in' has been associated with poor response rates and biased study populations. The NOffRA Pilot adopted 'opt-in' consent for logistical reasons regarding obtaining ethical approval within a tight time-frame. 'Opt-out' consent is recommended for a national registry. The difficulties caused by the 'opt-in' consent method encountered in the pilot are described in Section 6.

To capture all eligible patients to ensure an unbiased sample using a cost-effective approach we would recommend 'opt-out' consent as the recruitment strategy as participation in this Registry has a very low risk for participants and the registry will provide benefits to (future) patients and to the community.

Data collection

8. The collection of data for an Australian Clinical Quality Registry must not impact on the provision of health care and should not be a burden or incur a cost to consumers.

This is important for acceptance and compliance of Registry data collection. Data collection for NOffRA did not impact on the provision of health care and participants did not incur any costs. To achieve this, data were collected by Orthopaedic Interns in the two public hospitals and by a research assistant in the private hospital from the participants' case notes and electronic health

record, e.g. the Open Architecture Clinical Information System (OASIS) in SA. There were problems associated with this method of data collection. These are discussed in Section 6.

NOffRA participants were reviewed at the research project's expense by phone at four months after surgery to assess functional outcomes. Although the 4-month phone follow-up is considered an economical means of patient review, and while assessment of outcomes four months after injury can provide unique and potentially valuable information, doing this was time-consuming in the pilot. It would add materially to the cost of a national registry. We recommend that the value of this information should be assessed in relation to expected cost, and the assessment should consider the option of following-up a sample of cases rather than all of them.

The size of the sample required depends on the specific questions to be answered by this aspect of the registry, and these might change from time to time. For example, an analysis of the relationship between duration from fracture to surgery and an outcome such as return to independent living could probably be done with adequate precision using 4-month outcome data on a fairly small proportion of total registered cases, because the factor of interest exists for all cases that have surgery. In contrast, analysis of a question of how outcome at 4-months is influenced by a factor present in only a small proportion of cases would require either a larger sample fraction or (a potentially more complex design option) sampling restricted to a stratum of cases relevant to the question.

9. Data capture should be performed as close as possible to the time and place of care by appropriately trained data collectors.

The NOffRA pilot recommends this standard. For the NOffRA pilot, data capture took place at the point of discharge by orthopaedic interns and a research assistant. This was necessary to capture data across the spectrum of patient care which included multiple time frames. Discharge was as close as possible to the relevant care events. The pilot problems encountered with appropriate training and data capture at discharge are further examined in Section 6.

10. Data should be uniformly and easily accessible from the primary data source.

The NOffRA pilot project agrees with this principle. The NOffRA data elements collected were uniformly recorded in orthopaedic patient case notes. Not all data were easily accessible. There were difficulties obtaining some of the pre-fracture details from the case notes, including mobility status, walking aids used, and whether the patient was 'living alone'. The RMOs and Research Assistant at all three sites required assistance with the definition of the type of hip fracture and recording the details of the implant used to fix the fracture. Problems encountered with the recording of pressure ulcer details are summarised in Section 6.

11. Standard definitions, terminology and specifications should be used in Australian Clinical Quality Registries wherever possible to enable meaningful comparisons to be made and to allow maximum benefit to be gained from linkage to other registers and other databases (if approved by relevant ethics committees, etc.).

NOffRA data items are standard data items collected in hospital case notes. For example, the data element 'date of birth' is captured in the format of DDMMYYYY (METeOR identifier 287007). In the longer term it is envisaged that essential data items will be obtained from the routine hospital data electronically, i.e. the Registry will not collect these data separately. However, in this pilot project, using data items which have been defined in metadata registries such as METeOR ensures systematic data collection. Such standardization of data elements enables linkage with other databases and Registries.

12. Australian Clinical Quality Registries must use data dictionaries when they are established to ensure that a systematic and identical approach is taken to data collection and data entry. They need to publish eligibility criteria, metadata, data dictionaries, etc.

The IMS system for NOffRA has a data dictionary. NOffRA will publish eligibility criteria along with other Registry information.

13. To avoid duplicating data capture, Australian Clinical Quality Registries use data from existing data sources, including administrative data, where they are of a satisfactory quality.

This pilot project used state hospital separation data to verify hospital case data. However, if nationally implemented NOffRA would rely on the state and territory hospital separation data for some of the inpatient data as the primary source because of the difficulty collecting these case data from hospital medical records. It is anticipated that only the fracture and surgical data would be collected in the hospitals as this is not captured in the state and territory separation records.

14. Australian Clinical Quality Registries should have the capacity to enhance their value through linkage to other disease and procedure registers or other databases.

Use of patient identifiers will enable linkage with other datasets and Registries (with the appropriate consents). An obvious linkage would be with the AOA NJRR as NOffRA, if fully implemented, will need to collect details of any hip replacements that are re-operations after a hip fracture. Such a linkage would be beneficial to both Registries in ensuring maximum case ascertainment. NOffRA patient identifiers will be adequate to perform these linkages based on the experiences of the AOA NJRR. If nationally implemented, NOffRA will submit data to the NDI to determine patient survival.

Data elements

15. Australian Clinical Quality Registries should collect individually identifiable patient or subject information.

NOffRA collects first name, family name, address, hospital unit record (UR) number, date of birth (DOB), gender, Medicare number and Department of Veterans' Affairs (DVA) number (where relevant). Where possible these are collected as defined in the National Health Data Dictionary. Individually identifiable patient information is essential for outcomes follow-up in both the short (4-months post-surgery) and longer term (re-operations and mortality). It is also critical for value adding via linkages to other registries/data bases such as the Australasian Rehabilitation Outcomes Centre, NDI or the AOA NJRR.

16. Where patterns or processes of care have an established link to outcomes and process measures are simple, reliable and reproducible, they should be considered for collection by Australian Clinical Quality Registries.

This principle is relevant to NOffRA. For example NOffRA collects the time from admission to theatre and length of stay.

17. Where possible, outcomes should be assessed using objective measures. Where this is not possible, outcome should be assessed by an independent person and undertaken using standardised and validated tools.

NOffRA uses objective outcome measures such as mobility, length of stay and place of residence, but in instances where this is not possible standardised and validated outcome measures are employed, e.g. the GOSE and the European Pressure Advisory Panel 1999, Grade I – IV.

Risk adjustment

*18. Australian Clinical Quality Registries should collect objective, reliable co-variates for risk adjustment to enable factors outside the control of clinicians to be taken into account by using appropriate statistical adjustments***.**

NOffRA considers this important and is collecting a number of reliable co-variates such as gender, age, type of residence, place of residence, mobility and ASA grade.

Data security

19. To protect register data, Australian Clinical Quality Registries must utilise secure access controls and secure electronic transfer and electronic messaging systems.

High-level physical and logical security controls are in place to protect NOffRA data. These include restricted physical access, password controls at many levels, and using secure transmission protocols for data that are sent over the internet. Audit trails identify who has accessed and changed any data.

20. The collection, storage and transmission of clinical registry data must be in line with relevant legislation and guidelines.

The NOffRA Pilot Project is abiding by the *Australian Code for the Responsible Conduct of Research* the *National Statement on Ethical Conduct in Ethical Research,* and the *Information Privacy Principles*, the *National Privacy Principles,* and *Guidelines 95 and 95A* for health research under the Federal Privacy Act (1988 and amendments). The pilot utilises industry best practice tools to prevent unauthorised access.

21. Institutional policy principles set out in Part B: Technical standards should be met.

It is agreed that most of the technical standards should be met, especially those promoting the sharing of data, but this will not be completed within the timeframe of the NOffRA pilot. See the Technical Standards matrix below.

Ensuring data quality

22. Australian Clinical Quality Registries should report as a quality measure the percentage of eligible patients recruited to the registry.

The NOffRA Pilot Project considers this an essential registry principle to ensure data quality. For the pilot project each site reported their case ascertainment. Case ascertainment was achieved at FMC by cross-checking three electronic reports. These included the *FMC Previous Day Admissions (PDA) Report,* the *Weekly Surgical Report* generated by theatre and *OASIS*. The use of all three reports was necessary to ascertain which patients had surgery at FMC as not all patients admitted to FMC with a fractured hip go on to have surgery at FMC. Some patients were transferred to Flinders Private for surgery, some were returned to their original place of residence without surgery, and some patients died before surgery. It was also necessary to identify patients who sustained a hip fracture whilst currently in hospital for another admission. Knowing the number of hip fractures admitted to FMC it was then possible to calculate the percentage of eligible patients recruited to the registry.

If NOffRA is implemented on a national scale the case ascertainment will be achieved by comparing NOffRA data with state and territory separation data. This methodology has been successfully employed by the AOA NJRR.

23. Australian Clinical Quality Registries should have a robust quality control plan which allows ongoing monitoring of the completeness and accuracy of the data collected.

NOffRA has developed and implemented a quality control process similar to that successfully adopted by the AOA NJRR. This includes rigorous front and back-end controls for the data entry system.

24. Australian Clinical Quality Registry data should be checked in a sample of cases. This usually involves audit against source records. The sample size needs to be sufficient to produce reliable measures of data completeness and accuracy. The frequency of audits needs to be sufficient for data quality lapses to be identified promptly. Incomplete or inaccurate data should be identified by the data centre and remedied as soon as possible.

The NOffRA Pilot Project has conducted an audit of data collected, however we would question if this is possible for a fully implemented national registry. Rigorous quality control processes can largely obviate the need for audit. This would be a pragmatic decision based on the type and scope of the particular registry and on available resources.

25. Australian Clinical Quality Registries should incorporate in-built data management processes such as data range and validity checks.

Data range and validity checks are incorporated into the data management process. Furthermore, rigorous statistical cleaning programs have been developed to ensure data integrity.

26. Australian Clinical Quality Registry reports should be produced according to a strict timeline and should be appropriately funded to enable this to occur.

We would agree this is an important principle and would anticipate if fully implemented NOffRA would report to all stakeholders on an annual basis. For details see Principle 40.

Organisation and governance

27. Australian Clinical Quality Registries must formalise governance structures to ensure accountability, oversee resource application, provide focus and optimise output from the registry.

NOffRA agrees with this operating principle. This pilot project was controlled and managed by the Project Management Committee. There was no representation from consumers, jurisdictions or funders in this pilot project due to the time constraints for the project. These groups would have representation in a fully implemented Registry.

It is likely that if NOffRA was established nationally the AOA would use the NJRR as a "blueprint" for governance and management structures. In particular this would involve the establishment of an AOA Registry Committee to develop and manage Registry policies. This Committee would report to the AOA Board. Members of the Committee would potentially include the Chairman, Registry Director, Deputy Directors and an orthopaedic surgeon

from each state and territory. The AOA would also need to establish an external Registry Advisory Committee. This committee would have membership from stakeholders external to the AOA, in particular government, regulation, consumers, hospitals, health insurance, and medical device industry.

The AOA would appoint a director of the Registry. The director would be responsible for the day-to-day management of the Registry. The AOA would employ a Registry Coordinator to maintain cooperation of hospitals, surgeons, and government as well as implementing new strategies and coordinating the preparation of an annual report.

28. Australian Clinical Quality Registries must establish policies to manage a range of contingencies arising from the analysis of data from the registry, which includes a formal plan ratified by the Steering Committee to address outliers or unexplained variance, to ensure that quality of care issues are effectively addressed and escalated appropriately.

Once established a fully national Registry would report the data to peak bodies, funders, jurisdictions etc. The Registry's role is the establishment of systems to enable the collection, dissemination and reporting of data. Responsible bodies/institutions then have the information available to address any issues in safety and quality of care.

Data custodianship

29. Custodianship of clinical register data needs to be made explicit in Contracts and/or Funding Agreements.

In this pilot project the custodian of the data is Flinders Musculoskeletal Research Group at Flinders University. If NOffRA is nationally implemented it is proposed the AOA would be the data custodian. In this position the AOA would be responsible for contracting with the funder and would manage funds and maintain the Registry. If national, it is proposed a Steering Committee would determine Registry policies and procedures on access to data, interpretation of data and dissemination of data, including publication.

30. Data access and reporting policies for Australian Clinical Quality Registries should be made available to persons wishing to use register data.

In a national NOffRA, the Steering Committee, advised by the Management Committee, will devise a Data Request Form and Release Policy along the lines of the system implemented in the AOA NJRR. This system requires the applicant to provide information about themselves, i.e. what institution do they represent. Applicants are also asked how the information will be used, for example will it be published or presented publicly. If the data are requested as part of a research study, evidence of ethics approval is required.

31. Third parties wishing to access data and publish findings must seek approval from the Steering Committee and obtain relevant Institutional

Ethics Committee endorsement where identified or re-identifiable data or contact with patients is sought.

Third parties wishing to access data from NOffRA (if implemented nationally) will be required to comply with the Registry Data Request Policy. The requestor would be required to complete a Data Request Form and the request would be reviewed by the Registry Steering Committee. A determination will be made to either grant or deny the request. Applicants will be provided with the Committee's determination in the case of rejection and the applicant given the opportunity to resubmit the request. Requests may be denied if the custodian's designate determines that the request does not conform to the Data Release Policy.

NOffRA does not agree with releasing patient contact details to third parties or contacting patients for third parties for research purposes. Patient contact should only occur if the Registry is legislated to do so or if the participant has given written consent prior to participating in the registry for this to occur. Written prior consent or 'opt-in' consent has been discussed under Operating Principle 7 (pages 23 & 24) and in Section 6 (pages 38 & 39). **With regard to Operating Principle 31 we recommend the following wording:**

Third parties wishing to access data and publish findings must seek approval from the Steering Committee and obtain relevant Institutional Ethics Committee endorsement where identified or re-identifiable data are sought.

Ethics and privacy

With the exception of instances where data collection has been mandated through legislation or enabled through regulation or legislation:

32. Institutional Ethics Committee (IEC) approval must be obtained to establish the Australian Clinical Quality Registry.

Approval for the NOffRA (Pilot Project) data collection was obtained through each participating institution's Human Ethics Research Committee. If nationally implemented NOffRA would also apply for Federal Quality Assurance Activity status.

33. Registry personnel should be familiar with and abide by the requirements set out in relevant privacy legislation, the National Statement on Ethical Conduct in Human Research and the Australian Code for the Responsible Conduct of Research.

Project personnel engaged in the NOffRA Pilot Project are familiar with and abide by the requirements in relevant privacy legislation, the National Statement on Ethical Conduct in Human Research and the Australian Code for the Responsible Conduct of Research. NOffRA supports this principle.

34. *Participants or their next of kin should be made aware of the collection of register data. They should be provided with information about the Australian Clinical Quality Registry, the purpose to which their data will be put and provided with the option to not participate. This should be at no cost to the registry participant.*

The participants in NOffRA are elderly, 70 – 90+ years of age and a significant percentage of them suffer from dementia. It is essential that these patients are included in a hip fracture registry, but there are many instances where the patients do not have any family, they may have lost contact with their families, or their families live interstate. This is a trauma registry with the Hospital Emergency Department the point of contact for providing registry information and/or consent of participants. Often only the primary carer is present and it is time consuming to consent the next of kin.

Australian Clinical Quality Registries Operating Principles and Technical Standards do not include the primary carer as an alternate person who could be made aware of the registry data collection. As the data collection and 4-month review for NOffRA is not a 'medical research procedure' the FMC Research and Ethics Committee considered the primary carer an appropriate person to give consent for NOffRA registry data collection.

The *Guardianship and Administration Act 1986 (Vic)* also allows a primary carer to acknowledge participation of their subject in a register such as the data collection/4-month review for NOffRA as it is not a 'medical research procedure'. Each State has an Act that will give guidance regarding consent. This would need to be investigated on a state-by-state basis.

As the collection of registry data is not a 'medical research procedure' we recommend including the primary carer as a person who could be made aware of the collection of registry data in the situation where a patient cannot give consent.

35. Where projects are undertaken using register data, IEC approval must be sought unless the project falls within the scope of an institution's quality assurance activity.

For the purposes of this pilot project the data stored in the Registry will only be used for the purposes of this pilot project. If the pilot project is successful and NOffRA is implemented nationally then approval from an Institutional Ethics Committee will be necessary for any other projects that wish to use NOffRA Registry data.

Information output

36. Data from Australian Clinical Quality Registries should be used to evaluate quality of care by identifying gaps in best practice and benchmarking performance.

NOffRA agrees with this principle and will have the ability to identify gaps in best practice as well as providing benchmarks on hospital performance in hip fracture care. For example, a national registry could provide data back to hospitals of their performance and a comparison with other hospitals nationally. For details see Principle 40.

37. Australian Clinical Quality Registries must report without delay on risk-adjusted outcome analyses to institutions and clinicians.

NOffRA agrees with this principle in practice, but this was not applicable for the pilot project. A nationally implemented NOffRA would have the ability to provide these reports to the appropriate organisations. These reports could be provided via a secure web-based portal to approved stakeholders.

38. Australian Clinical Quality Registries should verify data collected using a formalised peer review process prior to publishing findings.

NOffRA agrees with this principle and again if implemented nationally would implement a system similar to that employed by the AOA NJRR. Prior to publication of the Annual Report, a group of key individuals (such as orthopaedic surgeons, geriatricians, public health physicians, epidemiologists and hospital administrators) would review and approve the contents of the report.

39. Local clinical register database managers should have the capacity to undertake ad hoc analyses of their data to enable monitoring of clinical care.

This principle was not applicable to the NOffRA pilot project as there were no local clinical registries. In a national hip fracture registry it is anticipated individual institutions, including local clinical registries would have access to their own institution's data. This could be automatically available, with appropriate access controls through the web site.

40. Australian Clinical Quality Registries must produce a publicly-accessible aggregated annual report detailing clinical and corporate findings.

If established nationally it is anticipated NOffRA would report to all stakeholders by means of an annual report. The annual report would report hospital specific data as well as the outcomes of hip surgery using a similar approach to the AOA's NJRR Annual Report. The Annual Report would be mailed to all orthopaedic surgeons and made publicly available on the Internet. Hospitals will have web-based password-protected access to their individual hospital's data in comparison to national benchmarks. Similarly medical device companies will have web-based access to a report specific to their products in relation to a report of all other products combined.

41. Australian Clinical Quality Registries must have documented procedures for reporting on quality of care, including addressing outliers or unexplained variance.

A national NOffRA will provide in its Annual Report data on quality of care as measured by data analysis of submitted data. Quality of care indices will be determined and hospital comparisons made.

Resources and funds

42. Australian Clinical Quality Registries should be appropriately funded to allow data collection, reporting and the institution of strong quality control procedures.

This pilot project assessed the feasibility of establishing a National Hip Fracture Registry. If/when the pilot project is successful monies will be made available from the appropriate funding body to continue the national implementation of the Registry.

Technical Standards Related to NOffRA

NOffRA's commentary relating to the technical standards have been summarised in the following matrix. See Table 2

Table 2: NOffRA's commentary on the technical standards

Recommended NEHTA standard	Conform	Partially conform	Non-conforming – but plan to	No – and not planned to	Not available	Requires Research	Relevance to project	Comments
E-Health Interoperability							High	
Interoperability Framework v2.0		X					High	
Unified Modelling Language v2.0						X	Low	UML is a tool that can be used to document systems. It can be used throughout the lifecycle of a system. It is useful, but not the only approach.
TOGAF "Enterprise Edition" Version 8.1				X			Unsure	
Information Technology - ODP		X					Unsure	
Clinical Communications							High	
Data Specifications		X					High	
Terminology		X					High	
Data Exchange		X					High	
Datatypes		X					High	
Unique Healthcare Identification							High	
Health Care Provider Identification		X					High	
Health Care Client Identification		X					High	
Identity Management							High	NOffRA has well developed facilities for Identity Management. Access to all NOffRA's systems and data are tightly controlled at a

Recommended NEHTA standard	Conform	Partially conform	Non-conforming – but plan to	No – and not planned to	Not available	Requires Research	Relevance to project	Comments
								physical and logical level. Detailed discussion of the approach taken and facilities available is in the Methodology section under ICT.
Authentication Assessment Methodology v1.0						X	Unsure	
Framework for Analysing, Planning and Implementing Identity Management v1.0						X	Unsure	
3 4.3 Identity Management Resource Set 16						X	Unsure	
AGAF						X	Unsure	
ACSI 33						X	Unsure	
Security Techniques							Unsure	
OASIS eXtensible Access Control Markup Language (XACML) TC						X	Unsure	
OASIS Security Services (SAML) TC v2.0						X	Unsure	
Secure Messaging							High	
Web Services		X					High	Web services is an important technology to bring about interoperability in all areas not just security. As NOffRA develops it will be important to use web services. This will be possible.
XML		X					Low	XML is a tool to be used where needed. If a need is identified it will be used in

Recommended NEHTA standard	Conform	Partially conform	Non-conforming – but plan to	No – and not planned to	Not available	Requires Research	Relevance to project	Comments
								NOffRA.
Supply Chain								
Supply Chain							**Not applicable - might be applicable in the area of terminology**	**Individual prosthesis information is not being collected, but we are identifying prosthesis types and this is where terminology might be relevant**
Engagement & Adoption							High	
Understanding Standards						X	High	
Corporate governance of information and communication technology						X	High	

6. ANALYSIS OF THE LEARNING GAINED

Consent for Registry in relation to Operating Principle 7 & 34:

Australian Clinical Quality Registries must ensure that complete registry data are collected from the eligible population.

Participants or their next of kin should be made aware of the collection of register data. They should be provided with information about the Australian Clinical Quality Registry, the purpose to which their data will be put and provided with the option to not participate. This should be at no cost to the registry participant.

The 'opt-in' consenting process was adopted for the NOffRA Pilot Project. This was discussed by the Project Management Committee and considered the most appropriate form of consent for the pilot project for ease of ethical approval from the appropriate Human Research Ethics Committees (HREC). Delayed ethical approval was considered a risk factor with the Christmas/New Year recess for HRECs looming and inherent mechanisms of HRECs. The 4-month post surgery follow-up data collection was deemed important and with the limited time frame available for the project early ethical approval was essential. It was thought HRECs traditionally were more comfortable with 'opt-in' consent, and 'opt-out' consent would further delay ethical approval. The nature of the eligible population was a factor. The majority of people who fracture their hip are 80 years and older and many suffer from dementia. These patients require third party consent to participate in the Registry and therefore 'opt-in' consent for this population was considered most appropriate for speedy ethical approval.

The 'opt-in' consenting process for the Pilot has proved difficult for the following reasons;

1. At FMC the consenting process was the responsibility of the RMOs. The Orthopaedic RMOs consented the patients for the NOffRA Registry when they did the surgery consent. In a busy ED this was at times either overlooked as patient care is a priority, or the consent form was misplaced. Chasing NOffRA Registry consent forms was very time consuming.

2. Two RMOs were responsible for consenting eligible patients for NOffRA at FMC, Monday to Friday 8am to 5pm. Outside of these hours the Registrars on-call for ED were responsible. FMC has 5 Registrars with a possibility of an additional 3 Registrars on-call from the Repatriation General Hospital. The Registrars are either Overseas Fellows or on the Orthopaedic Surgery Training Program and rotate every 6 – 12 months. As fractured hip cases are traumatic there is the possibility of admissions 24 hours/7 days per week. The responsibility of consenting the patients to the NOffFA Registry was pooled between 10 doctors with various rotations every 3 – 12 months. In this situation

it is easy for consenting to be someone else's problem, particularly near the end of a roster.

3. In most private hospitals there are no junior doctors to complete the consent process. At Epworth Richmond it was necessary to employ a research assistant to do this. This is an additional cost and is very time consuming as getting access to these patients or their third party after surgery can be difficult.

4. Patients admitted by ambulance from nursing homes are often not accompanied by a third party who could give consent for the NOffRA Registry. In this situation surgical consent often occurs via phone. It was then necessary to track down the appropriate person to consent for NOffRA.

Outcome of the NOffRA Consent Process

1. FMC: 96 out of 115 patients (83.4%) admitted for hip fractures were consented to NOffRA. Fifty three patient's (52.5%) consent was obtained after the patient was discharged.

2. Epworth Richmond: 62 out of 73 patients (85%) admitted for hip fractures were consented to NOffRA.

3. GVH: 31 patients out of 35 patients (88.6%) admitted for hip fractures were consented to NOffRA.

The NOffRA Project Management Committee is conscious that 'opt in' consent led to the collection of a smaller fraction of cases, but for the pilot the assessment of the data quality (priority of proposed data elements and accuracy and timing of proposed data elements) and the ability to validate different data elements against jurisdictional inpatient data were fundamental to the project and delayed ethical approval was identified as a risk factor.

Recommendation:

Involvement in a Registry such as NOffRA is considered low risk for participants. If this pilot is successful and a national registry is funded to capture all eligible patients using a cost-effective approach **we would recommend 'opt-out' consent as the recruitment approach**. This would involve providing potential participants or their carers with information about the register and a cost free option to 'opt off'.

The 'opt-out' approach is discussed by the 'Operating Principles and Technical Standards' document under *Ethics and Privacy* p53 – 54. 'Opt-out' is recommended as the standard approach for the establishment of new registries. **We recommend the inclusion of an *Operating Principle* stating 'opt-out' consent as a guideline for the operation of Australian Clinical Quality Registries**.

Case Ascertainment in relation to Operating Principles 7 and 22:

Australian Clinical Quality Registries must ensure that complete registry data are collected from the eligible population.

Australian Clinical Quality Registries should report as a quality measure the percentage of eligible patients recruited to the registry.

To ensure good quality data Australian Clinical Quality Registries must ensure that complete registry data are collected from all patients and that all eligible patients within a defined clinical population are included in the register. Case ascertainment and an appropriate method of consent are essential to establishing the completeness of registry data from the eligible population for a registry. The NOffRA pilot project case ascertainment to determine the 'eligible population' was undertaken by each participating hospital. This was time consuming requiring cross-checking from several sources.

Flinders Medical Centre

Case ascertainment was achieved at FMC by cross-checking three electronic reports/systems made available by the Information Technology (IT) Department and Theatre. The reports include the *PDA Report* from the IT Department and the *Weekly Surgical Report* generated by theatre. Both reports were emailed to the site coordinator. The *PDA Report* was emailed automatically once set up, but the *Weekly Surgical Report* was a report sent each week by the theatre staff. *OASIS* was accessed to confirm the data from the two reports.

The *Previous Day Admission Report* outlined all emergency patients admitted to FMC including their initial diagnosis. This was checked daily by the site coordinator. Not all these patients went on to surgery at FMC. The *Weekly Surgical Report* describing all orthopaedic surgical procedures at FMC confirmed which patients went on to surgery. Twenty two of 138 patients (15.9%) admitted for a hip fracture did not progress to surgery. Eighteen (13%) patients were transferred to Flinders Private for surgery, and 4 patients (2.9%) were not eligible for surgery. These included one patient discharged as the x-ray revealed no evidence of a fracture, one patient's x-rays revealed an old hip fracture, one patient was not fit for surgery and one patient died before surgery. This information was sourced from the discharge summaries reported electronically in *OASIS*.

The *Weekly Surgical Report* was also important as it identified those patients who fractured their hip while they were in hospital for another admission. Two patients (1.4%) were medical inpatients who fell on the wards and subsequently underwent surgery for a hip fracture.

Epworth Richmond

Case ascertainment at Epworth Richmond was managed by the Research Assistant who searched the inpatient management (IPM) database on a regular basis for patients requiring surgery for a fractured hip at Epworth

Richmond. Once identified these patients or their carers were approached for consent or third party acknowledgement for NOffRA data collection.

To identify re-operations the Research Assistant reviewed the daily nursing handover sheet. To verify all the re-operations were identified, at the end of the study the Research Assistant searched for every participant's inpatient history using the IPM and was able to identify if patients had been re-admitted after their initial hip surgery.

Goulburn Valley Health

Case ascertainment at GVH was managed by the Orthopaedic Registrar. Patients were identified for participation in NOffRA on admission to hospital with a hip fracture.

Recommendation:

The methods for case ascertainment adopted by the pilot sites are not sustainable for a national registry involving over 300 hospitals. If this pilot is successful and a national hip fracture registry is established **it is recommended that case ascertainment is determined by links with each State and Territory Health Department's hospital separation data similar to the method used by the AOA NJRR.**

Efficient, accurate data collection in relation to Operating Principles 4, 9, 10 & 13:

Methods used to collect data in Australian Clinical Quality Registries should be systematic, with identical approaches used at the different institutions contributing information.

Data capture should be performed as close as possible to the time and place of care by appropriately trained data collectors.

Data should be uniformly and easily accessible from the primary data source.

To avoid duplicating data capture, Australian Clinical Quality Registries use data from existing data sources, including administrative data, where they are of a satisfactory quality;

For the NOffRA pilot data capture took place at the point of discharge. This was necessary to capture data across the spectrum of patient care which included multiple time frames.

The Orthopaedic Interns at FMC are responsible for writing the patient's discharge summary. For this reason the Project Management Team identified the Interns as the most appropriate persons for recording the NOffRA data from the patient's medical records (case notes, electronic records and X-rays). The data were recorded on paper forms and later entered into the registry by trained personnel. At any one time there are three Orthopaedic Interns at

FMC and they rotate between medical/surgical specialities every three months. Adequacy of training and supervision of data collection are difficult using this model as there is a constant turn over of doctors. Interns have a busy schedule and the NOffRA hospital data collection was additional to their daily work commitment. As several interns were responsible for the data collection this too easily became someone else's problem. The efficiency and accuracy of this method were low. The Interns had to be constantly reminded to complete the NOffRA hospital data forms and often this was left to one Intern at the end of a rotation. If this was not done the Interns from the next rotation had to complete the backlog.

The accuracy of completion of the NOffRA hospital data was dependent on the individual Intern. Of a sample of 68 forms reviewed by the Site Coordinator, 57 were completed by Interns and 11 had been completed by the Site Coordinator. The forms completed by the Interns were reviewed and 45 forms had missing or incorrect data recorded that were subsequently corrected by the Site Coordinator. Fracture and surgical details (Appendix 1, Q.20 to Q.29) were missing in 29 forms with one missing data point in 12 forms, 2 missing data points in 10 forms, 3 missing data points in 4 forms and more than 3 missing data points in 3 forms. Question 24: the type of fracture question 28: the name of the implant and question 29: the manufacturer(s) of the implant were most often missing. Incorrect data in 17 forms was mostly detected in the fracture and surgical details with the type of fracture (4 forms) and name of implant (4 forms) most often recorded incorrectly, but also incorrect details of primary hip surgery, fracture side and ASA selected.

It was more difficult to review the accuracy of the pre-fracture details, pressure ulcer and discharge information. Only problems identified by the Site Coordinator when interviewing participants at 4 months after their hip surgery were identified. Fourteen of the 57 forms were identified as having missing or incorrect pre-fracture details, pressure ulcer and discharge information.

Both the efficiency and accuracy of the initial hospital data recorded by the Interns at discharge was low. FMC is a model for large metropolitan public hospitals in Australia. The difficulties experienced with data capture by Interns at FMC may potentially occur in all large metropolitan public hospitals throughout Australia.

Based on work at the Epworth Richmond, the investigators of this pilot project anticipate that data collection in private hospitals would impose a cost burden on the registry or the health care system if the pilot model of data collection were to be adopted. This is an important consideration for a national hip fracture registry.

Recommendation:

It was not possible to capture the NOffRA data from the primary data source as it is necessary to record data across the spectrum of patient care including multiple time frames. For both efficiency and accuracy **we recommend the fracture and surgical details required for NOffRA are captured in**

theatre (the primary data source) by trained theatre staff with a surgeon responsible for each hospital using a similar method to the successful AOA NJRR. The remaining essential hospital data required should be obtained electronically from existing data sources, in particular the individual State and Territory Health Departments' separation records.

Outcomes assessment in relation to Operating Principle 6:

In determining the time to outcome assessment, Australian Clinical Quality Registries must consider the burden and cost of data collection together with the likelihood of loss to follow-up.

The outcomes assessment at four months after surgery was carried out by phone interview of the participant or one of their close relatives or carers. This established residential status, level of mobility, hip pain, any hospital readmissions or re-operations, mortality status and the GOSE was conducted. The interview was conducted centrally by the Project Coordinator.

The four-month outcomes assessment is in progress at the time of writing this report. The details to date are outlined in Table 3. On average each review required two phone calls (minimum one call and maximum 13 calls) to the participant, one of their close relatives or a carer before the assessment could be conducted. Of those participants reviewed 12 (17.6%) had an incorrect phone number recorded.

Table 3: Number of participants phoned for 4-months outcomes assessment

No. of participants contacted by phone/no. of calls	No. of outstanding phone contacts/no. of calls	No. of phone contacts recorded incorrectly	No. of participants unable to contact/no. of calls
Flinders Medical Centre			
41/72	0	9	1/12
Epworth Richmond			
22/59	5/10	1	0
Goulburn Valley Health			
5/6	1/4	2	0
Total			
68/137	6/14	12	1/12

So far we have been able to contact most participants, their close relative or their carer for a phone interview. However, the burden and cost of this approach must be taken into consideration for a national registry. An average of two calls have been necessary to get in touch with participants and the phone interviews once contacted have taken between 5 – 30 minutes to conduct with an average of 10 minutes per call.

Recommendation:

Assessment of outcomes four months after injury can provide unique and potentially valuable information, but was time-consuming in the pilot. It would add materially to the cost of a national registry. **We recommend that the value of this information should be assessed in relation to expected cost, and the assessment should consider the option of following-up a sample of cases rather than all of them.**

Capture of NOffRA Re-operations in relation to Operating Principle 7

Australian Clinical Quality Registries must ensure that complete registry data are collected from the eligible population.

For case ascertainment of re-operations for registry patients the same methods were employed as those to identify the initial hip surgery. Re-operations were more difficult to identify if they occurred in the initial admission as the theatre data or other electronic management systems had to be routinely reviewed manually by the Site Coordinator.

The number of re-operations identified at:

1. Epworth Richmond, 4 out of 62 patients
2. FMC, 2 out of 96 patients
3. GVH, 0 out of 31 patients

Refer to Appendix 6, Table A49 for details. At FMC **none** of the re-operations were identified by the Interns or appropriate forms completed when the patient was discharged.

Recommendation:

If this registry becomes national **methods similar to those used by the AOA NJRR for identifying re-operations will need to be employed.**

Pressure Ulcers in relation to Operating Principles 3, 4, 17

Data collected by Australian Clinical Quality Registries should be confined to items which are epidemiologically sound, i.e. simple, objective, and reproducible.

Methods used to collect data in Australian Clinical Quality Registries should be systematic, with identical approaches used at the different institutions contributing information.

Where possible, outcomes should be assessed using objective measures. Where this is not possible, outcome should be assessed by an independent person and undertaken using standardised and validated tools.

The European Pressure Advisory Panel 1999, Grade I-IV pressure ulcer classification was employed for the pilot. Although several pressure ulcer

classification systems may be used most classification systems describe four ulcer stages.[24] To allow comparison grading systems which define a grade two pressure sore as 'partial thickness skin loss or damage involving epidermis and/or dermis'[20] similar to the European Pressure Advisory Panel 1999 should be used.[20] The quality of data depends on the existence of good inter-rater reliability and documentation.

We question the quality of the sites reporting of pressure ulcer existence on admission and discharge. There were differences between hospitals in the recording of the presence or absence of pressure ulcers with missing data ranging from 3% to 32%. (Appendix 5, Tables A15 & A16) The reporting of pressure ulcer development may be less likely where the awareness of pressure ulcer care is poor.

An alternative is monitoring the state and territory separation data ICD-10 – AM codes would identify pressure ulcers in patients who also had a primary diagnosis of a hip fracture. These data allow the estimation of incidence, but do not identify the hospital acquisition of pressure ulcers (though the recently introduced "present on admission" codes might do so) or the grading of pressure ulcers.

7. PROBLEMS OR ISSUES ENCOUNTERED DURING THE PROJECT WERE RESOLVED.

PROBLEM	BARRIERS	SOURCE OF PROBLEM	HOW PROBLEM WAS RESOLVED
Delays in ethics submissions	Project commencement end of 2008, just prior to Christmas break	Lead-up time to ethics submission too short for submission of 3 different hospital applications to December HREC meetings HRECs January recess Annual leave for project team over Christmas/New Year – varying times spanning 2 months leading to difficulties for early group planning meetings	Initial PMC meeting held early, 5/11/08 to decide on data collection for Registry - as ethics submissions a priority. Ethics submission priority - to FMC on 25/11/2008 before the HREC Christmas/New Year recess and ARL for PMC.
Sub-contracts delayed	Delays in drafting sub-contracts	Flinders University Office of Research part-time lawyer/contract staff member 2 x annual leave for Office of Research contact lawyer early 2009 lawyer/contract staff on annual leave in consecutive months FMC Business Manager on 6 weeks annual leave over Christmas and New Years Business Manager – resignation on return from annual leave	Project Coordinator took over negotiations and liaised closely with Flinders University Office of Research from Business Manager
	Delays in signing sub-contracts	University of Melbourne – required ethics approval from GVH HREC before signing contract Ethics application approval delayed - approval given by HREC pending satisfactory response to queries	As experienced delays with ethical approval as well signing of contract - data collection commenced at GVH as soon as ethical approval was gained. FMC and Epworth Richmond data collection commenced upon ethical

PROBLEM	BARRIERS	SOURCE OF PROBLEM	HOW PROBLEM WAS RESOLVED
			approval from these institutions.
Release of funds	Sub-contracts for all 3 parties had to be signed before any funds were released from Flinders University	DMAC and Epworth Foundation sub-contracts signed GVH – require HREC ethics approval before signing sub-contract	Negotiations with the FU Office of Research enabled funds to be released to DMAC and Epworth Richmond before University of Melbourne contract was signed.
	Ethics applications must be approved from all 3 sites before any funds are released	Office of Research at Flinders University will consider a formal request for release of funds if necessary	Negotiations with the FU Office of Research enabled funds to be released to DMAC and Epworth Richmond before GVH ethics approval and University of Melbourne contract signed.
Ethics approval	HREC's have January recess	Delay in ethical approval for Epworth Richmond and GVH	Ethics submissions prepared for early February submission to Feb/March HREC meetings.
	Structure of Epworth Richmond's Ethics meetings	Epworth Richmond only accepts 4 submissions for ethical review to each monthly meeting.	Reserved a place for NOffRA's Ethics application so it did not miss March meeting.
	GVH HREC meets every 2 months	First HREC meeting for 2009 was 25 February.	Ethics application ready for submission on 11/02/09 (Meeting 25/02/2009)
	One month annual leave for GVH HRECs Coordinator in March 2009	GVH HREC Executive Secretary went on 4 weeks annual leave immediately after the first HREC meeting in Feb 2009 without notifying applicants of Ethics Committee's questions/concerns. Notification by HREC to project team of the outcome of the February HREC meeting	After several enquiries by Site Coordinator re the status of GVH ethics application – project team had to wait for the return of the GVH HREC Executive Secretary. Once notified of outcome of ethics application the responses to their

PROBLEM	BARRIERS	SOURCE OF PROBLEM	HOW PROBLEM WAS RESOLVED
		occurred in early April	concerns were answered ASAP.
Consent	Pilot project requires opt-in consent	Informed consent Admission to hospital at irregular times due to traumatic nature of condition	Consent sought during hospital admission – not just in ED when consenting for surgery. For a National Registry recommend opt-off consent.
	Large proportion of dementia patients	Third Party/Acknowledgement of Consent difficult as carer not always present in ED	Consent sought during hospital admission – not just in ED when consenting for surgery.
	Registrars and Overseas Fellows consenting patients when consenting for surgery	Recruitment missed Difficulties tracing consented patients/consent forms	Weekly audits completed by Project Coordinator RMOs made aware of missing consents RMOs made responsible to chase missing consents.
Data completion	Interns completing data forms	Additional workload for busy doctors Incomplete forms Missing forms Difficulties completing some questions: fracture classification surgical information ASA grade	Weekly audits completed by Project Coordinator Interns made aware of missing data forms Project personnel complete missing data where possible using electronic sources, e.g. the Picture Archive Communication System (PACS), OASIS, a Weekly Surgical Report, the PDA report at FMC and the IPM (Epworth Richmond).

PROBLEM	BARRIERS	SOURCE OF PROBLEM	HOW PROBLEM WAS RESOLVED
Case ascertainment	No single electronic method available	To ascertain hip fracture patients at FMC use a combination of IT reports: PDA Weekly Surgical Report OASIS	Continued with current system for Pilot as necessary to capture all hip fractures. For a National Registry the use of jurisdictional health data for case ascertainment using a similar method to the AOA NJRR.
Public hospitals medical staff	Medical staff responsible for recruitment and data collection - Up to 12 medical staff responsible at FMC	Missing consent and data forms	Persevered with this method for pilot. FMC used retrospective consent For pilot used reminders and weekly audits to help RMOs catch up with consents Recommend opt-off consent for a National Registry For a National Registry recommend collect only theatre data in hospitals by similar methods to the successful AOA NJRR. Hospital data sourced from State Health Department Discharge data.
	Medical staff rotations - Fellows, Registrars, RMOs and Interns – each group rotates at different time frames – difficulty with Registry training	Missing consent and data forms	FMC used retrospective consent. For pilot used reminders and weekly audits to help Interns catch up with data collection. For a National Registry recommend collect only theatre data in hospitals by similar methods to the successful AOA NJRR. Hospital data sourced from State Health Department Discharge data.

PROBLEM	BARRIERS	SOURCE OF PROBLEM	HOW PROBLEM WAS RESOLVED
	Additional workload for medical staff -Junior doctors already have heavy clinical workload	Data form completion	
Private hospital medical hierarchy	Consultant driven – don't have hierarchy of junior doctors – pay staff to recruit and collect data	Consent and data form completion Budgetary implications	Research Assistant employed to recruit participants and collect data for study. Not sustainable for an ongoing Hip Fracture Registry. For a National Registry only collect theatre data in hospitals by similar methods to the successful AOA NJRR. Hospital data sourced from State Health Department Discharge data
State Hospital data	Coding – matching State Health Department data with Registry data	Validation of Registry data	
	Access to Victorian State Health Department data	Validation of Registry data	

8. EVALUATION INFORMATION USEFUL TO THE IMPLEMENTATION OF THE 'OPERATING PRINCIPLES AND TECHNICAL STANDARDS FOR AUSTRALIAN CLINICAL QUALITY REGISTRIES'

Alterations and Additions to the Operating Principles

1. The 'opt-out' approach is discussed in the 'Operating Principles and Technical Standards' document under *Ethics and Privacy* p53 – 54. 'Opt-out' is recommended as the standard approach for the establishment of new registries. We suggest this needs to be stated explicitly.

We recommend the inclusion of an *Operating Principle* explicitly stating 'opt-out' consent as a guideline for the operation of Australian Clinical Quality Registries.

2. Australian Clinical Quality Registries Operating Principles and Technical Standards do not include the primary carer as an alternate person who could be made aware of the registry data collection. As the data collection for registries is not a 'medical research procedure' the primary carer can be nominated as an appropriate person to give consent/acknowledgement for registry data collection.

We recommend including the primary carer as a person who could be made aware of the collection of registry data in the situation where a patient cannot give consent.

3. The current document does not provide much guidance on the IT requirements for Registries. We believe that recognition and acknowledgement of the IT requirements necessary to implement robust data management principles need to be included in the Operating Principles, including the use of industry standard products.

We recommend the inclusion of an *Operating Principle* encouraging the establishment of Registries by groups or organisations with appropriate technical infrastructure and technical support.

4. NOffRA does not agree with releasing patient contact details to third parties or contacting patients for third parties for research purposes. Patient contact should only occur if the Registry is legislated to do so or if the participant has given written consent prior to participating in the registry.

We <u>do not</u> recommend registries releasing patient contact details or contacting patients for third parties for the purpose of publishing findings.

APPENDIX 1

NECK OF FEMUR FRACTURE REGISTRY OF AUSTRALIA (Pilot Project) Flinders Medical Centre - Initial Hospital Data	
CONTACT DETAILS (place patient details label below, if patient details not on hospital label please complete details)	
1. UR number	☐☐☐☐☐☐☐☐
2. Family name	
3. Given names	
4. Sex	☐ male ☐ female
5. Date of birth	☐☐/☐☐/☐☐☐☐
6. Medicare number	☐☐☐☐☐☐☐☐☐☐
7. DVA number	☐☐☐☐☐☐☐
8. Address	no./street
	city postcode ☐☐☐☐
9. Phone number	home: (_ _) _ _ _ _ _ _ _ _ mobile: _ _ _ _ _ _ _ _ _ _
10. Alternative contact	name relationship
11. Alternative contact phone	home: (_ _) _ _ _ _ _ _ _ _ mobile: _ _ _ _ _ _ _ _ _ _
12. GP name	Dr
13. GP address	no./street
	city postcode ☐☐☐☐
14. GP phone number	phone: (_ _) _ _ _ _ _ _ _ _
15. Interpreter required	☐ yes ☐ no **if yes,** ☐ family member ☐ professional language ……
PRE-FRACTURE DETAILS (immediately prior to the fracture)	
16. Admitted from (please choose one only - the option that best applies)	☐ home ☐ permanent hospital resident ☐ acute hospital ☐ nursing home ☐ residential care ☐ rehab unit ☐ hostel ☐ other……..
17. Living alone (choose one only)	☐ yes ☐ no ☐ institutional care ☐ not documented
18. Walking - refers to the patients normal walking ability right before the fracture occurred. (please choose one only)	☐ alone out of doors ☐ indoors if accompanied ☐ outdoors if accompanied ☐ unable to walk ☐ alone indoors, not out of doors ☐ not documented
19. Walking aids (please choose one only)	☐ no aids ☐ walking frame ☐ not documented ☐ one stick ☐ wheelchair ☐ two sticks ☐ bed bound

FRACTURE DETAILS	
20. Date of hip fracture	☐☐/☐☐/☐☐☐☐ ☐ unknown
21. Date & time of admission	☐☐/☐☐/☐☐☐☐ ☐☐☐☐ hrs
22. Side of hip fracture	☐ right ☐ left (if bilateral fractures use 2 forms)
23. Pathological hip fracture	☐ yes ☐ no
24. Type of hip fracture (Choose the area of bone where the main fracture line crosses the femur)	☐ undisplaced intracapsular (Garden 1 & 2) ☐ displaced intracapsular (Garden 3 & 4) ☐ basocervical (lateral side of neck) ☐ trochanteric ☐ subtrochanteric ☐ other …….
SURGICAL DETAILS	
25. Date & time of surgery	☐☐/☐☐/☐☐☐☐ ☐☐☐☐ hrs
26. ASA grade	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ not recorded
27. Primary hip surgery	☐ single screw ☐ two screws ☐ three screws ☐ DHS ☐ intramedullary nail ☐ cemented hemiarthroplasty ☐ uncemented hemiarthroplasty ☐ THR ☐ conservative ☐ other……...
28. Name of implant	
29. Manufacturer of implant	
PRESSURE ULCERS	
30. Pressure ulcer on admission (please choose one only)	☐ no pressure ulcer ☐ stage 3 ☐ stage 1 ☐ stage 4 ☐ stage 2 ☐ unstageable ☐ not recorded
31. Pressure ulcer on discharge (please choose one only)	☐ no pressure ulcer ☐ stage 3 ☐ stage 1 ☐ stage 4 ☐ stage 2 ☐ unstageable ☐ not recorded
DISCHARGE INFORMATION	
32. Deceased	☐ yes ☐ no **If yes,** date ☐☐/☐☐/☐☐☐☐ ☐ date of death unknown
33. Discharge date from acute ward	☐☐/☐☐/☐☐☐☐
34. Discharge destination (please choose one only - the option that best applies)	☐ home ☐ permanent hospital resident ☐ acute hospital ☐ nursing home ☐ residential care ☐ rehab unit ☐ hostel ☐ other…….

APPENDIX 2

NECK OF FEMUR FRACTURE REGISTRY OF AUSTRALIA (Pilot Project)

Flinders Medical Centre - 4 month phone interview - Please answer all questions

35. UR Number	☐☐☐☐☐☐☐☐
36. Family Name	
37. Given Names	
38. Sex	☐ Male ☐ Female
39. Date of Birth	☐☐/☐☐/☐☐☐☐
40. Home phone number	
41. Mobile phone number	
42. Next of Kin/Alternative phone number.	
43. Interpreter required	☐ No ☐ Family member ☐ Professional
44. Date of Hip Fracture	☐☐/☐☐/☐☐☐☐
45. Side of Hip Fracture	☐ Right ☐ Left
46. Date and Time of Completion	☐☐/☐☐/☐☐☐☐ ☐☐☐☐ hrs
47. Data Collection - Able to collect	☐ Yes ☐ No (please provide an explanation) ……
48. Data collected from	☐ Patient ☐ Family member ☐ Other (please specify) ……..
49. Contact Attempts	1. Date/Time: ☐☐/☐☐/☐☐ ☐☐☐☐hrs Notes…….. 2. Date/Time: ☐☐/☐☐/☐☐ ☐☐☐☐hrs Notes…… 3. Date/Time: ☐☐/☐☐/☐☐ ☐☐☐☐hrs Notes……

50. Residential status (Choose the options that best applies)	☐ 1. home ☐ 5. permanent hospital resident ☐ 2. residential care ☐ 6. rehab unit ☐ 3. hostel ☐ 7. acute hospital ☐ 4. nursing home ☐ 8. other ……..
51. Walking	☐ alone out of doors ☐ indoors if accompanied ☐ outdoors if accompanied ☐ unable to walk ☐ alone indoors, not out of doors ☐ not documented
52. Walking aids (Aids normally used 4 months after hip fracture)	☐ no aids ☐ walking frame ☐ one stick ☐ wheelchair ☐ two sticks ☐ bed bound
53. Hip pain (choose the most relevant option)	☐ The pain in my hip is severe and spontaneous. I experience it even when I am not moving ☐ The pain in my hip is severe when I attempt to walk and it prevents all activity. ☐ The pain in my hip is tolerable, permitting limited activity. ☐ The pain in my hip occurs only after some activity and disappears quickly with rest. ☐ The pain in my hip is slight or intermittent. I experience pain when starting to walk, but the pain gets less with normal activity. ☐ I experience no pain in my hip. ☐ unable to answer
54. Type of stay / re-admissions For type of stay, use options in question 16. For days, give number of days stay at each residential category from the time of discharge from primary admission up to 90 from fracture. For reason use the following codes: 1=surgical complications requiring re-operation (complete questions form 3 for each re-operation) 2=surgical complications not requiring re-operation 3=medical complications related to hip fracture 4=failure to manage at place of origin due to NOF# 5=reasons not related to hip fracture 6=return to place of origin 7=unknown / not stated	1. ☐ type of stay ☐ days ☐ reason 2. ☐ type of stay ☐ days ☐ reason 3. ☐ type of stay ☐ days ☐ reason 4. ☐ type of stay ☐ days ☐ reason 5. ☐ type of stay ☐ days ☐ reason 6. ☐ type of stay ☐ days ☐ reason
Death (if within 4 month of fracture give date of death)	Death ☐☐/☐☐/☐☐☐☐ ☐ Date of death unknown ☐ Alive

2. GLASGOW OUTCOME SCALES INTERVIEW

Consciousness

1. Is the person able to obey simple commands? No ☐ Yes ☐

Anyone who shows ability to obey even simple commands, or utter any word or communicate specifically in any other
way is no longer considered to be in the vegetative state. Eye movements are not reliable evidence of meaningful responsiveness. Corroborate with nursing staff.

Independence in the home

2a. Is the assistance of another person at home essential every day for some activities of daily living? No ☐ Yes ☐

For a 'No' answer they should be able to look after themselves at home for 24 hours if necessary, though they need not actually look after themselves. Independence includes the ability to plan for and carry out the following activities: getting washed, putting on clean clothes without prompting, preparing food for themselves, dealing with callers, and handling minor domestic crises. The person should be able to carry out activities without need prompting or reminding, and should be capable of being left along overnight.

2b. Do they need frequent help or someone to be around at home most of the time?
No ☐ Yes ☐

For a 'no' answer they should be able to look after themselves at home for up to 8 hours during the day if necessary, though they need not actually look after themselves.

2c. Was assistance at home essential before the injury? No ☐ Yes ☐

Independence outside the home

3a. Are they able to shop without assistance? No ☐ Yes ☐

This includes being able to plan what to buy, take care of money themselves, and behave appropriately in public. They need not normally shop, but must be able to do so.

3b. Were they able to shop without assistance before the injury? No ☐ Yes ☐

4a. Are they able to travel locally without assistance? No ☐ Yes ☐

They may drive or use public transport to get around. Ability to use a taxi is sufficient, provided the person can phone for it themselves and instruct the driver.

4b. Were they able to travel without assistance before the injury? No ☐ Yes ☐

Work

5a. Are they currently able to work to their previous capacity? No ☐ Yes ☐

If they were working before, then their current capacity for work should be at the same level. If they were seeking work before then the injury should not have adversely affected their chances of obtaining work or the level of work for which they are eligible. If the patient was a student before injury then their capacity for study should not have been adversely affected.

5b. How restricted are they? ☐ Reduced work capacity
☐ Able to work only in a sheltered workshop or non-competitive job, or currently unable to work

5c. Were they either working or seeking employment before the injury? No ☐ Yes ☐

Social & Leisure Activities

6a. Are they able to resume regular social and leisure activities outside the home?
No ☐ Yes ☐

They need not have resumed all their previous leisure activities, but should not be prevented by physical or mental impairment. If they stopped the majority of activities because of loss of interest or motivation then this is also considered a disability.

6b. What is the extent of restriction on their social and leisure activities?

☐ Participate a bit less: at least half as often as before
☐ Participate much less: less than half as often
☐ Unable to participate: rarely, if ever, take part

6c. Did they engage in regular social and leisure activities outside home before the injury? No ☐ Yes ☐

Family and friendships

7a. Have there been psychological problems which have resulted in ongoing family disruption or disruption to friendships? No ☐ Yes ☐

Typical post-traumatic personality changes: quick temper, irritability, anxiety, insensitivity to others, mood swings, depression, and unreasonable or childish behaviour.

7b. What has been the extent of disruption or strain?

☐ Occasional – less than weekly
☐ Frequent – once a week or more, but tolerable
☐ Constant – daily and intolerable

7c. Were there problems with family or friends before the injury? No ☐ Yes ☐

If there were some problems before injury but these have become markedly worse since injury then answer 'No' to Q7c.

Return to normal life

8a. Are there any other current problems relating to the injury which affect daily life?
No ☐ Yes ☐

Other typical problems reported after head injury: headaches, dizziness, tiredness, sensitivity to noise or light, slowness, memory failures, and concentration problems.

8b. Were similar problems present before the injury? No ☐ Yes ☐

If there were some problems before injury but these have become markedly worse since injury then answer 'No' to Q8b.

APPENDIX 3

NECK OF FEMUR FRACTURE REGISTRY OF AUSTRALIA (Pilot Project) **Flinders Medical Centre - Re-operation Form - Please answer all questions**	
CONTACT DETAILS (place patient details label below, if patient details not on hospital label please complete details)	
55. UR Number	☐☐☐☐☐☐☐☐
56. Family name	
57. Given names	
58. Sex	☐ male ☐ female
59. Date of birth	☐☐/☐☐/☐☐☐☐
60. Medicare number	☐☐☐☐☐☐☐☐☐☐
61. DVA number	☐☐☐☐☐☐☐
62. Side of hip fracture	☐ right ☐ left
63. Date of hip fracture	☐☐/☐☐/☐☐☐☐
64. Date of admission	☐☐/☐☐/☐☐☐☐
65. Admitted from (Choose the option that best applies)	☐ home ☐ permanent hospital resident ☐ residential care ☐ rehab unit ☐ hostel ☐ acute hospital ☐ nursing home ☐ other ……
66. Date of re-operation	☐☐/☐☐/☐☐☐☐
67. Reason for re-operation (please choose one - the most relevant option)	☐ fracture displacement ☐ loss of position of osteosynthesis material without fracture displacement ☐ additional fracture around the implant ☐ non-union (pseudarthrosis) (Non-union normally takes 3-6 months to occur, so fracture displacement or loss of position of the implant before this time should normally be coded as first 2 reasons above.) ☐ femoral head necrosis ☐ local pain or tenderness at operation or prominent implant causing discomfort with healed fracture ☐ wound infection ☐ wound haematoma ☐ dislocation of arthroplasty ☐ breakage of the implant ☐ dissembling of the implant ☐ 'elective' removal of the implant. (Fracture healed and no significant symptoms) ☐ other (please specify)…….....

68. Type of re-operation (please choose one only)	☐ removal of implant ☐ hemi-arthroplasty ☐ THR ☐ re-osteosynthesis (revision with internal fixation) ☐ girdlestone/excision arthroplasty ☐ drainage haematoma / infection ☐ reduction dislocation ☐ other (please specify) ……
69. Deceased	☐ yes ☐ no **If yes,** date of death ☐☐/☐☐/☐☐☐☐ ☐ date of death unknown
70. Date of discharge from acute ward	☐☐/☐☐/☐☐☐☐
71. Discharged to (please choose the option that best applies)	☐ home ☐ permanent hospital resident ☐ residential care ☐ rehab unit ☐ hostel ☐ acute hospital ☐ nursing home ☐ other ……

APPENDIX 4

DMAC Record Structure

DMC-SERVER-X.NO....tblLivingAlones | DMC-SERVER-XI.NJ...blOrganisations* | DMC-SERVER-XI.NJ...stributorModels* | DMC-SERVER-XI.NJ... - dbo.tblUsers* | Object Explorer Details

ID	ObjID	SrceID	LAlnAbbr	LAlnDesc	LAlnNumb	CreatdBy	DateCrtd	DiscrdBy	DateDscd
1	9999	5	N/A	Not Available	9999	ps01	16/04/2009 2:5...	NULL	NULL
2	8888	5	N/D	Not Defined	8888	ps01	16/04/2009 2:5...	NULL	NULL
3	7777	5	N/R	Not Required	7777	ps01	16/04/2009 2:5...	NULL	NULL
4	6666	5	Unk	Unknown	6666	ps01	16/04/2009 2:5...	NULL	NULL
5	5555	5	Oth	Other	5555	ps01	16/04/2009 2:5...	NULL	NULL
6	4444	5	M	Missing	4444	ps01	16/04/2009 2:5...	NULL	NULL
7	3	5	IC	institutional care	3	bob	16/04/2009 2:5...	NULL	NULL
8	2	5	N	no	2	bob	16/04/2009 2:5...	NULL	NULL
9	4	5	ND	not documented	4	bob	16/04/2009 2:5...	NULL	NULL
10	1	5	Y	yes	1	bob	16/04/2009 2:5...	NULL	NULL
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

APPENDIX 5

Table A5 (1): Hospital of Admission

Hospital of Admission	Number	Percent
Flinders Medical Centre	96	50.5%
Epworth Richmond	62	32.6%
Goulburn Valley Health	32	16.8%
TOTAL	**190**	**100.0%**

Table A5 (2): Gender by Hospital

	Epworth Richmond		Flinders Medical		Goulburn Valley		TOTAL	
Gender	N	%	N	%	N	%	N	%
Male	16	25.8	30	31.3	5	15.6	51	26.8
Female	46	74.2	66	68.8	27	84.4	139	73.2
TOTAL	**62**	**100.0**	**96**	**100.0**	**32**	**100.0**	**190**	**100.0**

Table A5 (3): Interpreter Required by Hospital

	Epworth Richmond		Flinders Medical		Goulburn Valley		TOTAL	
Interpreter Required	N	%	N	%	N	%	N	%
Yes	2	3.2	5	5.2	1	3.1	8	4.2
No	29	46.8	89	92.7	22	68.8	140	73.7
Data Not Available	31	50.0	2	2.1	9	28.1	42	22.1
TOTAL	**62**	**100.0**	**96**	**100.0**	**32**	**100.0**	**190**	**100.0**

Table A5 (4): Interpreter Used by Hospital

	Epworth Richmond		Flinders Medical		Goulburn Valley		TOTAL	
Interpreter Used	N	%	N	%	N	%	N	%
Family Member	2	3.2	4	4.2	1	3.1	7	3.7
Professional	.	.	1	1.0	.	.	1	0.5
Not Required	29	46.8	89	92.7	22	68.8	140	73.7
Data Not Available	31	50.0	2	2.1	9	28.1	42	22.1
TOTAL	**62**	**100.0**	**96**	**100.0**	**32**	**100.0**	**190**	**100.0**

Table A5 (5): Side of Fracture by Hospital

Side of Fracture	Epworth Richmond		Flinders Medical		Goulburn Valley		TOTAL	
	N	%	N	%	N	%	N	%
Left	30	48.4	46	47.9	24	75.0	100	52.6
Right	32	51.6	50	52.1	8	25.0	90	47.4
TOTAL	**62**	**100.0**	**96**	**100.0**	**32**	**100.0**	**190**	**100.0**

Table A5 (6): Residential Status at Admission, by Hospital

Residential Status	Epworth Richmond		Flinders Medical		Goulburn Valley		TOTAL	
	N	%	N	%	N	%	N	%
Home	42	67.7	49	51.0	25	78.1	116	61.1
Residential Care	2	3.2	8	8.3	3	9.4	13	6.8
Hostel	5	8.1	2	2.1	.	.	7	3.7
Nursing Home	5	8.1	26	27.1	4	12.5	35	18.4
Acute Hospital	7	11.3	9	9.4	.	.	16	8.4
Other	1	1.6	2	2.1	.	.	3	1.6
TOTAL	**62**	**100.0**	**96**	**100.0**	**32**	**100.0**	**190**	**100.0**

Table A5 (7): Living Alone at Admission, by Hospital

Living Alone	Epworth Richmond		Flinders Medical		Goulburn Valley		TOTAL	
	N	%	N	%	N	%	N	%
Yes	12	19.4	22	22.9	10	31.3	44	23.2
No	10	16.1	35	36.5	17	53.1	62	32.6
Institutional Care	12	19.4	38	39.6	5	15.6	55	28.9
Not Documented	28	45.2	1	1.0	.	.	29	15.3
TOTAL	**62**	**100.0**	**96**	**100.0**	**32**	**100.0**	**190**	**100.0**

Table A5 (8): Walking Ability before Fracture, by Hospital

Walking	Epworth Richmond		Flinders Medical		Goulburn Valley		TOTAL	
	N	%	N	%	N	%	N	%
Alone out of doors	28	45.2	44	45.8	22	68.8	94	49.5
Outdoors if accompanied	7	11.3	8	8.3	6	18.8	21	11.1
Alone indoors, not out of doors	14	22.6	10	10.4	3	9.4	27	14.2
Indoors if accompanied	5	8.1	12	12.5	1	3.1	18	9.5
Unable to walk	1	1.6	2	2.1	.	.	3	1.6
Not documented	7	11.3	20	20.8	.	.	27	14.2
TOTAL	**62**	**100.0**	**96**	**100.0**	**32**	**100.0**	**190**	**100.0**

Table A5 (9): Use of Walking Aids before Fracture, by Hospital

Walking Aids	Epworth Richmond		Flinders Medical		Goulburn Valley		TOTAL	
	N	%	N	%	N	%	N	%
No Aids	24	38.7	27	28.1	14	43.8	65	34.2
One Stick	11	17.7	6	6.3	4	12.5	21	11.1
Two Sticks	2	3.2	.	.	.	.	2	1.1
Walking Frame	19	30.6	42	43.8	14	43.8	75	39.5
Wheelchair	.	.	1	1.0	.	.	1	0.5
Not documented	6	9.7	20	20.8	.	.	26	13.7
TOTAL	**62**	**100.0**	**96**	**100.0**	**32**	**100.0**	**190**	**100.0**

Table A5 (10): Known Hip Fracture Date by Hospital

Known Hip Fracture Date	Epworth Richmond		Flinders Medical		Goulburn Valley		TOTAL	
	N	%	N	%	N	%	N	%
Yes	57	91.9	87	90.6	31	96.9	175	92.1
No	5	8.1	9	9.4	1	3.1	15	7.9
TOTAL	**62**	**100.0**	**96**	**100.0**	**32**	**100.0**	**190**	**100.0**

Table A5 (11): Pathological Hip Fracture by Hospital

Pathological Hip Fracture	Epworth Richmond		Flinders Medical		Goulburn Valley		TOTAL	
	N	%	N	%	N	%	N	%
Yes	.	.	3	3.1	1	3.1	4	2.1
No	62	100.0	93	96.9	30	93.8	185	97.4
Missing	.	.	.	.	1	3.1	1	0.5
TOTAL	**62**	**100.0**	**96**	**100.0**	**32**	**100.0**	**190**	**100.0**

Table A5 (12): Hip Fracture Type by Hospital

Hip Fracture Type	Flinders Medical		Epworth Richmond		Goulburn Valley		TOTAL	
	N	%	N	%	N	%	N	%
Undisplaced Intracapsular (Garden 1 & 2)	17	17.7	5	8.1	2	6.3	24	12.6
Displaced Intracapsular (Garden 3 & 4)	43	44.8	24	38.7	9	28.1	76	40.0
Basocervical (Lateral side of neck)	2	2.1	4	6.5	2	6.3	8	4.2
Trochanteric	30	31.3	28	45.2	15	46.9	73	38.4
Subtrochanteric	4	4.2	1	1.6	2	6.3	7	3.7
Missing	.	.	.	.	2	6.3	2	1.1
	96	**100.0**	**62**	**100.0**	**32**	**100.0**	**190**	**100.0**

Table A5 (13): ASA Grade at Surgery, by Hospital

ASA Grade	Epworth Richmond		Flinders Medical		Goulburn Valley		TOTAL	
	N	%	N	%	N	%	N	%
1	4	6.5	1	1.0	.	.	5	2.6
2	9	14.5	17	17.7	4	12.5	30	15.8
3	28	45.2	43	44.8	19	59.4	90	47.4
4	15	24.2	21	21.9	6	18.8	42	22.1
5	2	3.2	3	3.1	.	.	5	2.6
Not Recorded	4	6.5	11	11.5	3	9.4	18	9.5
TOTAL	**62**	**100.0**	**96**	**100.0**	**32**	**100.0**	**190**	**100.0**

Table A5 (14): Primary Hip Surgery by Hospital

Primary Hip Surgery	Epworth Richmond		Flinders Medical		Goulburn Valley		TOTAL	
	N	%	N	%	N	%	N	%
Two Screws	.	.	2	2.1	.	.	2	1.1
Three Screws	2	3.2	12	12.5	.	.	14	7.4
DHS	25	40.3	4	4.2	17	53.1	46	24.2
Intramedullary Nail	10	16.1	34	35.4	2	6.3	46	24.2
Cemented Hemiarthroplasty	4	6.5	36	37.5	.	.	40	21.1
Uncemented Hemiarthroplasty	5	8.1	7	7.3	8	25.0	20	10.5
THR	13	21.0	.	.	4	12.5	17	8.9
Hemiarthroplasty (Unclassified)	3	4.8					3	1.6
Missing	.	.	1	1.0	1	3.1	2	1.1
TOTAL	**62**	**100.0**	**96**	**100.0**	**32**	**100.0**	**190**	**100.0**

Table A5 (15): Pressure Ulcer Status on Admission by Hospital

Pressure Ulcer on Admission	Epworth Richmond		Flinders Medical		Goulburn Valley		TOTAL	
	N	%	N	%	N	%	N	%
No Pressure Ulcer	54	87.1	64	66.7	29	90.6	147	77.4
Stage 1	.	.	1	1.0	2	6.3	3	1.6
Stage 4	.	.	1	1.0	.	.	1	0.5
Present, not staged	1	1.6	1	1.0	.	.	2	1.1
Not Recorded	7	11.3	29	30.2	1	3.1	37	19.5
TOTAL	**62**	**100.0**	**96**	**100.0**	**32**	**100.0**	**190**	**100.0**

Table A5 (16): Pressure Ulcer Status on Discharge by Hospital

Pressure Ulcer on Discharge	Epworth Richmond		Flinders Medical		Goulburn Valley		TOTAL	
	N	%	N	%	N	%	N	%
No Pressure Ulcer	47	75.8	59	61.5	27	84.4	133	70.0
Stage 1	.	.	2	2.1	2	6.3	4	2.1
Stage 2	2	3.2	2	2.1	.	.	4	2.1
Stage 3	2	3.2	1	1.0	.	.	3	1.6
Stage 4	.	.	1	1.0	.	.	1	0.5
Present, not staged	2	3.2	.	.	.	.	2	1.1
Not Recorded	9	14.5	31	32.3	3	9.4	43	22.6
TOTAL	**62**	**100.0**	**96**	**100.0**	**32**	**100.0**	**190**	**100.0**

Table A5 (17): Deceased on Discharge by Hospital

Deceased on Discharge	Epworth Richmond		Flinders Medical		Goulburn Valley		TOTAL	
	N	%	N	%	N	%	N	%
Yes	3	4.8	7	7.3	1	3.1	11	5.8
No	58	93.5	89	92.7	30	93.8	177	93.2
Missing	1	1.6	.	.	1	3.1	2	1.1
TOTAL	**62**	**100.0**	**96**	**100.0**	**32**	**100.0**	**190**	**100.0**

Table A5 (18): Date of Death Known by Hospital

Date of Death Known	Epworth Richmond		Flinders Medical		Goulburn Valley		TOTAL	
	N	%	N	%	N	%	N	%
Yes	3	4.8	7	7.3	1	3.1	11	5.8
Not Applicable	59	95.2	89	92.7	31	96.9	179	94.2
TOTAL	**62**	**100.0**	**96**	**100.0**	**32**	**100.0**	**190**	**100.0**

Table A5 (19): Discharge Destination by Hospital

Discharge Destination	Flinders Medical		Epworth Richmond		Goulburn Valley		TOTAL	
	N	%	N	%	N	%	N	%
Home	6	6.3	1	1.6	1	3.1	8	4.2
Residential Care	4	4.2	1	1.6	1	3.1	6	3.2
Hostel	1	1.0	.	.	.	.	1	0.5
Nursing Home	26	27.1	7	11.3	1	3.1	34	17.9
Rehab Unit	31	32.3	40	64.5	24	75.0	95	50.0
Acute Hospital	17	17.7	1	1.6	.	.	18	9.5
Other	4	4.2	8	12.9	2	6.3	14	7.4
Died in Hospital	7	7.3	3	4.8	2	6.3	14	7.4
Missing	.	.	1	1.6	1	3.1	2	1.1
TOTAL	**96**	**100.0**	**62**	**100.0**	**32**	**100.0**	**190**	**100.0**

Table A5 (20): Length of Stay

Hospital	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Flinders Medical Centre	89	51.1%	4	94	10	14.7	14.7
Epworth Richmond	58	33.3%	6	58	12	15.4	9.6
Goulburn Valley Health	27	15.5%	3	21	6	7.1	4.4
TOTAL	**174**	**100.0%**	**3**	**94**	**10**	**13.7**	**12.3**

Table A5 (21): Days to Admission

Hospital	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Flinders Medical Centre	87	49.7%	0	5	0	0.4	0.9
Epworth Richmond	57	32.6%	0	25	0	1.1	3.8
Goulburn Valley Health	31	17.7%	0	2	0	0.2	0.5
TOTAL	**175**	**100.0%**	**0**	**25**	**0**	**0.6**	**2.3**

Table A5 (22): Days to Surgery from Admission

Hospital	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Flinders Medical Centre	96	50.5%	0	11	1	1.6	1.5
Epworth Richmond	62	32.6%	0	12	1	1.8	2.1
Goulburn Valley Health	32	16.8%	0	4	1	1.3	0.9
TOTAL	**190**	**100.0%**	**0**	**12**	**1**	**1.6**	**1.6**

Table A5 (23): Age at Hip Fracture

Hospital	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Flinders Medical	96	50.5%	44	101	83	82.5	9.6
Epworth Richmond	62	32.6%	54	101	84	82.9	9.4
Goulburn Valley	32	16.8%	61	100	84	83.1	8.3
TOTAL	**190**	**100.0%**	**44**	**101**	**84**	**82.7**	**9.3**

Table A5 (24): Age at Hip Fracture by Gender

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	51	26.8%	44	97	83	81.9	9.1
Female	139	73.2%	52	101	84	83.0	9.3
	190	**100.0%**	**44**	**101**	**84**	**82.7**	**9.3**

Table A5 (25): Time of Surgery by Hospital

Surgery Time	Flinders Medical		Epworth Richmond		Goulburn Valley		TOTAL	
	N	%	N	%	N	%	N	%
midnight-9am	4	4.2	5	8.1	.	.	9	4.7
9am-noon	38	39.6	6	9.7	5	15.6	49	25.8
noon-3pm	37	38.5	9	14.5	2	6.3	48	25.3
3pm-5pm	12	12.5	5	8.1	7	21.9	24	12.6
5pm-midnight	5	5.2	35	56.5	7	21.9	47	24.7
Missing	.	.	2	3.2	11	34.4	13	6.8
TOTAL	**96**	**100.0**	**62**	**100.0**	**32**	**100.0**	**190**	**100.0**

Table A5 (26): Residential Status before Fracture by Discharge Destination

Residential Status	Home		Residential Care		Hostel		Nursing Home		Rehab Unit		Acute Hospital		Other		Missing		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Home	8	100.0	1	16.7	1	100.0	3	8.8	79	83.2	9	50.0	10	71.4	2	66.6	113	63.1
Residential Care	.	.	5	83.3	.	.	2	5.9	3	3.2	1	5.6	.	.	1	33.3	12	6.7
Hostel	.	.	.	.	.	.	1	2.9	3	3.2	1	5.6	2	14.3	.	.	7	3.7
Nursing Home	.	.	.	.	.	.	25	73.5	3	3.2	1	5.6	1	7.1			30	16.6
Acute Hospital	.	.	.	.	.	.	3	8.8	6	6.3	4	22.2	1	7.1			14	8.4
Other	.	.	.	.	.	.	.	.	1	1.1	2	11.1	.	.	.	.	3	1.6
	8	**100.0**	**6**	**100.0**	**1**	**100.0**	**34**	**100.0**	**95**	**100.0**	**18**	**100.0**	**14**	**100.0**	**3**	**100.0**	**179**	**100.0**

Table A5 (27): Pressure Ulcer Status on Admission by Pressure Ulcer Status on Discharge

Pressure Ulcer on Admission	No Pressure Ulcer		Stage 1		Stage 2		Stage 3		Stage 4		Present, not staged		Not Recorded		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
No Pressure Ulcer	126	94.7	1	25.0	3	75.0	2	66.7	.	.	2	100.0	13	30.2	147	77.4
Stage 1	.	.	3	75.0	.	.	.	.	.	.	.	.	.	.	3	1.6
Stage 4	.	.	.	.	.	.	.	.	1	100.0	.	.	.	.	1	0.5
Present, not staged	.	.	.	.	.	.	.	.	.	.	.	.	2	4.7	2	1.1
Not Recorded	7	5.3	.	.	1	25.0	1	33.3	.	.	.	.	28	65.1	37	19.5
TOTAL	**133**	**100.0**	**4**	**100.0**	**4**	**100.0**	**3**	**100.0**	**1**	**100.0**	**2**	**100.0**	**43**	**100.0**	**190**	**100.0**

ADDITIONAL RESULTS prepared for AOA Annual Scientific Meeting Presentation Oct 13, 2009

Table A5 (28): Residential Status before Fracture by Discharge Destination - FMC

Residential Status	Home		Residential Care		Hostel		Nursing Home		Rehab Unit		Acute Hospital		Other		Died in Hospital		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Home	6	100.0	.	.	1	100.0	2	7.7	27	87.1	8	47.1	3	75.0	2	28.6	49	51.0
Residential Care	.	.	4	100.0	.	.	2	7.7	1	3.2	1	5.9	.	.	.	.	8	8.3
Hostel	.	.	.	.	.	.	.	.	1	3.2	1	5.9	.	.	.	.	2	2.1
Nursing Home	.	.	.	.	.	.	20	76.9	.	.	1	5.9	1	25.0	4	57.1	26	27.1
Acute Hospital	.	.	.	.	.	.	2	7.7	2	6.5	4	23.5	.	.	1	14.3	9	9.4
Other	.	.	.	.	.	.	.	.	.	.	2	11.8	.	.	.	.	2	2.1
	6	**100.0**	**4**	**100.0**	**1**	**100.0**	**26**	**100.0**	**31**	**100.0**	**17**	**100.0**	**4**	**100.0**	**7**	**100.0**	**96**	**100.0**

Table A5 (29): Pressure Ulcer Status on Admission by Pressure Ulcer Status on Discharge - FMC

Pressure Ulcer on Admission	No Pressure Ulcer		Stage 1		Stage 2		Stage 3		Stage 4		Not Recorded		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
No Pressure Ulcer	54	91.5	1	50.0	1	50.0	1	100.0	.	.	7	22.6	64	66.7
Stage 1	.	.	1	50.0	.	.	.	.	.	.	.	.	1	1.0
Stage 4	.	.	.	.	.	.	.	.	1	100.0	.	.	1	1.0
Present, not staged	.	.	.	.	.	.	.	.	.	.	1	3.2	1	1.0
Not Recorded	5	8.5	.	.	1	50.0	.	.	.	.	23	74.2	29	30.2
TOTAL	**59**	**100.0**	**2**	**100.0**	**2**	**100.0**	**1**	**100.0**	**1**	**100.0**	**31**	**100.0**	**96**	**100.0**

Table A5 (30): Walking Ability by Walking Aids before Fracture

Walking	No Aids		One Stick		Walking Frame		Wheelchair		Not documented		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Alone out of doors	19	70.4	3	50.0	18	42.9	.	.	4	20.0	44	45.8
Outdoors if accompanied	4	14.8	.	.	4	9.5	.	.	.	.	8	8.3
Alone indoors,not out of doors	2	7.4	1	16.7	6	14.3	.	.	1	5.0	10	10.4
Indoors if accompanied	1	3.7	1	16.7	9	21.4	.	.	1	5.0	12	12.5
Unable to walk	.	.	.	.	1	2.4	1	100.0	.	.	2	2.1
Not documented	1	3.7	1	16.7	4	9.5	.	.	14	70.0	20	20.8
TOTAL	**27**	**100.0**	**6**	**100.0**	**42**	**100.0**	**1**	**100.0**	**20**	**100.0**	**96**	**100.0**

Table A5 (31): Age at Hip Fracture - FMC

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	30	31.3%	44	96	82	80.1	9.7
Female	66	68.8%	52	101	84	83.5	9.4
TOTAL	**96**	**100.0%**	**44**	**101**	**83**	**82.5**	**9.6**

Table A5 (32): Time from Admission to Surgery (Hours) - FMC

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	30	31.9%	2	263	25	46.4	53.4
Female	64	68.1%	3	136	24	32.5	24.7
TOTAL	**94**	**100.0%**	**2**	**263**	**25**	**36.9**	**36.7**

Table A5 (33): Time of Surgery by Gender - FMC

	Male		Female		TOTAL	
Surgery Time	**N**	**%**	**N**	**%**	**N**	**%**
midnight-9am	2	6.7	2	3.0	4	4.2
9am-noon	10	33.3	28	42.4	38	39.6
noon-3pm	13	43.3	24	36.4	37	38.5
3pm-5pm	3	10.0	9	13.6	12	12.5
5pm-midnight	2	6.7	3	4.5	5	5.2
TOTAL	**30**	**100.0**	**66**	**100.0**	**96**	**100.0**

Table A5 (34): Time of Surgery by Age - FMC

	<60		60-69		70-79		80-89		90+		TOTAL	
Surgery Time	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
midnight-9am	.	.	.	.	2	7.4	2	4.8	.	.	4	4.2
9am-noon	.	.	1	20.0	12	44.4	17	40.5	8	40.0	38	39.6
12pm-3pm	2	100.0	3	60.0	11	40.7	14	33.3	7	35.0	37	38.5
3pm-5pm	.	.	1	20.0	.	.	6	14.3	5	25.0	12	12.5
5pm-12am	.	.	.	.	2	7.4	3	7.1	.	.	5	5.2
	2	**100.0**	**5**	**100.0**	**27**	**100.0**	**42**	**100.0**	**20**	**100.0**	**96**	**100.0**

Table A5 (35): Residential Status before Fracture by Discharge Destination - Epworth Richmond

Residential Status	Home		Residential Care		Nursing Home		Rehab Unit		Acute Hospital		Other		Missing		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Home	1	100.0	1	100.0	1	14.3	31	77.5	1	100.0	5	62.5	1	100	41	69.5
Residential Care	.	.	.	.	.	.	1	2.5	.	.	.	.			1	1.7
Hostel	.	.	.	.	1	14.3	2	5.0	.	.	2	25.0	.	.	5	8.1
Nursing Home	.	.	.	.	4	57.1	1	2.5	.	.	.	.	.	.	5	8.1
Acute Hospital	.	.	.	.	1	14.3	4	10.0	.	.	1	12.5			6	11.3
Other	.	.	.	.	.	.	1	2.5	.	.	.	.	.	.	1	1.6
	1	**100.0**	**1**	**100.0**	**7**	**100.0**	**40**	**100.0**	**1**	**100.0**	**8**	**100.0**	**1**	**100.0**	**59**	**100.0**

Table A5 (36): Pressure Ulcer Status on Admission by Pressure Ulcer Status on Discharge - Epworth Richmond

Pressure Ulcer on Admission	No Pressure Ulcer		Stage 2		Stage 3		Present, not staged		Not Recorded		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
No Pressure Ulcer	45	95.7	2	100.0	1	50.0	2	100.0	4	44.4	54	87.1
Present, not staged	.	.	.	.	.	.	.	.	1	11.1	1	1.6
Not Recorded	2	4.3	.	.	1	50.0	.	.	4	44.4	7	11.3
TOTAL	**47**	**100.0**	**2**	**100.0**	**2**	**100.0**	**2**	**100.0**	**9**	**100.0**	**62**	**100.0**

Table A5 (37): Walking Ability by Walking Aids before Fracture - Epworth Richmond

Walking	No Aids		One Stick		Two Sticks		Walking Frame		Not documented		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Alone out of doors	18	75.0	6	54.5	1	50.0	2	10.5	1	16.7	28	45.2
Outdoors if accompanied	1	4.2	.	.	.	.	5	26.3	1	16.7	7	11.3
Alone indoors, not out of doors	3	12.5	4	36.4	1	50.0	6	31.6	.	.	14	22.6
Indoors if accompanied	1	4.2	1	9.1	.	.	1	5.3	2	33.3	5	8.1
Unable to walk	.	.	.	.	.	.	.	.	1	16.7	1	1.6
Not documented	1	4.2	.	.	.	.	5	26.3	1	16.7	7	11.3
TOTAL	**24**	**100.0**	**11**	**100.0**	**2**	**100.0**	**19**	**100.0**	**6**	**100.0**	**62**	**100.0**

Table A5 (38): Age at Hip Fracture - Epworth Richmond

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	16	25.8%	63	97	87	84.9	8.1
Female	46	74.2%	54	101	83	82.2	9.8
	62	**100.0%**	**54**	**101**	**84**	**82.9**	**9.4**

Table A5 (39): Time from Admission to Surgery - Epworth Richmond

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	10	21.3%	6	143	23	38.2	40.7
Female	37	78.7%	5	287	33	47.2	52.0
TOTAL	**47**	**100.0%**	**5**	**287**	**30**	**45.3**	**49.6**

Table A5 (40): Time of Surgery by Gender - Epworth Richmond

	Male		Female		TOTAL	
Surgery Time	N	%	N	%	N	%
midnight-9am	.	.	5	10.9	5	8.1
9am-noon	1	6.3	5	10.9	6	9.7
noon-3pm	2	12.5	7	15.2	9	14.5
3pm-5pm	1	6.3	4	8.7	5	8.1
5pm-midnight	12	75.0	23	50.0	35	56.5
Missing	.	.	2	4.3	2	3.2
TOTAL	**16**	**100.0**	**46**	**100.0**	**62**	**100.0**

Table A5 (41): Time of Surgery by Age - Epworth Richmond

	<60		60-69		70-79		80-89		90+		TOTAL	
Surgery Time	N	%	N	%	N	%	N	%	N	%	N	%
midnight-9am	1	50.0	.	.	3	21.4	1	3.4	.	.	5	8.1
9am-noon	.	.	1	25.0	2	14.3	3	10.3	.	.	6	9.7
noon-3pm	.	.	.	.	1	7.1	8	27.6	.	.	9	14.5
3pm-5pm	.	.	2	50.0	.	.	1	3.4	2	15.4	5	8.1
5pm-midnight	1	50.0	1	25.0	8	57.1	15	51.7	10	76.9	35	56.5
Missing	.	.	.	.	.	.	1	3.4	1	7.7	2	3.2
	2	**100.0**	**4**	**100.0**	**14**	**100.0**	**29**	**100.0**	**13**	**100.0**	**62**	**100.0**

Table A5 (42): Residential Status before fracture by Discharge Destination - GVH

	Home		Residential Care		Nursing Home		Rehab Unit		Other		Missing		TOTAL	
Residential Status	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Home	1	100.0	.	.	.	.	21	87.5	2	100.0	1	50.0	25	80.6
Residential Care	.	.	1	100.0	.	.	1	4.2	.	.	1	50.0	3	9.7
Nursing Home	.	.	.	.	1	100.0	2	8.3	.	.			3	9.7
	1	**100.0**	**1**	**100.0**	**1**	**100.0**	**24**	**100.0**	**2**	**100.0**	**2**	**100.0**	**31**	**100.0**

Table A5 (43): Pressure Ulcer Status on Admission by Pressure Ulcer Status on Discharge – GVH

Pressure Ulcer on Admission	No Pressure Ulcer		Stage 1		Not Recorded		TOTAL	
	N	%	N	%	N	%	N	%
No Pressure Ulcer	27	100.0	.	.	2	66.7	29	90.6
Stage 1	.	.	2	100.0	.	.	2	6.3
Not Recorded	.	.	.	.	1	33.3	1	3.1
TOTAL	**27**	**100.0**	**2**	**100.0**	**3**	**100.0**	**32**	**100.0**

Table A5 (44): Walking Ability, by Walking Aids before Fracture - GVH

Walking	No Aids		One Stick		Walking Frame		TOTAL	
	N	%	N	%	N	%	N	%
Alone out of doors	11	78.6	3	75.0	8	57.1	22	68.8
Outdoors if accompanied	1	7.1	1	25.0	4	28.6	6	18.8
Alone indoors, not out of doors	2	14.3	.	.	1	7.1	3	9.4
Indoors if accompanied	.	.	.	.	1	7.1	1	3.1
TOTAL	**14**	**100.0**	**4**	**100.0**	**14**	**100.0**	**32**	**100.0**

Table A5 (45): Age at Hip Fracture - Goulburn Valley Health

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	5	15.6%	75	93	85	83.5	7.2
Female	27	84.4%	61	100	84	83.0	8.6
	32	**100.0%**	**61**	**100**	**84**	**83.1**	**8.3**

Table A5 (46): Time from Admission to Surgery - GVH

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	4	21.1%	24	52	27	32.3	13.1
Female	15	78.9%	13	46	22	25.3	10.0
TOTAL	**19**	**100.0%**	**13**	**52**	**24**	**26.7**	**10.7**

Table A5 (47): Time of Surgery by Gender - GVH

Surgery Time	Male		Female		TOTAL	
	N	%	N	%	N	%
9am-noon	.	.	5	18.5	5	15.6
noon-3pm	.	.	2	7.4	2	6.3
3pm-5pm	2	40.0	5	18.5	7	21.9
5pm-midnight	2	40.0	5	18.5	7	21.9
Missing	1	20.0	10	37.0	11	34.4
TOTAL	**5**	**100.0**	**27**	**100.0**	**32**	**100.0**

Table A5 (48) Time of Surgery by Age - GVH

	60-69		70-79		80-89		90+		TOTAL	
Surgery Time	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
9am-noon	.	.	.	.	4	21.1	1	20.0	5	15.6
noon-3pm	1	33.3	.	.	1	5.3	.	.	2	6.3
3pm-5pm	1	33.3	1	20.0	3	15.8	2	40.0	7	21.9
5pm-midnight	1	33.3	2	40.0	3	15.8	1	20.0	7	21.9
Missing	.	.	2	40.0	8	42.1	1	20.0	11	34.4
	3	**100.0**	**5**	**100.0**	**19**	**100.0**	**5**	**100.0**	**32**	**100.0**

Figure 1(A): Time from Admission to Surgery by Hospital (Number)

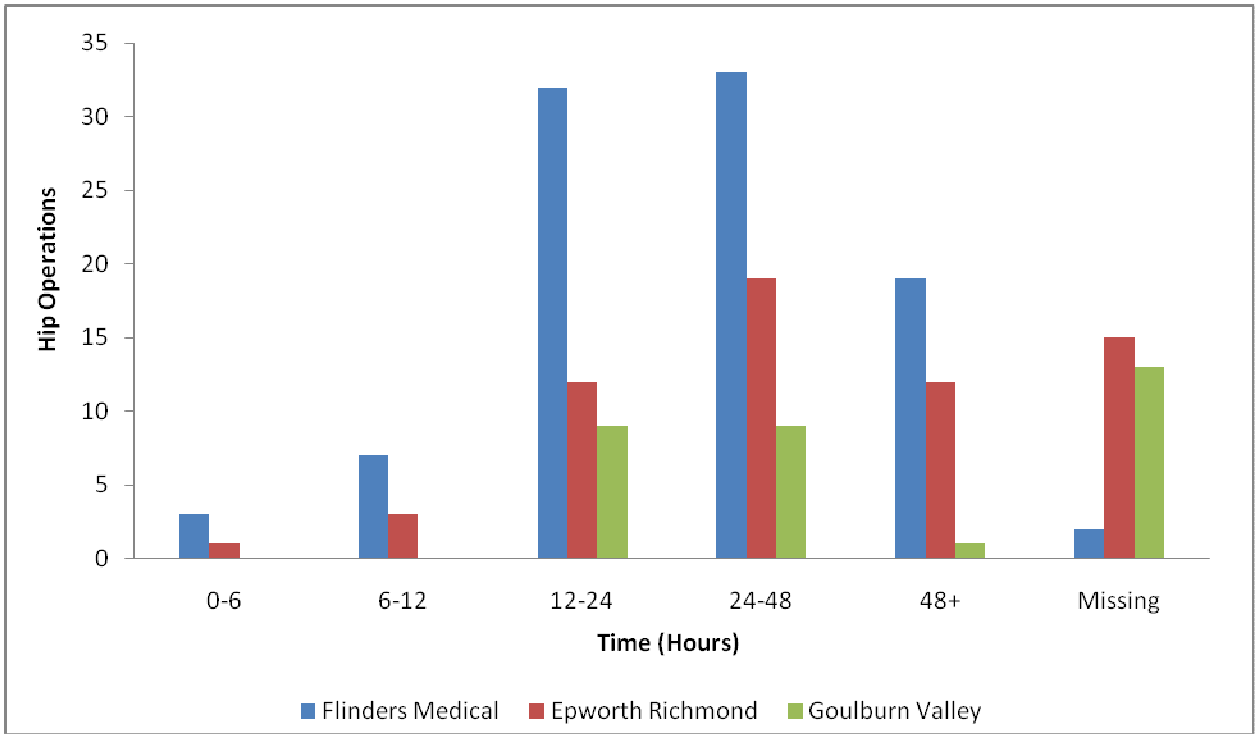

Figure 1(B): Time from Admission to Surgery by Hospital (Percent)

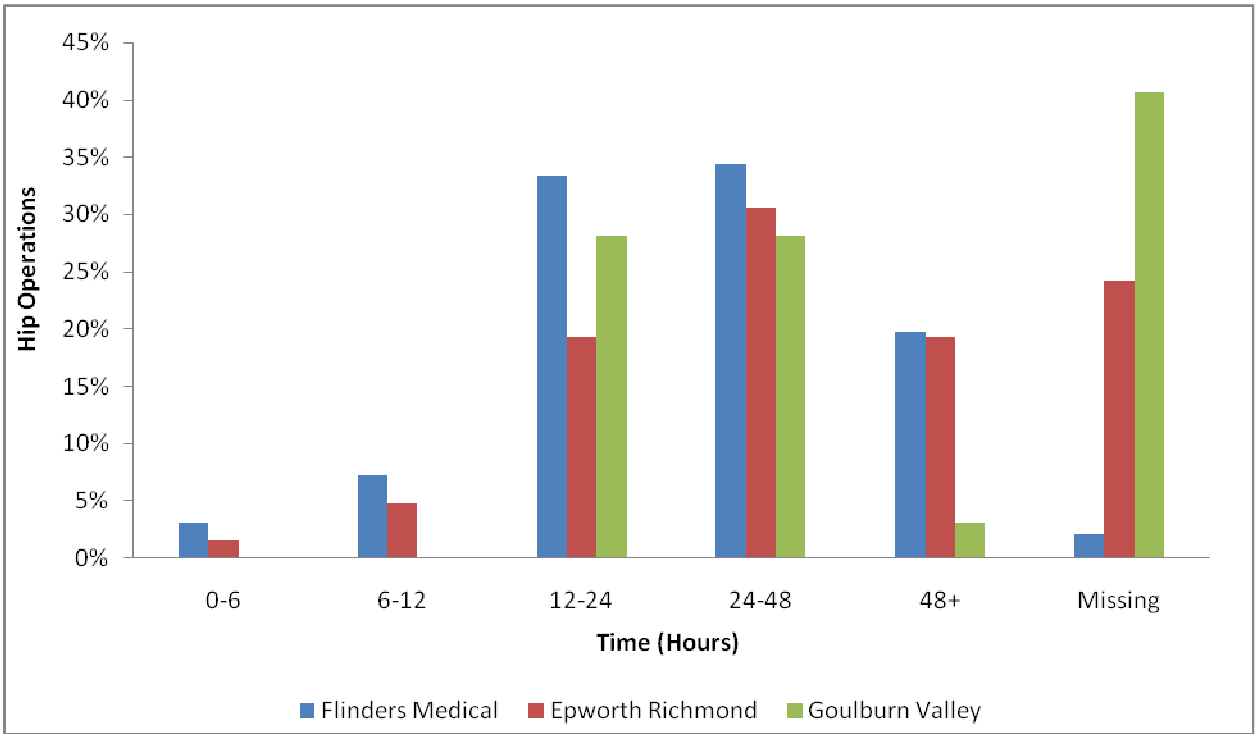

Figure 2(A): Time of Surgery by Hospital (Number)

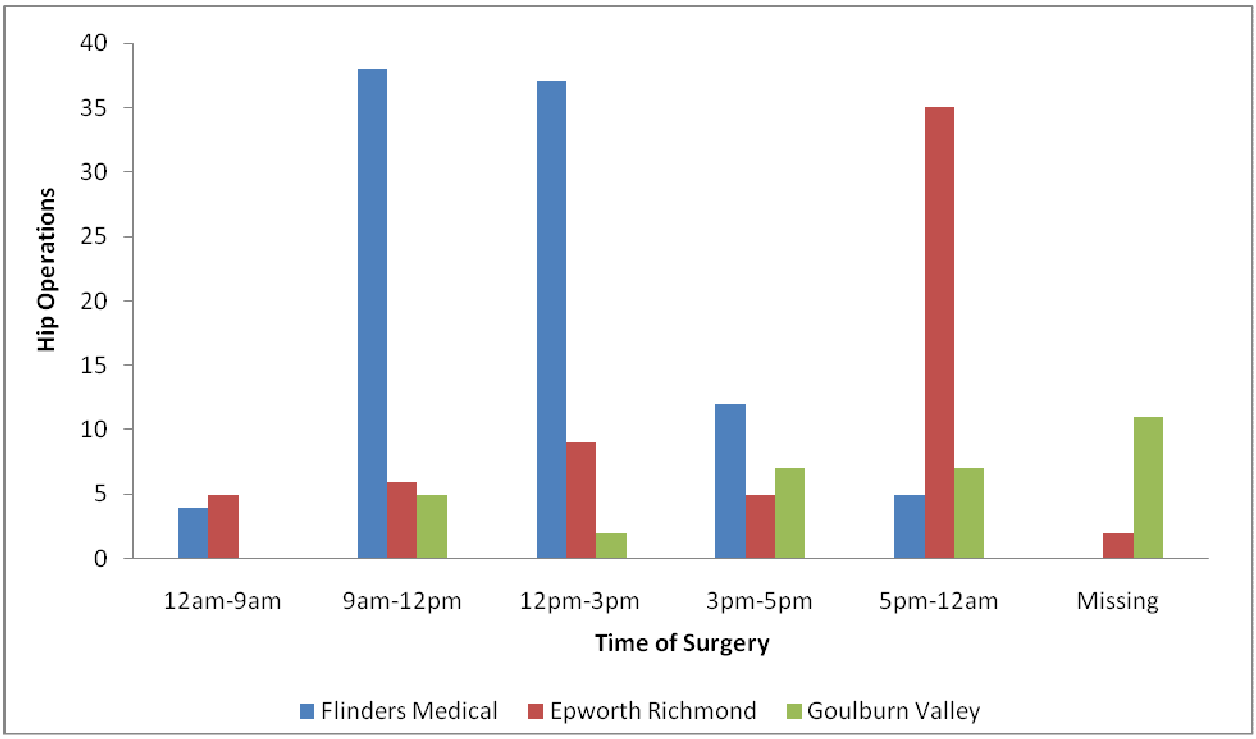

Figure 2(B): Time of Surgery by Hospital (Percent)

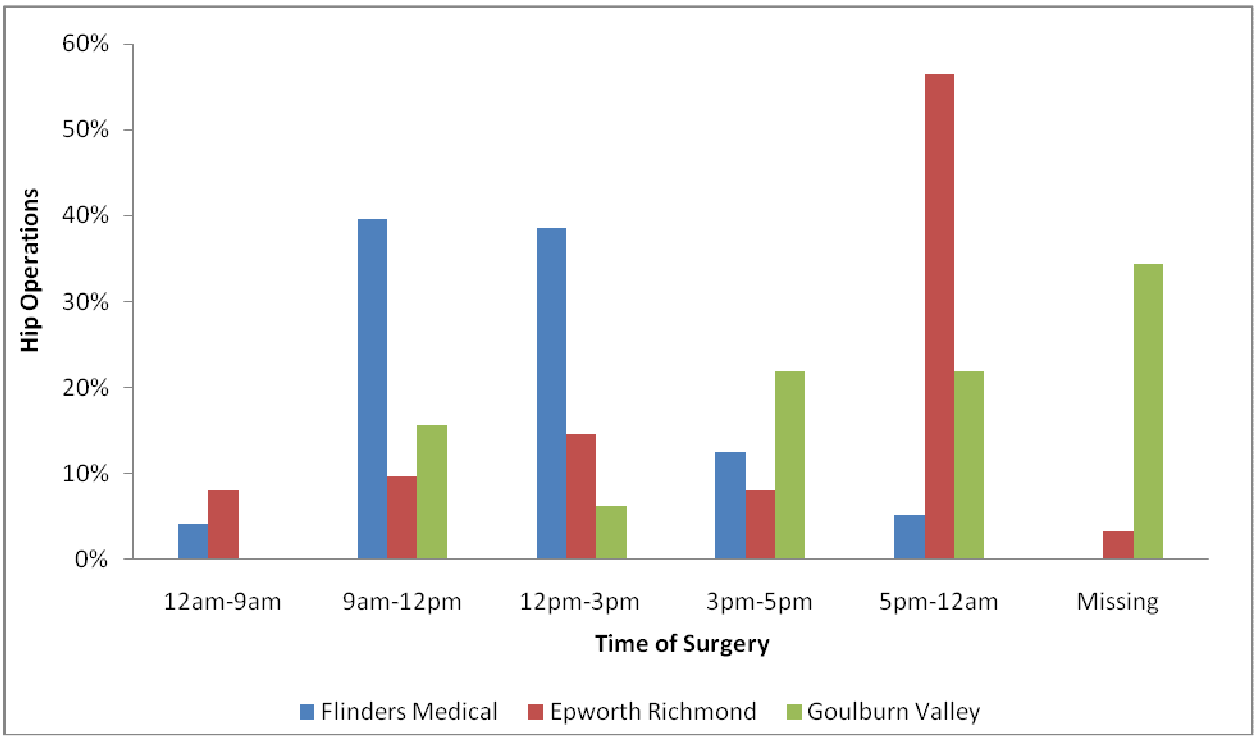

Figure 3(A): Age at Time of Fracture by Hospital (Percent)

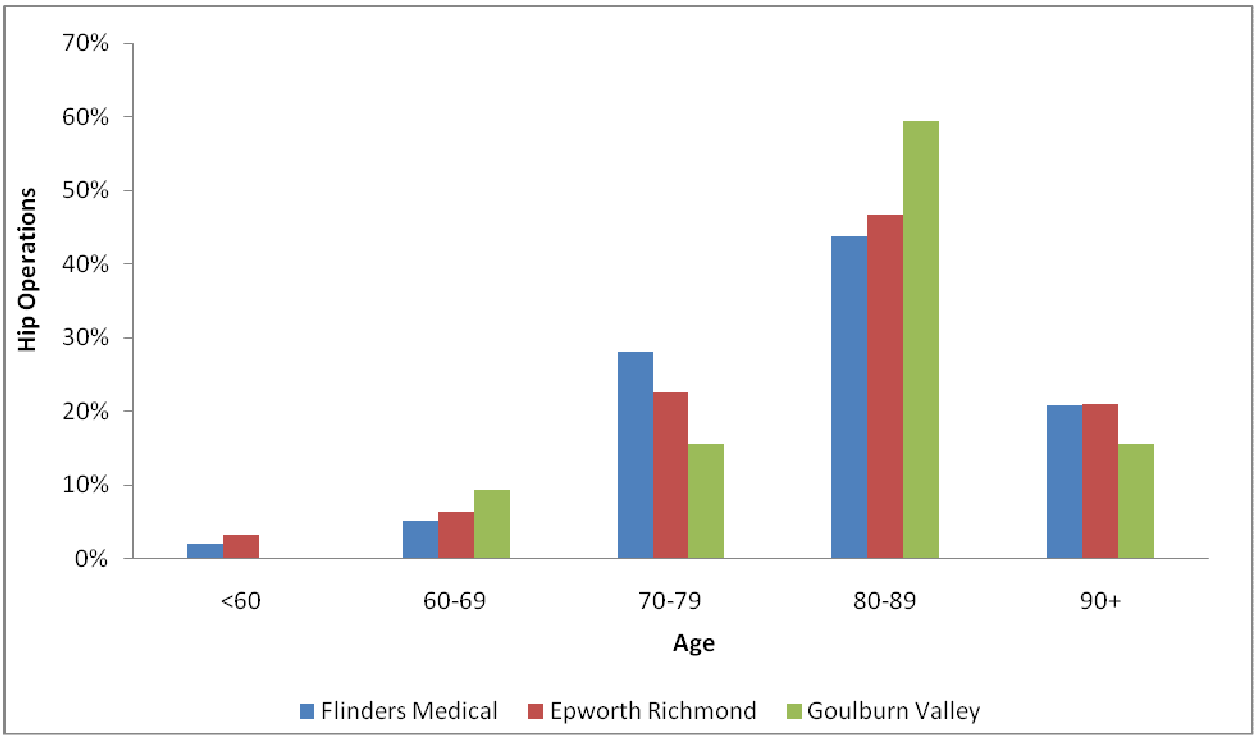

Figure 4(A): Type of Primary Hip Fracture by Hospital (Percent)

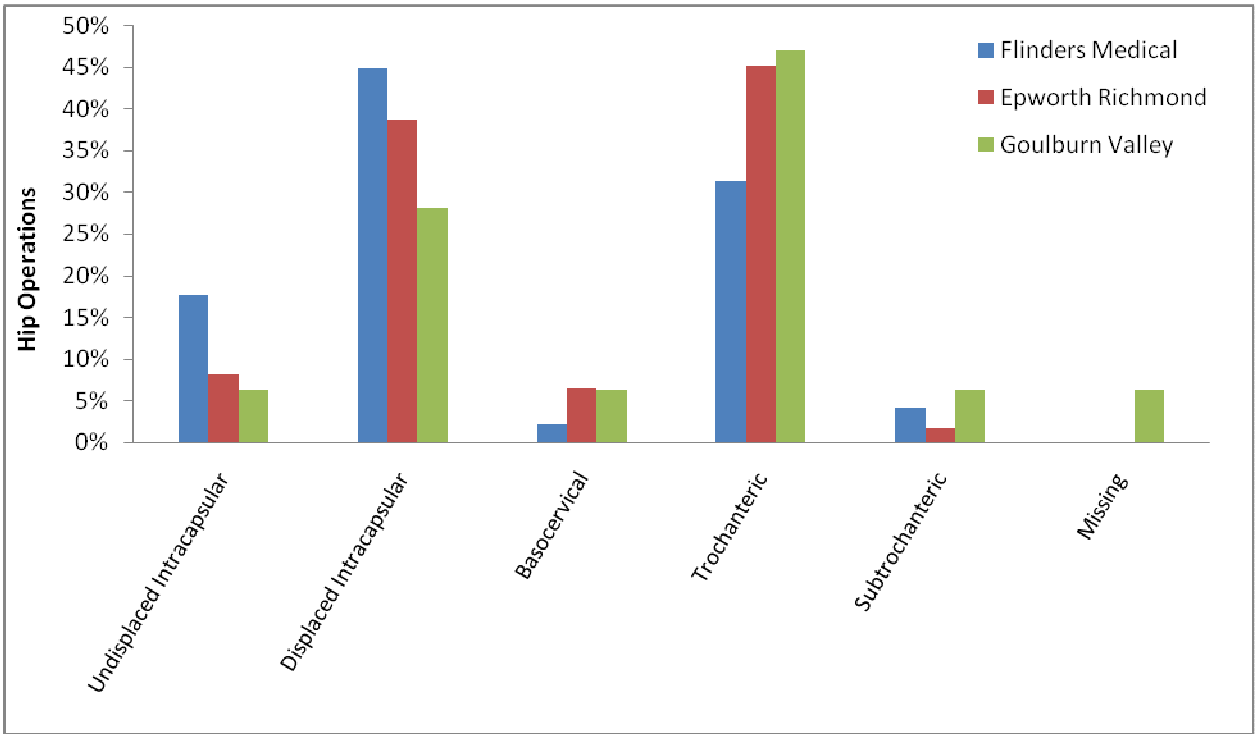

Figure 5(A): Type of Primary Surgery by Hospital (Percent)

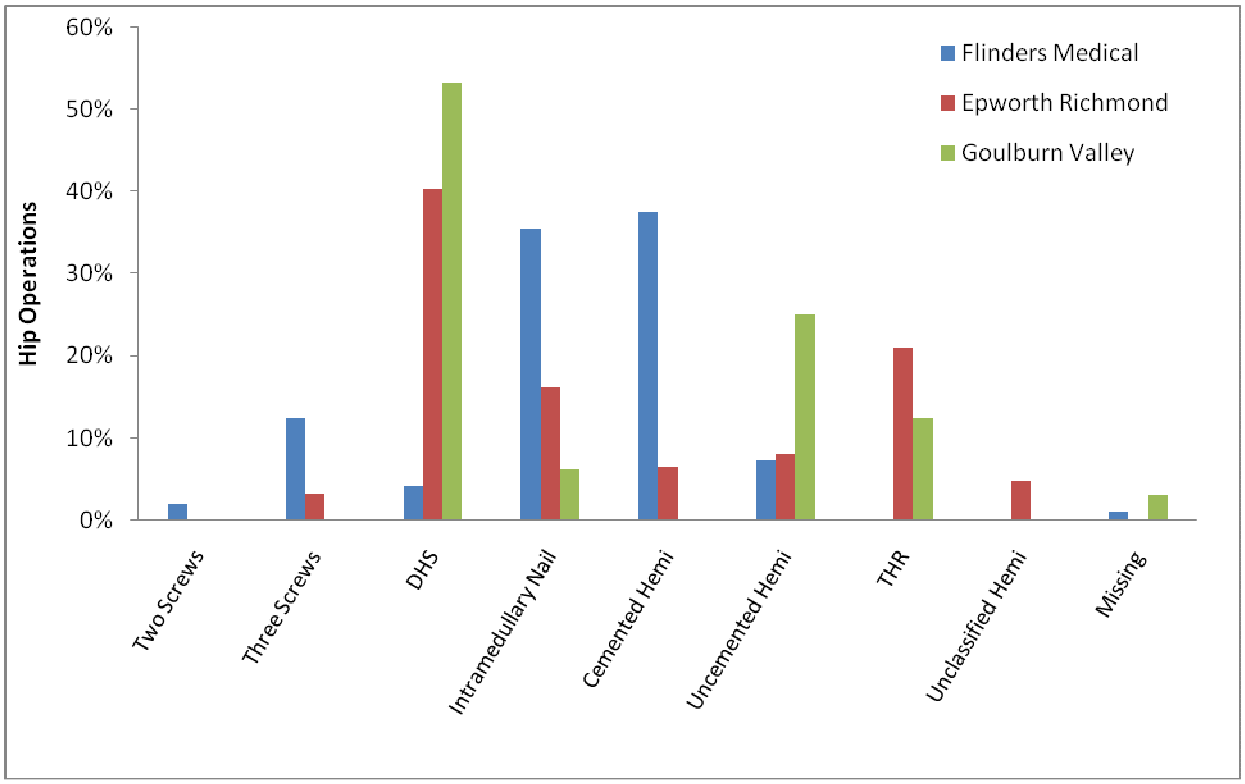

Table A5 (49): Re-Operation Data

Primary							Revision			
Hospital	**Admitted From**	**Fracture Date**	**Surgery**	**Type of Fracture**	**Discharge Date**	**Discharge Destination**	**Date Revision**	**Revision Reason**	**Revision Type**	**Discharge Destination**
FMC	Home	23/04/2009	Intramedullary Nail	Trochanteric	30/04/2009	Acute Hospital	15/07/2009	Fracture Displacement	THR	Rehab Unit
Epworth Richmond	Home	15/04/2009	Other	Trochanteric	23/04/2009	Rehab Unit	01/05/2009	Wound Infection	drainage haematoma/Infection	Acute Hospital
Epworth Richmond	Home	29/07/2009	DHS	Trochanteric	07/08/2009	Rehab Unit	31/07/2009	Elective removal of implant	Other	Rehab Unit
FMC	Nursing Home	17/03/2009	Intramedullary Nail	Trochanteric	23/03/2009	Nursing Home	08/05/2009	Additional Fracture around implant	Re-Osteosynthesis	Nursing Home
Epworth Richmond	Home	21/06/2009	THR	Displaced Intracapsular (Garden 3 & 4)	01/01/1900	Missing	16/07/2009	Wound Infection	drainage haematoma/Infection	Acute Hospital
Epworth Richmond	Home	21/06/2009	THR	Displaced Intracapsular (Garden 3 & 4)	01/01/1900	Missing	09/08/2009	Wound Infection	drainage haematoma/Infection	Acute Hospital

APPENDIX 6

Verification of South Australian Data with State Separation Data

Table A6 (1): Hospital of Admission by Hospital

	FMC		TOTAL	
Hospital of Admission	**N**	**%**	**N**	**%**
Flinders Medical	54	100.0	54	100.0
TOTAL	**54**	**100.0**	**54**	**100.0**

Table A6 (2): Gender by Gender_SA

	Female		Male		TOTAL	
Gender	**N**	**%**	**N**	**%**	**N**	**%**
Male	.	.	16	100.0	16	29.6
Female	38	100.0	.	.	38	70.4
TOTAL	**38**	**100.0**	**16**	**100.0**	**54**	**100.0**

Table A6 (3): Residential Status by Source of Referral

	RAC F		CHS		Hosp T		Cas/EM		Oth		TOTAL	
Residential Status	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Home	.	.	1	100.0	1	33.3	20	71.4	5	45.5	27	50.0
Residential Care	2	18.2	.	.	.	.	2	7.1	1	9.1	5	9.3
Hostel	.	.	.	.	.	.	1	3.6	1	9.1	2	3.7
Nursing Home	9	81.8	.	.	.	.	5	17.9	1	9.1	15	27.8
Acute Hospital	.	.	.	.	2	66.7	.	.	2	18.2	4	7.4
Other	.	.	.	.	.	.	.	.	1	9.1	1	1.9
TOTAL	**11**	**100.0**	**1**	**100.0**	**3**	**100.0**	**28**	**100.0**	**11**	**100.0**	**54**	**100.0**

Table A6 (4): Residential Status by Transfer from Hospital

	No Transfer		P Pirie		NSW		TOTAL	
Residential Status	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Home	26	51.0	1*	100.0	.	.	27	50.0
Residential Care	5	9.8	.	.	.	.	5	9.3
Hostel	2	3.9	.	.	.	.	2	3.7
Nursing Home	15	29.4	.	.	.	.	15	27.8
Acute Hospital	2	3.9	.	.	2**	100.0	4	7.4
Other	1	2.0	.	.	.	.	1	1.9
TOTAL	**51**	**100.0**	**1**	**100.0**	**2**	**100.0**	**54**	**100.0**

*** This patient transferred in from Port Pirie. Would have been admitted from home to PP, then transferred to FMC.**
**** Two patients came from Broken Hill**

Table A6 (5): Hip Fracture Type by Principal Diagnosis

Hip Fracture Type	S7200		S7203		S7204		S7208		S7210		S7211		S722		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Undisplaced Intracapsular (Garden 1 & 2)	.	.	8	40.0	1	11.1	.	.	.	.	.	.	.	.	9	16.7
Displaced Intracapsular (Garden 3 & 4)	1	50.0	11	55.0	8	88.9	1	33.3	.	.	1	8.3	.	.	22	40.7
Basocervical (Lateral side of neck)	.	.	.	.	.	.	.	.	1	16.7	.	.	.	.	1	1.9
Trochanteric	1	50.0	1	5.0	.	.	1	33.3	5	83.3	11	91.7	1	50.0	20	37.0
Subtrochanteric	.	.	.	.	.	.	1	33.3	.	.	.	.	1	50.0	2	3.7
TOTAL	**2**	**100.0**	**20**	**100.0**	**9**	**100.0**	**3**	**100.0**	**6**	**100.0**	**12**	**100.0**	**2**	**100.0**	**54**	**100.0**

S7200: # NOF, part unspecified
S7203: # subcapital section of femur
S7204: # midcervical section of femur
S7208: # of other parts of NOF, NOS and Head
S7210: # trochanteric section of femur
S7211: # intertrochanteric section of femur
S722: Subtrochangeric fracture

Table A6 (6): Hip Fracture Type by Activity

Hip Fracture Type	Transport		Domestic Duty		Personal Hygiene		Other Unspec		Unspec		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Undisplaced Intracapsular (Garden 1 & 2)	.	.	1	33.3	1	12.5	.	.	7	18.9	9	16.7
Displaced Intracapsular (Garden 3 & 4)	1	100.0	1	33.3	3	37.5	2	40.0	15	40.5	22	40.7
Basocervical (Lateral side of neck)	.	.	.	.	.	.	.	.	1	2.7	1	1.9
Trochanteric	.	.	1	33.3	4	50.0	3	60.0	12	32.4	20	37.0
Subtrochanteric	.	.	.	.	.	.	.	.	2	5.4	2	3.7
TOTAL	**1**	**100.0**	**3**	**100.0**	**8**	**100.0**	**5**	**100.0**	**37**	**100.0**	**54**	**100.0**

Table A6 (7): Hip Fracture Type by DRG Current

Hip Fracture Type	901Z		I03A		I03B		I03C		I08A		I08B		W02A		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Undisplaced Intracapsular (Garden 1 & 2)	.	.	1	16.7	.	.	1	33.3	.	.	6	40.0	1	50.0	9	16.7
Displaced Intracapsular (Garden 3 & 4)	.	.	5	83.3	13	100.0	2	66.7	1	7.1	.	.	1	50.0	22	40.7
Basocervical (Lateral side of neck)	.	.	.	.	.	.	.	.	1	7.1	.	.	.	.	1	1.9
Trochanteric	1	100.0	.	.	.	.	.	.	11	78.6	8	53.3	.	.	20	37.0
Subtrochanteric	.	.	.	.	.	.	.	.	1	7.1	1	6.7	.	.	2	3.7
TOTAL	**1**	**100.0**	**6**	**100.0**	**13**	**100.0**	**3**	**100.0**	**14**	**100.0**	**15**	**100.0**	**2**	**100.0**	**54**	**100.0**

901Z: Extensive OR procedure unrelated to principal diagnosis
I03A: Hip revision or replacement
I03B: Hip revision or replacement
I03C: Hip revision or replacement
I08A: Other Hip or Femur procedure
I08B: Other Hip or Femur procedure
W02A: Hip, Femur and Limb Procs for Multiple Significant trauma

Table A6 (8): Hip Fracture Type by External Cause

Hip Fracture Type	V4840		W010		W011		W012		W03		W05		W069		W079		W109		W181		W188		W189		W19		X59		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Undisplaced Intracapsular (Garden 1 & 2)	.	.	.	.	8	53.3	.	.	.	.	.	.	1	25.0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	9	16.7
Displaced Intracapsular (Garden 3 & 4)	1	100.0	2	50.0	5	33.3	.	.	.	.	.	.	1	25.0	.	.	1	100.0	.	.	2	66.7	4	33.3	5	71.4	1	100.0	22	40.7
Basocervical (Lateral side of neck)	.	.	.	.	1	6.7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1.9
Trochanteric	.	.	2	50.0	1	6.7	1	100.0	1	100.0	1	100.0	2	50.0	1	100.0	.	.	2	100.0	1	33.3	6	50.0	2	28.6	.	.	20	37.0
Subtrochanteric	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	16.7	.	.	.	.	2	3.7
TOTAL	**1**	**100.0**	**4**	**100.0**	**15**	**100.0**	**1**	**100.0**	**1**	**100.0**	**1**	**100.0**	**4**	**100.0**	**1**	**100.0**	**1**	**100.0**	**2**	**100.0**	**3**	**100.0**	**12**	**100.0**	**7**	**100.0**	**1**	**100.0**	**54**	**100.0**

V4840 Transport
W010 Fall (slipping)
W011 Fall (tripping)
W012 Fall (stumbling)
W03 Fall (collision other person)
W05 Fall (involving wheelchair)
W069 Fall (involving bed)
W079 Fall (involving chair)
W109 Fall (stairs)
W181, W188, W189 Other fall
W19 Fall (unspecified)
X59 Accident NOS

Table A6 (9): Hip Fracture Type by Place of Occurrence

Hip Fracture Type	Y9200 N	Y9201 N	Y9203 N	Y9204 N	Y9205 N	Y9206 N	Y9207 N	Y9209 N	Y9214 N	Y9222 N	Y9229 N	Y9230 N	Y9240 N	Y9241 N	Y9250 N	Y9287 N	Y929 N	TOTAL N
Undisplaced Intracapsular (Garden 1 & 2)	.	.	.	1	2	.	.	4	1	.	.	.	.	1	.	.	.	9
Displaced Intracapsular (Garden 3 & 4)	1	1	.	.	2	1	1	3	8	.	1	1	1	.	.	1	1	22
Basocervical (Lateral side of neck)	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	1
Trochanteric	.	1	2	1	.	.	.	2	10	1	.	.	.	1	2	.	.	20
Subtrochanteric	.	.	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	2
TOTAL	**1**	**2**	**2**	**2**	**4**	**2**	**1**	**9**	**20**	**2**	**1**	**1**	**1**	**2**	**2**	**1**	**1**	**54**

Home = 23
ACF = 20
Other Health Serv/Pub Admin = 3
Sporting (outdoors) = 1
Street/sidewalk = 3
Trade service area = 2
Parking lot = 1
Unspef = 1

All Y920* in and around home; Y9214 – aged care facilities; Y9222 – Health Service Area; Y9229 - Oth spec institution & public admin area; Y9230 – sporting grounds (outdoors); Y9240 – street and highway (roadway); Y9241 – street and highway (sidewalk); Y9250 - Trade and service area, shop and store; Y9287 – Parking lot; Y929 - Unspecified

Table A6 (10): Primary Hip Surgery by Procedure One

Primary Hip Surgery	4736600		4751900		4752200		4752801		4753100		4931500		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Two Screws	.	.	1	3.6	.	.	.	.	.	.	.	.	1	1.9
Three Screws	1	100.0	5	17.9	.	.	.	.	.	.	.	.	6	11.1
DHS	.	.	1	3.6	.	.	.	.	.	.	.	.	1	1.9
Intramedullary Nail	.	.	19	67.9	1	4.5	1	100.0	1	100.0	.	.	22	40.7
Cemented Hemiarthroplasty	.	.	.	.	19	86.4	.	.	.	.	1	100.0	20	37.0
Uncemented Hemiarthroplasty	.	.	.	.	2	9.1	.	.	.	.	.	.	2	3.7
DHS + Two Screws	.	.	1	3.6	.	.	.	.	.	.	.	.	1	1.9
Other	.	.	1	3.6	.	.	.	.	.	.	.	.	1	1.9
TOTAL	**1**	**100.0**	**28**	**100.0**	**22**	**100.0**	**1**	**100.0**	**1**	**100.0**	**1**	**100.0**	**54**	**100.0**

Table A6 (11): Pressure Ulcer on Discharge by Pressure Ulcer - L89*

Pressure Ulcer on Discharge	No		Yes		TOTAL	
	N	%	N	%	N	%
No Pressure Ulcer	37	72.5	1	33.3	38	70.4
Stage 1	1	2.0	.	.	1	1.9
Stage 2	.	.	1	33.3	1	1.9
Stage 3	.	.	1	33.3	1	1.9
Not Recorded	13	25.5	.	.	13	24.1
TOTAL	**51**	**100.0**	**3**	**100.0**	**54**	**100.0**

Table A6 (12): Discharge Destination by Nature of Separation

Discharge Destination	1		2		5		6		7		A		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Home	4	21.1	.	.	.	.	.	.	.	.	1	16.7	5	9.3
Residential Care	1	5.3	.	.	.	.	.	.	.	.	.	.	1	1.9
Nursing Home	14	73.7	.	.	.	.	.	.	.	.	2	33.3	16	29.6
Rehab Unit	.	.	1	50.0	.	.	.	.	14	63.6	3	50.0	18	33.3
Acute Hospital	.	.	1	50.0	.	.	.	.	7	31.8	.	.	8	14.8
Other	.	.	.	.	.	.	.	.	1	4.5	.	.	1	1.9
9999	.	.	.	.	3	100.0	2	100.0	.	.	.	.	5	9.3
TOTAL	**19**	**100.0**	**2**	**100.0**	**3**	**100.0**	**2**	**100.0**	**22**	**100.0**	**6**	**100.0**	**54**	**100.0**

1: usual place of residence
2: other hospital, up transfer
5: died (no autopsy)
6: died (autopsy)
7: other hospital, down transfer
A: administrative separation

Table A6 (13): Discharge Destination by Transfer to Hospital

Discharge Destination	No Trans		0018		0033		0112		0205		0211		4309		4310		4338		5200		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Home	5	16.7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	9.3
Residential Care	1	3.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1.9
Nursing Home	16	53.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	16	29.6
Rehab Unit	3	10.0	13	92.9	1	100.0	.	.	.	.	.	.	.	.	1	100.0	.	.	.	.	18	33.3
Acute Hospital	.	.	1	7.1	.	.	1	100.0	1	100.0	1	100.0	.	.	.	.	1	100.0	3	100.0	8	14.8
Other	.	.	.	.	.	.	.	.	.	.	.	.	1	100.0	.	.	.	.	.	.	1	1.9
9999	5	16.7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	9.3
TOTAL	**30**	**100.0**	**14**	**100.0**	**1**	**100.0**	**1**	**100.0**	**1**	**100.0**	**1**	**100.0**	**1**	**100.0**	**1**	**100.0**	**1**	**100.0**	**3**	**100.0**	**54**	**100.0**

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