Research Report

Pain Management for fractured neck of femur: retrospective comparative study of cognitively impaired and cognitively intact patients.

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Abbreviations

AMTS - Abbreviated Mental Test Score

CAM - Confusion Assessment Method

DRAT - Delirium Rist Assessment Tool

FLACC - Face, Legs, Activity, Cry and Consolability

NOF - Neck of femur

OME – Oral Morphine Equivalent

PAINAD - Pain Assessment IN Advanced Dementia

VAS - Visual Analogue Scale

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Abstract

Background: Self-reported pain has historically been seen as the gold standard for pain assessment for patients with a fractured neck of femur. Self-reporting requires patients to have sound linguistic and social skills to express pain verbally. Cognitive impairment can alter communication style and act as a barrier to verbalising the pain experienced by these patients. Dementia and delirium are common amongst fractured neck of femur patients with over a quarter of patients experiencing cognitive impairment on admission and up to 40% going on to be diagnosed with delirium post-operatively. Pain assessment and subsequent administering of analgesia becomes more complex when traditional assessment methods are unable to be used. Inaccurate pain assessment and pain management can result in inadequate treatment of pain, leading to negative outcomes for the patient.

Objective: The aim of the study was to investigate the current pain management practices for patients with a fractured neck of femur and to characterise the pain assessment and management strategies and pain-related outcomes between cognitively intact and cognitively impaired individuals.

Methods: The study design was a retrospective observational cohort study comparing pain assessments conducted, analgesia administered and mobility from day one to day six following surgical repair of a fractured neck of femur between cognitively intact and cognitively impaired patients. The study was conducted in a large regional hospital in a coastal region of northern NSW, Australia. Descriptive statistics were utilised to summarise the data and measures of variation. Independent t-tests or Mann–Whitney U tests were used to compare continuous variables depending on data distribution.

Results: Pain assessments were performed regularly on all fractured neck of femur patients. Cognitively impaired patients had a larger range of assessment tools used during admission, zero to five compared to cognitively intact patients who had one to four. Cognitively impaired patients had lower maximum pain scores, of up to two points, documented at both rest and on movement. A statistical difference in pain scores was shown on all days except day six. There was no significant difference in the amount of simple analgesia administered between the two groups. Cognitively impaired patients received significantly lower doses of opioid analgesia in the first five days post-operatively. This was most notably seen on day one with a difference of 26.5 OME ($p<0.01$). This gap did not close until day six when doses of opioid analgesia administered to the cognitively intact group trended down to the levels administered to cognitively impaired patients. Outcomes remain poorer for cognitively impaired patients. On day one 39% of cognitively impaired patients mobilised rising to 71% on day six. This contrasts with cognitively intact patients where 73% mobilised day one increasing to 91% on day six. Cognitively impaired patients experiencing an increased length of stay of 2 days with 12% discharged to rehabilitation and 4% discharged back to private accommodation. Rehabilitation occurred for 33% of cognitively intact patients with 41% discharged back to private accommodation.

Conclusion: This study has shown a significant difference in pain scores recorded, opiate analgesia administered and function post-operatively between cognitively impaired and cognitively intact patients. Pain management in cognitively impaired patients with a fractured neck of femur remains challenging for nurses. Cognitive impairment remains a barrier to assessing pain and administering analgesia in patients post a hip fracture.

Key Words: fractured neck of femur, pain assessment, pain management, analgesia, cognitive impairment, dementia, delirium.

INTRODUCTION

Fractured neck of femur patients constitute a significant health cohort with over 19,000 Australians per year, aged 45 and over hospitalised with a fractured hip per year, rising from 9 cases per 100,000 among people aged 45–49 to nearly 1,800 per 100,000 among those aged 85 and over (Australian Institute of Health and Welfare, 2018). This number is predicted to rise in NSW alone to between 25,000 – 37,000 cases by 2036 (Stephens, Toson, & Close, 2014). The average length of stay for a fractured neck of femur patient in NSW health is 10.2 days (Agency for Clinical Innovation (NSW), 2023).

The Tweed Hospital, a major referral and teaching hospital in northern NSW, reported 135 cases of fractured neck of femur to the Australian and New Zealand Hip Fracture Registry (ANZHFR) in 2021 (Australian and New Zealand Hip Fracture Registry, 2022). Of the 135 cases reported, 52% had perioperative cognitive screening with no impairment identified, 27% had a cognitive impairment and 21% were not assessed (Australian and New Zealand Hip Fracture Registry, 2022). Delirium is the most common complication post operatively with around 40% of patients diagnosed with this after surgery (Oberai et al., 2021). Underdiagnosis of delirium is a significant issue in the acute setting so rates are potentially higher than reported (Boucher et al., 2019). Existing or newly developed cognitive impairment poses challenges for health care staff in the assessment and management of pain for older patients with a fractured hip (Jones et al., 2017). It important that pain is recognised and treated in these patients because effective pain management for patients with a fractured neck of femur is associated with positive outcomes such as early mobilisation, decreased post operative complications, and reduced length of stay (Dixon et al., 2018).

Self-reported pain has historically been seen as the gold standard for pain assessment for patients diagnosed with a fractured neck of femur (Aftab et al., 2022). Self-reporting requires patients to have sound linguistic and social skills to express pain verbally (Booker & Haedtke, 2016). Cognitive impairment can alter communication, pain perception, and pain expression and can act as a barrier to assessing pain and administering analgesia to patients post neck of femur fracture (Moschinski et al., 2017). Pain management in people with dementia is not holistic in nature and is less effective when staff do not know the patient, fragmented information is available and there is a lack of knowledge of the patient's needs (Harkin, Coates, & Brown, 2022). Healthcare workers report uncertainty about validated pain assessment tools, poor training and understanding of evidence-based pain management, which can contribute to poorer pain outcomes (Smith et al., 2023). Pain management in people with dementia is best achieved when the family are included in care, however, family carers often report that they have insufficient information from and communication with the care team to address their family members pain effectively (Pu, Chen, Jones, & Moyle, 2023). Suboptimal pain assessments for cognitively impaired patients may subsequently lead to the undertreatment of pain for patients with a fractured neck of femur.

Contemporary clinical practice guidelines, such as the Hip Fracture Care Clinical Care Standard recommend a comprehensive pain assessment for patients with a fractured NOF (Australian Commission on Safety and Quality in Health Care, 2023). This includes immediate assessment upon hospital arrival, a follow-up within 30 minutes of initial analgesia administration, hourly assessments until the patient's condition stabilises, and routine ongoing observations throughout their hospital stay (Australian Commission on Safety and Quality in Health Care, 2023). The Australian and New Zealand Guideline for Hip Fracture Care also recommends offering patients and their carers verbal and printed information about the choice of analgesia and engaging with the patient and or their family in all aspects of care post a fractured hip (Australian and New Zealand Hip Fracture Registry (ANZHFR) Steering Group, 2014). Guidelines from the Australian Commission on Safety and Quality in Health Care (ACSQHC) and Australian and New Zealand Hip Fracture Registry (ANZHFR) are not specific in their recommendations related to post-operative pain management recommending "regular" assessment (Australian Commission on Safety and Quality in Health Care, 2023; Australian and New Zealand Hip Fracture Registry (ANZHFR) Steering Group, 2014). As per the NSW Health Policy NNSW-LHD-PRO-

0862-21 Observations – minimum standards, a pain assessment should be conducted with each set of observations. For non-acute patients who have been in the hospital for over 48 hours, a minimum of 12 hourly observations is required (NSW Health, 2022). Currently, no audit captures data about the frequency of pain assessment or quality of analgesia given. The annual observation audit conducted in Northern New South Wales Local Health District (NNSWLHD) facilities only asks if pain has been assessed with the last set of observations. This audit does not differentiate the reason for admission or look at the frequency of documented pain assessments during an admission. The Australian and New Zealand Hip Fracture Registry (ANZHFR) only reports analgesia given prehospital arrival and within the first hour of the ED admission (Australian and New Zealand Hip Fracture Registry, 2022).

A search of the Ovid database for articles published between 2000 and 2023, conducted in the preparatory phase of this research, revealed a notable scarcity of research in pain management across the entire acute admission of patients with a fractured neck of femur. A study in 2000 explored analgesia requirements following hip fractures, revealed that cognitively impaired patients received notably less analgesia during the first week post-fracture than their cognitively intact counterparts (Forster, Pardiwala, & Calthorpe, 2000). Similar results were reported by a case-control study that revealed significant discrepancies in pain assessment and treatment between individuals with cognitive impairment and those without cognitive impairment following a fractured neck of femur (McDermott, Nichols, & Lovell, 2014). These studies are now over 10 years old, and the significant discrepancies reported underscore the need for further investigation and characterisation of the current pain management practices for patients with fractured neck of femur.

A fractured neck of femur constitutes a significant injury that can lead to a long-term loss of mobility, decreased quality of life, the need to leave private accommodation and may be a sentinel event leading to death (de Joode at al., 2019; Dyer et al., 2016). Emerging evidence exists indicating suboptimal pain assessment and management for cognitively impaired patients with a fractured hip (Jensen-Dahm, Palm, Gasse, Dahl, & Waldemar, 2016). Currently, there is no comprehensive audit system to capture data regarding the frequency of pain assessments, the quality of analgesia administered, and other pain-related outcomes for fractured neck of femur patients. This study aims to bridge this knowledge gap by conducting a retrospective analysis of electronic medical records to characterise pain management practices for patients with a fractured neck of femur. By conducting this retrospective analysis, the study seeks to provide a detailed understanding of current pain assessment and management practices and contribute to enhancing the quality of care for this population. Examining these records will give valuable insights, guiding future improvements in pain management strategies for cognitively impaired patients with fractured hip.

RESEARCH AIMS AND QUESTIONS

The aim of the study was to investigate the current pain management practices for patients with a fractured neck of femur, and to characterise and compare the pain management strategies and pain related outcomes between cognitively intact and cognitively impaired individuals.

Questions

For fractured neck of femur patients with cognitive impairment is there a difference in the:

- Number of pain assessments and pain assessment tools used?
- Pain scores documented?
- Amount of analgesia administered?
- Outcomes post-surgery?

METHOD

The study design was a retrospective observational cohort study, employing patient record analysis.

Setting

A single site, The Tweed Hospital, a large regional referral and teaching hospital located in a coastal region of northern NSW, was used. The study focused on the Surgical 2 Orthopaedic Ward as most fractured neck of femur (NOF) patients are inpatients on this unit. Data was collected from other areas of The Tweed Hospital including the Intensive Care Unit, Surgical 1, Coronary Care Unit and Medical 1 if the patients were nursed as outlying patients or in units with specialist equipment such as telemetry or isolation rooms. Data was collected from patient Electronic Medical Records, predominantly Powerchart. Data was collected regarding analgesia given via the ambulance service, the emergency department, operating theatres, recovery and inpatient units.

Participant Records

The electronic records of adult patients admitted to the Tweed Hospital with a fractured neck of femur between July 2021 and June 2023 were sampled. The patient records were divided into cognitively intact and cognitively impaired. Cognitively intact was defined as no documented history of dementia, with an Abbreviated Mental Test Score (AMTS) greater than 7/10. Cognitively impaired was defined as a documented history of cognitive impairment, an AMTS of 7 or less or a diagnosis of delirium. Delirium was assessed through the Delirium Risk Assessment Tool (DRAT) and the Confusion Assessment Measure (CAM), the two tools for delirium identification used by The Tweed Hospital at the time of the study.

Inclusion Criteria

Patients were included in the study if complete medical records were available, were diagnosed with a primary fractured neck of femur, and were under the management or co-management of the orthopaedic team. Medical records were considered complete when data was available for the entirety of the patients contact with the healthcare service. Incomplete medical records may occur if the patient is transferred out of the service for a procedure for more than 12 hours.

Exclusion Criteria

Patients were excluded if complete medical records were not available, they were not diagnosed with a primary fractured neck of femur or they were not managed or co-managed by the Orthopaedic team. Patients were excluded from the study from the time when transferred to another team such as palliative care or rehabilitation.

Sample Size

223 patient records were sampled for patients admitted between June 2021 - June 2023 with a fractured neck of femur. Seventeen records were excluded (see Figure 1).

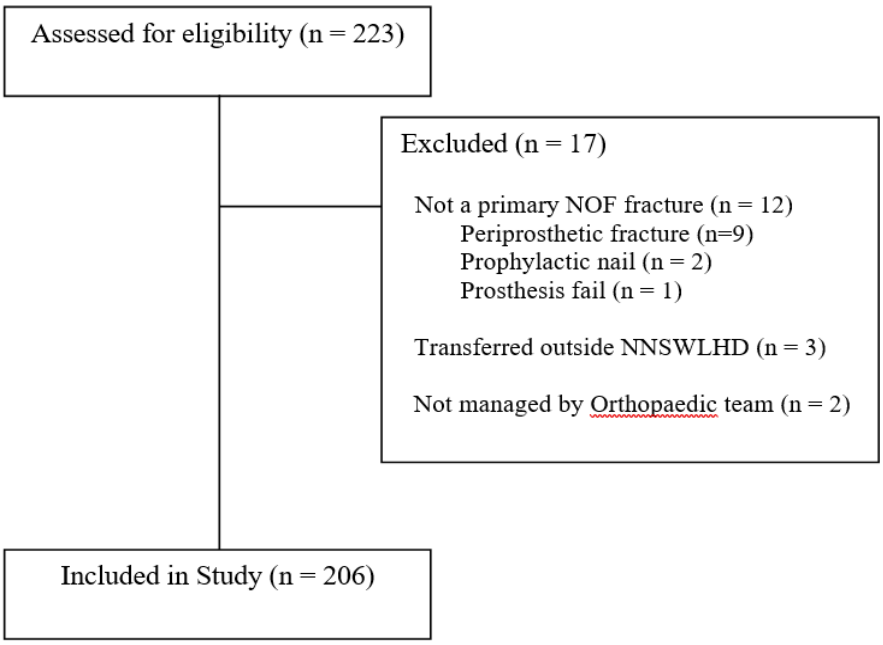

Figure 1: Flowchart of eligibility criteria.

Variables

A literature review did not identify an appropriate tool that incorporated the range of variables to investigate analgesia prescribing, pain assessment, and analgesia administration for fractured neck of femur patients across the entire acute care journey. The data collection tool was co-designed with clinicians, academics, the Nurse Practitioner Acute Pain Service, The Tweed Hospital, the Acting Clinical Nurse Consultant for Dementia and Delirium, and a Southern Cross University Data Analyst. It was trialled and adapted to ensure practicality and to improve usability. Data collected included demographic data, cognitive status, pain assessments attended, analgesia administered and mobility (Appendix 2).

Data Analysis

Data was exported from an Excel file to IBM SPSS Version 22 for analysis. Descriptive statistics was utilised to summarise the data, including frequency distributions, measures of central tendency (mean, median, and mode), and measures of variation (range and standard deviation). Parametric (independent t-tests) or non-parametric (Mann–Whitney U tests) were used to compare continuous variables (e.g., amount of analgesia administered, pain scores) between cognitively intact and cognitively impaired groups. Categorical variables (e.g., opioid use, presence of delirium) were analysed using chi-square tests or Fisher's exact tests, as appropriate. The level of statistical significance was set at $p < 0.05$.

Ethics

Ethics approval was obtained from the Northern New South Wales Local Health District Research Office in October 2023 (Reference No. QA482).

Funding

Funding was provided for 60 days of clinical backfill by the Health Education and Training Institute through the Rural Research Capacity Building Program for this project to be accomplished.

RESULTS

Characteristics of Participants

The age range for the cohort was 49 – 101 years. There was a significant difference in age with the cognitively intact group having a mean age of 76 (SD 11.1) compared to the cognitively impaired group with a mean age of 87 (SD 7.7). Females accounted for 69.9% of the total cohort with no significant difference in the ratio of males to females between the cognitively intact and cognitively impaired groups (p 0.43). During admission 44.2% of the cohort was identified as having a cognitive impairment. Dementia was present in 26.7%, cognitive impairment with no diagnosis 8.3% and delirium identified in 14% of patients admitted. Only one patient was identified as not speaking English at home. The length of stay was significantly longer for cognitively impaired patients, 8.21 days for cognitively intact people vs 10.05 days for cognitively impaired people (p 0.03).

Most cognitively intact patients were admitted from home (n=105, 91.3%) with less than half discharged directly home (n=47, 40.9%). Of those not discharged home rehabilitation was the most common destination (n=38, 33%), discharge to another hospital (n=20, 17.4%), residential aged care facility (n=8, 7%) and death (n=3 (2.6%). Most Cognitively impaired patients were admitted from a residential aged care facility (n=51, 56%) with the rest admitted from home (n=40, 44%). Of those admitted from home only 10% (n=4) were discharged directly back home. Most cognitively impaired patients were discharged to residential aged care facilities (n=49, 53.8%) with the remainder discharged to another hospital (n=22, 24.2%), hospice (n=1, 1.1%) or death (n=4, 4.4%). Rehabilitation was only offered to 11 (12.1%) of the cognitively impaired group. Cognitively impaired patients were more likely to return directly to the place of admission (n=51, 56% vs n=55, 48%) but less likely to return home if admitted from home (n=4, 4.4% vs n=47, 40.9%). (See Table 2). A Wilcoxon signed-rank test showed a statistically significant difference in the discharge location for both cognitively impaired patients and cognitively intact patients (Z = -7.0, p <0.001; Z = -5.7, p < 0.001)

Table 1: Characteristics of participants

		Total Group	Cognitively Intact [SD]	Cognitively Impaired	p
Age		80.93	75.74 [11.1]	87.49 [7.7]	<0.01
Gender:	Male	62 (30.1%)	34 (29.6%)	28 (30.8%)	0.43
	Female	144 (69.9%)	81 (69.2%)	63 (70.4%)	
Length of Stay			8.21 [4.5]	10.05 [9.2]	0.03
Admit from:	Home		105 (91.3%)	40 (44%)	<0.01
	RACF		8 (7.0%)	51 (56%)	
	Other Hospital		2 (1.7%)	-	
Discharge to:	Home		47 (40.9%)	4 (4.4%)	<0.01
	RACF		8 (7.0%)	49 (53.8%)	
	Other Hospital		20 (17.4%)	22 (24.2%)	
	Rehabilitation		38 (33.0%)	11 (12.1%)	
	Hospice		0 (0%)	1 (1.1%)	
	RIP		3 (2.6%)	4 (4.4%)	
Discharge Same Location		106 (51%)	55 (48%)	51 (56%)	<0.01

Pain Assessment

The median number of pain assessments attended each day for both cognitively intact patients and cognitively impaired patients was similar. There was a statistical difference in the number of pain assessments conducted only on day one with cognitively impaired people being reviewed on average once less per day (See Table 3).

Table 2: Pain assessments attended.

	N	Median	Mean (SD)	p
Day 1				
Cognitively Intact	115	5	7.1 (3.31)	0.01
Cognitively Impaired	91	6	6.2 (2.90)	
Day 2				
Cognitively Intact	115	5	5.9 (2.70)	0.32
Cognitively Impaired	91	6	5.6 (2.53)	
Day 3				
Cognitively Intact	102	5	5.7 (2.80)	0.85
Cognitively Impaired	88	5	5.8 (3.14)	
Day 4				
Cognitively Intact	85	6	5.7 (2.75)	0.32
Cognitively Impaired	78	6	5.4 (2.81)	
Day 5				
Cognitively Intact	73	5	5.8 (3.08)	0.32
Cognitively Impaired	62	6	5.4 (2.75)	
Day 6				
Cognitively Intact	66	5	5.1 (1.37)	0.94
Cognitively Impaired	48	6	5.5 (2.44)	

Pain Assessment Tools

Cognitively impaired patients had a greater chance of 3 or more different pain assessment tools being used in a single day (see Graph 1). There was a significant difference in the number of pain assessment tools used between cognitively impaired patients and cognitively intact patients ($p < 0.001$). The median number of pain assessment tools used during the study, day one to day six was 2 (SD 0.46) for cognitively intact patients and 3 (SD 0.94). There was no difference in the use of the pain assessment tools 0 – 10 and verbal between the two groups with over 95% of all patients having these tools used on them during their admission. Cognitively impaired patients had a greater likelihood of Abbey, Faces, PAINAD or FLACC scales being used during their admission. No patients had a VAS scale used. See Table 3.

Table 3: Number of pain assessment tools used, postoperatively days 1-6.

Pain Tool	N (%)	p
0 - 10 Cognitively Intact Cognitively Impaired	 114 (99%) 87 (96%)	 0.06
Verbal Cognitively Intact Cognitively Impaired	 113 (98%) 88 (97%)	 0.23
Abbey Cognitively Intact Cognitively Impaired	 11 (10%) 60 (66%)	 <0.01
Faces Cognitively Intact Cognitively Impaired	 6 (5%) 46 (51%)	 <0.01
PAINAD Cognitively Intact Cognitively Impaired	 1 (1%) 9 (10%)	 0.01
FLACC Cognitively Intact Cognitively Impaired	 1 (1%) 6 (7%)	 0.01

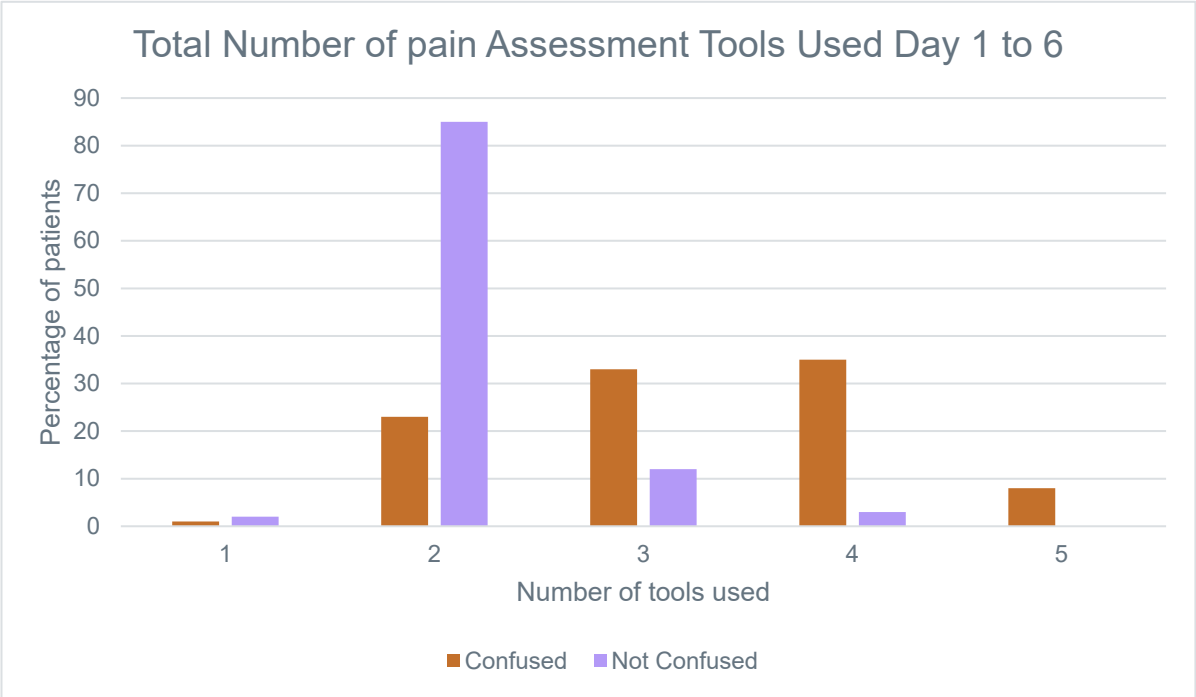

Figure 2: Number of pain tools used per day, Day One to Day Six.

Pain Scores

Median minimum resting pain scores were 0 for cognitively intact and cognitively impaired patients. Median maximum dynamic pain scores were 2. Although median scores were the same a significant difference in the maximum resting pain scores was evident between day 1 to day 4 (see Table 5, Graph 2).

Median minimum dynamic pain scores were 0 for both cognitively intact and cognitively impaired patients. A statistical difference was only noted on day one. Median maximum dynamic pain scores ranged from 3 to 5 whilst cognitively intact patients ranged from 2 to 4. Maximum dynamic pain scores showed a significant difference on all days except day 3 and day 6 (see Table 6, Graph 3).

Table 4: Resting pain scores.

	Minimum				Maximum		
	N	Median	Mean (SD)	p	Median	Mean (SD)	p
Day 1							
Cognitively Intact	115	0	0.11 (0.44)	0.26	2	2.93 (1.93)	<0.01
Cognitively Impaired	91	0	0.08 (0.37)		2	2.12 (1.86)	
Day 2							
Cognitively Intact	115	0	0.10 (0.42)	0.38	2	2.59 (1.81)	<0.01
Cognitively Impaired	91	0	0.08 (0.37)		2	1.82 (1.65)	
Day 3							
Cognitively Intact	102	0	0.19 (0.58)	0.10	2	2.21 (1.86)	0.04
Cognitively Impaired	88	0	0.09 (0.42)		2	1.75 (1.70)	
Day 4							
Cognitively Intact	85	0	0.15 (0.48)	0.18	2	2.34 (1.81)	<0.01
Cognitively Impaired	78	0	0.09 (0.40)		2	1.55 (1.68)	
Day 5							
Cognitively Intact	73	0	0.19 (0.62)	0.22	2	2.21 (1.82)	0.06
Cognitively Impaired	62	0	0.32 (1.27)		2	1.69 (1.91)	
Day 6							
Cognitively Intact	66	0	0.11 (0.43)	0.32	2	1.98 (1.78)	0.18
Cognitively Impaired	48	0	0.15 (0.46)		2	2.31 (2.00)	

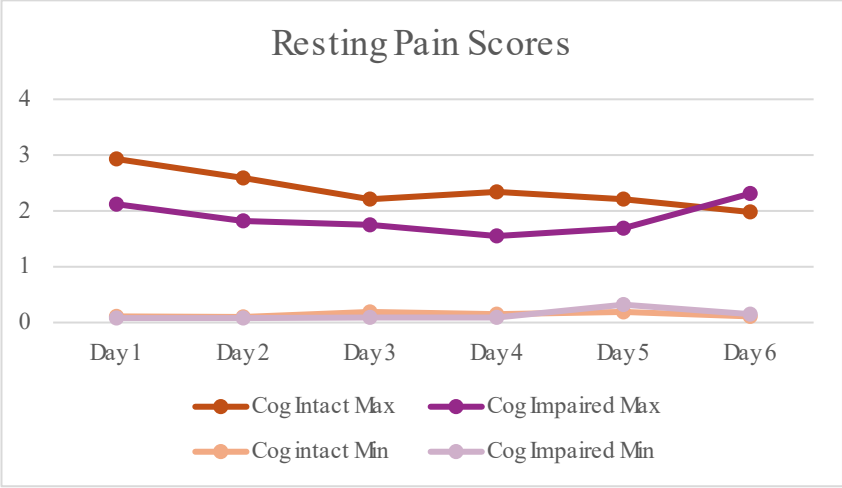

Figure 3: Resting Pain Scores

Table 5: Dynamic pain scores.

	Minimum				Maximum		
	N	Median	Mean (SD)	p	Median	Mean (SD)	p
Day 1							
Cognitively Intact	115	0	0.84 (1.27)	0.04	5	4.13 (1.66)	<0.01
Cognitively Impaired	91	0	0.55 (0.99)		3	3.32 (1.92)	
Day 2							
Cognitively Intact	115	0	0.83 (1.24)	0.28	5	4.04 (1.74)	<0.01
Cognitively Impaired	91	0	0.72 (1.37)		4	3.32 (1.91)	
Day 3							
Cognitively Intact	102	0	0.92 (3.31)	0.25	3	3.21 (1.83)	0.30
Cognitively Impaired	88	0	0.67 (1.26)		3	3.07 (1.82)	
Day 4							
Cognitively Intact	85	0	0.66 (1.16)	0.07	4	3.53 (1.91)	0.01
Cognitively Impaired	78	0	0.41 (0.10)		3	2.88 (1.71)	
Day 5							
Cognitively Intact	73	0	0.64 (1.19)	0.47	4	3.57 (1.71)	0.02
Cognitively Impaired	62	0	0.66 (1.18)		2	2.87 (1.99)	
Day 6							
Cognitively Intact	66	0	0.53 (1.01)	0.40	3	3.23 (1.95)	0.35
Cognitively Impaired	48	0	0.58 (1.13)		4	3.38 (2.22)	

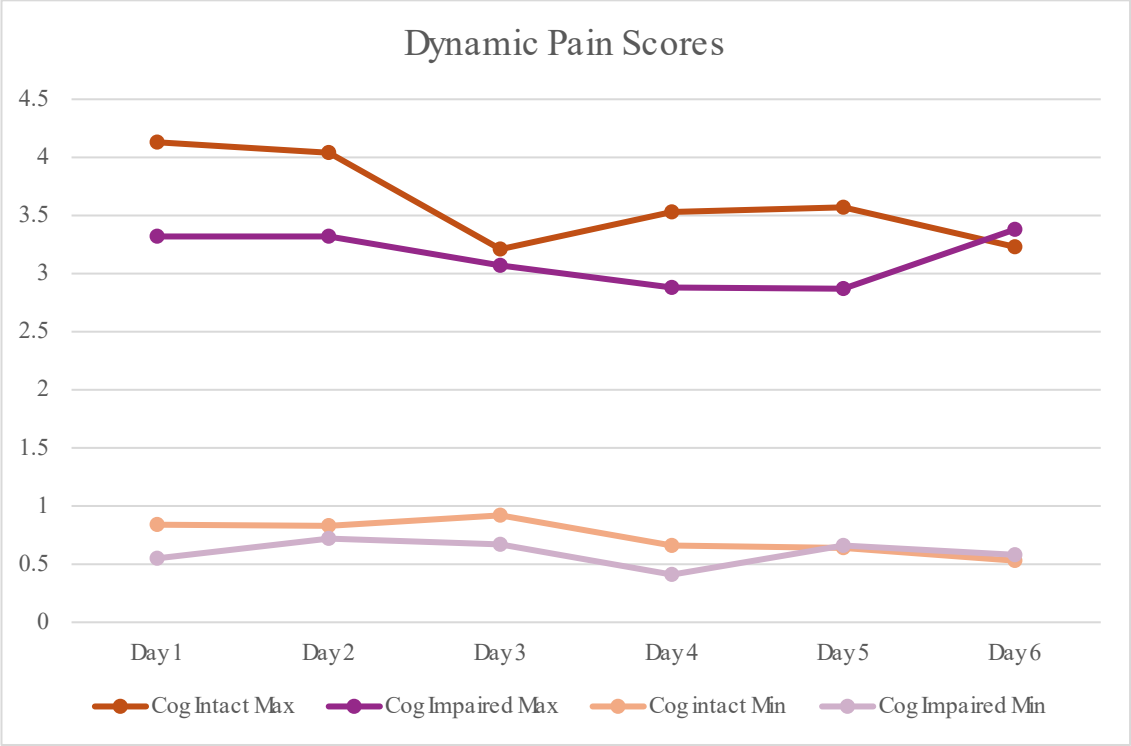

Figure 4: Dynamic Pain Scores

Analgesia Administered

Analgesia administered was separated into simple analgesia and opioid analgesia. Simple analgesia ranged from 2.20 g on day six to 2.85 g on day one for cognitively intact patients. Cognitively impaired patients received between 2.27 g on day four to 2.50 g on day three. Despite a difference in the amount of simple analgesia administered between the two groups only being observed on day one postoperatively the amount of increase in simple analgesia for the cognitively impaired group only represents 0.8 – 1.3 g per day more than their pre-hospital use whilst cognitively intact people had an increase of 1.7 – 2.4 g per day on their prehospital use (see Table 7and Graph 4).

Table 6: Simple analgesia administered.

	N	Mean	SD	p
Pre-Op Regular Simple Analgesia				
Cognitively Intact	115	0.49	1.24	<0.01
Cognitively Impaired	91	1.32	1.57	
Day 1				
Cognitively Intact	115	2.85	0.93	<0.01
Cognitively Impaired	91	2.42	1.19	
Day 2				
Cognitively Intact	115	2.76	0.95	0.09
Cognitively Impaired	91	2.46	1.17	
Day 3				
Cognitively Intact	102	2.64	1.02	0.48
Cognitively Impaired	88	2.50	1.19	
Day 4				
Cognitively Intact	85	2.64	1.13	0.12
Cognitively Impaired	78	2.27	1.02	
Day 5				
Cognitively Intact	73	2.55	1.21	0.29
Cognitively Impaired	62	2.38	1.25	
Day 6				
Cognitively Intact	66	2.20	1.26	0.27
Cognitively Impaired	48	2.48	1.12	

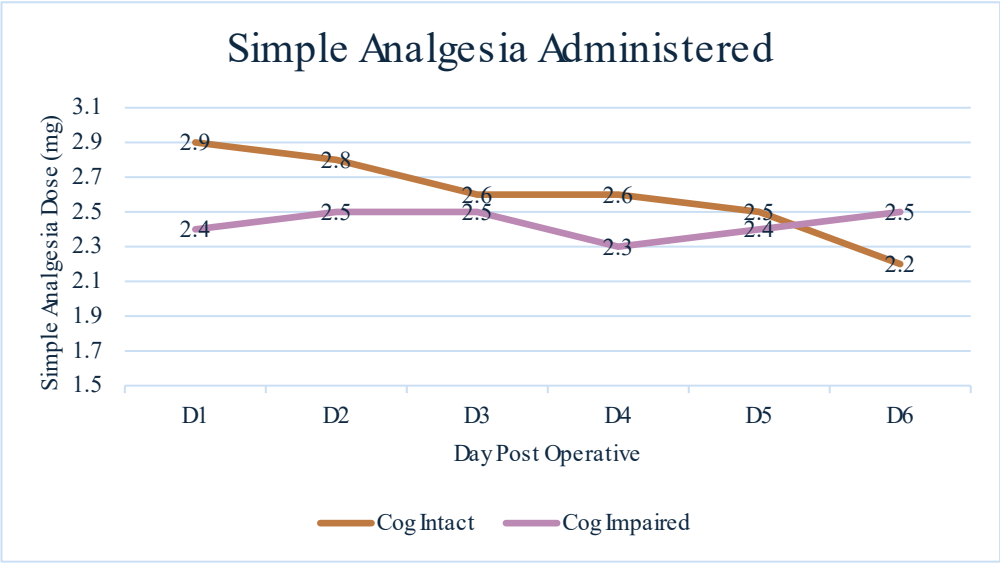

Figure 5: Simple analgesia administered.

Opioid analgesia was recorded in oral morphine equivalents. Opioid analgesia administered showed a significant difference between cognitively intact and cognitively impaired patients from day one to day five of the study (see Graph 5). This difference in opioid analgesia administered abated on day 6 with the cognitively intact group trending down to meet the cognitively impaired group. Cognitively intact patients received an average of 49.17 oral morphine equivalents (OME) of opioid analgesia on day one, trending down to 23.62 OME on day six. Cognitively impaired patients received an average of 22.65 OME on day one, generally trending downwards to 17.13 OME on day six (see Table 8).

Table 7: Opioid analgesia administered.

	N	Mean	SD	p
Pre-op Regular Opioid Analgesia				
Cognitively Intact	115	13.7	63.18	0.05
Cognitively Impaired	91	2.65	8.44	
Day 1				
Cognitively Intact	115	49.17	67.22	<0.01
Cognitively Impaired	91	22.65	23.78	
Day 2				
Cognitively Intact	115	44.39	71.86	<0.01
Cognitively Impaired	91	21.92	21.31	
Day 3				
Cognitively Intact	102	39.74	72.11	<0.01
Cognitively Impaired	88	16.63	19.33	
Day 4				
Cognitively Intact	85	31.95	56.00	0.02
Cognitively Impaired	78	17.42	21.08	
Day 5				
Cognitively Intact	73	27.04	56.00	0.01
Cognitively Impaired	62	14.87	21.08	
Day 6				
Cognitively Intact	66	23.62	26.24	0.14
Cognitively Impaired	48	17.13	22.39	

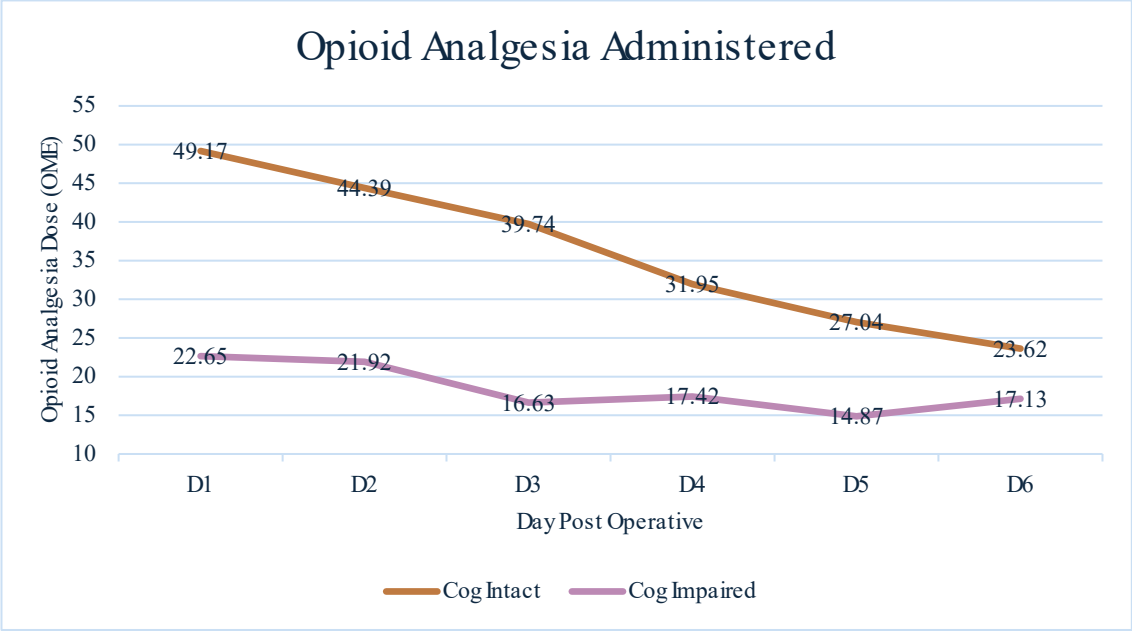

Figure 6: Opioid analgesia administered.

Mobility

Mobilisation rates varied significantly (p<0.01) between cognitively intact and cognitively impaired patients every day postoperatively. Pre fracture all cognitively intact patients were mobile (n=115, 100%) whilst most cognitively impaired patients were mobile (n=87, 96%). Patients who were immobile on admission were excluded from analysis of postoperative mobility. Rates of mobilisation postoperatively in the cognitively intact group increased from 73% (n=84) of patients on day one to 90.9% (n=60) on day six. Rates of mobilisation postoperatively in the cognitively impaired group increased from 39% (n=36) of patients on day one to 70.8% (n=34) of patients on day six.

Table 8: Mobility post operatively.

	Mobilised	Stood	No	p
Pre-op Mobility				
Cognitively Intact	115 (100%)			
Cognitively Impaired	88 (96%)		3 (4%)	
Day 1				
Cognitively Intact	84 (73%)	16 (14%)	15 (13%)	<0.01
Cognitively Impaired	36 (39%)	19 (22%)	33 (38%)	
Day 2				
Cognitively Intact	95 (83%)	7 (6%)	13 (11%)	<0.01
Cognitively Impaired	40 (44%)	21 (24%)	27 (31%)	
Day 3				
Cognitively Intact	91 (89%)	3 (3%)	8 (8%)	<0.01
Cognitively Impaired	50 (57%)	16 (18%)	19 (22%)	
Day 4				
Cognitively Intact	77 (91%)	5 (6%)	3 (3%)	<0.01
Cognitively Impaired	46 (59%)	21 (24%)	10 (11%)	
Day 5				
Cognitively Intact	65 (89%)	5 (7%)	3 (4%)	<0.01
Cognitively Impaired	42 (68%)	14 (22%)	6 (10%)	
Day 6				
Cognitively Intact	60 (91%)	5 (7%)	1 (2%)	<0.01
Cognitively Impaired	34 (71%)	9 (19%)	5 (10%)	

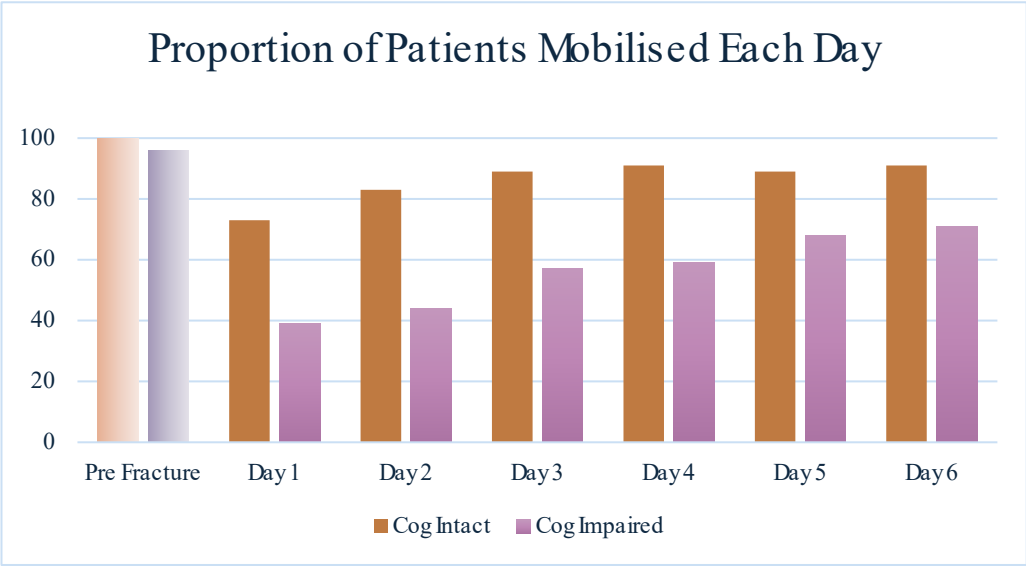

Figure 7: Mobility post operatively.

DISCUSSION

The aim of this study was to explore current trends in pain assessment and analgesia administration and the differences in the way these are executed in cognitively impaired and cognitively intact patients post a surgical repair of a fractured neck of femur. This study found that pain assessments are being attended regularly however a range of assessment tools are being used, the amount of opioid analgesia administered to cognitively impaired people is significantly lower, and they continue to have poorer outcomes post-surgery including mobilisation, access to rehabilitation and return to private accommodation. Pain is considered the fifth vital sign (American Pain Society Quality of Care Committee, 1995). Despite its importance there remains little recent research evaluating current pain assessment and management of the fractured neck of femur patient in the postoperative period (Forster et al., 2000; McDermott et al., 2014). An integrative review conducted on nurses' experiences of pain management in cognitively impaired older people with a fractured hip in the acute setting highlighted that this remains challenging for nurses and further research is required (Lincoln, Lapkin and Aggar, 2024)

This study observed in practice regular and routine assessment is occurring for all fractured neck of femur patients as per recommended guidelines. Current Australian guidelines for post operative pain assessment in fractured neck of femur patients recommend routine or regular assessment of pain (Australian Commission on Safety and Quality in Health Care, 2023; Australian and New Zealand Hip Fracture Registry Steering Group, 2014). These recommendations are echoed in international guidelines however many recommendations focussed on the preoperative phase (National Institute for Health and Care Excellence, 2023; American Academy of Orthopaedic Surgeons, 2021). Cognitively intact and cognitively impaired patients in the study had a similar number of pain assessments attended each day with a statistical difference evident only on day one. This resulted in cognitively impaired people being reviewed on average once less on this day. This study observed in practice this regular and routine assessment is occurring for all fractured neck of femur patients as per recommended guidelines.

This study found that cognitively impaired patients had more likelihood of multiple pain assessment tools being used. Nurses are responsible for selecting and accurately applying the most appropriate pain assessment tools, which may include self-report, observational, unidimensional, and multidimensional measures (Baamer et al., 2022). Seven pain assessment scales are available within the electronic medical record system. These are the 0 to 10, Verbal, Abbey, Faces, Pain Assessment IN Advanced Dementia (PAINAD), Face, Legs, Activity, Cry and Consolability (FLACC) and Visual Analogue Scale (VAS) pain scales. Instructions or guidelines are available for the Abbey and PAINAD scales with training recommended for the PAINAD scale (Lichtner et al, 2014). Nurses are required to assess each person, choose a suitable tool, apply it correctly and interpret the score accurately (Jones et al., 2017). Self-reported assessment tools have been shown to be effective in assessing pain in older people with mild to moderate cognitive impairment only (Taylor et al, 2005). Observer rated pain scales such as Abbey, faces, PAINAD and FLACC improve the identification and rating of pain in patients with moderate to severe cognitive impairment (Agit et al., 20). The use of a single domain of behavioural expression reduces the accuracy of assessment in these patients (Lukas et al, 2013). Reliance on non-verbal communication cues can make differentiating between pain and other experiences such as anxiety challenging (Seffo et al., 2020). This can lead to pain not being recognised (Miu et al., 2014). Use of multiple tools may represent the difficulty of nurses in choosing an appropriate tool for the patient being assessed with nurses reporting a lack of access to training and resources about pain management (Lincoln, Lapkin and Aggar, 2024).

This study showed minimum resting and dynamic pain scores were similar between the two groups. The maximum resting and dynamic pain scores were significantly lower in the cognitively impaired group. This was most evident with the dynamic, at movement, scores being lower across all six days. There is no evidence that cognitively impaired patients experience less pain than those who are cognitively intact

(Cole et al., 2006; Benedetti et al., 2004; Gibson et al., 2001). There is evidence that neurobiological changes in the brain due to dementia can cause intensified pain processing responses in these people due to a reduction in pain moderation ability (Bunk et al., 2021). Use of pain assessment tools that are not appropriate for the patient reduces the accuracy of assessment (Lichtner et al, 2014). This may be a function of the range of pain scales used in a day and the choice of scale not being appropriate to the person assessed leading to reduced accuracy of assessment (Breivik et al., 2008). Improved pain assessments are always desirable, however, a study by Fry Chenoweth and Arendts (2018) showed that even when nurses were trained in the use of an observational pain assessment tool and the amount of pain assessments performed increased, the time to the patient receiving analgesia did not decrease. This use of pain assessment tools that are not appropriate for the patient reduces the accuracy of assessment and may be one of the causal factors for reduced analgesia administration in cognitively impaired patients (Lichtner et al, 2014).

This study has confirmed reduced analgesia administration in postoperative cognitively impaired patients with a fractured neck of femur. Managing pain in cognitively impaired patients with a fractured neck of femur presents unique challenges, particularly concerning the use of analgesics. Cognitively impaired patients with a fractured neck of femur are less likely to receive timely analgesia in the emergency department (Taylor et al., 2024; Aftab et al., 2022). Historically studies have shown that this continues post operatively to at least day three to four (Feldt et al., 1998; Morrison and Siu, 2000). The amount of simple analgesia administered to both the cognitively intact and cognitively impaired group was similar however the cognitively intact group showed a significant increase from their baseline regular simple analgesia dose.

Opioid analgesia administered showed a significant difference between cognitively intact and cognitively impaired patients. This difference was evident up to day six and only equalised when the cognitively intact patient's opioid dose trended down to meet that of the cognitively impaired group. Cognitively impaired patients had minimal difference in the amount of opioid analgesia administered on day one in comparison to day six. Cognitively intact patients were administered higher doses of analgesia during the post-operative period with the most inflammation, nerve sensitisation and pain with doses decreasing as these pathophysiological processes subside (Eisenach and Brennan, 2018). There remained a significant difference in the amount of opioid analgesia administered between the two groups even on day three when there was no significant difference in the maximum pain scores for the day. Nurses continue to have significant concerns about potential side effects of opioids such as increased confusion or over sedation (Neville et al., 2023; Titler et al., 2003; Krupic et al., 2018). This cautious approach can result in lower analgesia administration rates for patients with a cognitive impairment, potentially leading to the under-treatment of pain (McAuliffe et al., 2012). Nurses also experience insufficient documentation about the effects of previous analgesia and a lack of a documented pain plans which can contribute to a lack of person specific knowledge making analgesia choices more challenging (Rantala et al., 2014; Herr et al., 2004).

Cognitively impaired patients experience poorer outcomes post-operatively including mobilisation, access to rehabilitation and return to private accommodation. Cognitively impaired patients had an increased length of stay of two days. Although cognitively impaired patients were more likely to discharged to their place of admission this is partly a function of the majority admitted from aged care facilities where full mobility is not required for discharge. Of those admitted from home only 10% were discharged directly back home whilst over 40% of cognitively intact patients were discharged back home. Mobility outcomes were significantly reduced in the cognitively impaired group with under half of patients mobilised day one. Improved analgesia administration is associated with improved functional mobility post a fractured neck of femur even though pain scores may not be significantly different (Chin et al., 2013). Although these reduced outcomes represent correlation not causation due to the observational nature of this study, many studies have noted effective pain management to be associated with early mobilisation, decreased post operative complications and reduced length of stay (Dixon et al., 2018; Ní Chróinín and Chuan, 2022; Gray et al., 2024).

Despite there being no evidence that patients with a cognitive impairment feel pain differently (Bunk et al., 2021), they continue to receive significantly less analgesia compared to their cognitively intact counterparts. Despite this pain is viewed as an important clinical issue with nurses recognising that people with dementia have the same rights to analgesia as cognitively intact people (Seffo et al., 2020; Fry et al., 2017; Rantala et al., 2014). Although pain assessments are being conducted regularly in cognitively impaired patients a range of pain tools are being used, pain scores recorded are lower, less analgesia is administered and reduced mobility post-surgery are seen in these patients.

Limitations

A potential limitation of this study is that only simple and opioid analgesia administered were analysed. Simple and opioid analgesia are the most common forms of analgesia used post-operatively however other forms of analgesia may have been utilised. Non-steroidal anti-inflammatory drugs, adjunctive analgesia and non-pharmacological pain management strategies were not included in this study. There is no way to compare the effectiveness of different non-steroidal anti-inflammatory drugs or adjunctive analgesia. Non-pharmacological pain management strategies such as leg positioning and heat or cold therapies are often not documented in the notes and therefore difficult to compare.

In this study only 14% of the cohort was diagnosed with delirium. This is less than expected with 20 to 40% of patients developing a delirium post a fractured neck of femur. Under reporting of delirium is a known phenomenon and this may reflect a function of under diagnosis.

This study collected data about all analgesia prescribed, pain assessments attended, and all analgesia administered from ambulance collection, through Emergency Department, pre surgery, intraoperative as well as post operative day one to day ten. This paper is nursing focussed and reports on the aspects of pain assessment and management that nurses participate in during the most acute phase post-operatively where the paucity of research knowledge is most profound. Further analysis is possible from this extensive data set.

Conclusion

Cognitively impaired patients with a fractured neck of femur experience significant differences in pain assessment and pain management to cognitively intact patients. Cognitive impairment remains a barrier to assessing pain and administering analgesia post a fractured neck of femur. Analgesia administered is not optimised to peak times of pathophysiological damage. Reduced post-operative outcomes including mobilisation, rehabilitation and return to private accommodation occur. Further research is required to reduce this analgesia gap and optimise post operative outcomes for this vulnerable group.

Recommendations

- Further analysis of data collected for this research project including analgesia prescribing across the entire acute care presentation to identify further factors influencing the amount of analgesia administered in cognitively impaired patients with a fractured neck of femur.
- Interventional RCT providing pain management training to family and carers of cognitively impaired patients with a fractured neck of femur to enhance family and carer involvement in pain assessment to improve recognition of pain.
- Education for nurses to improve knowledge of pain assessment and pharmacology to support confidence in decision-making for analgesia administration in cognitively impaired patients with a fractured neck of femur.

Contributions

Research question and protocol design by Clinical Nurse Specialist Orthopaedics Belinda Lincoln with contributions from Conjoint Assoc. Prof. Christina Aggar, Assoc. Prof. Samuel Lapkin and Dr. David Schmidt. Data collection tool design by Belinda Lincoln with contributions from Conjoint Assoc. Prof. Christina Aggar, Assoc. Prof. Samuel Lapkin, Dr. David Schmidt and reviewed by Nurse Practitioner Acute Pain Service Allison Taylor, Acting Clinical Nurse Consultant for Dementia and Delirium Brenda Paddon and Southern Cross University Data Analyst Ade Adeyinka. Data collection by Belinda Lincoln. Statistical analysis by Belinda Lincoln with contributions by Assoc. Prof. Samuel Lapkin and Dr. David Schmidt. Report authored by Belinda Lincoln with review by Conjoint Assoc. Prof. Christina Aggar, Assoc. Prof. Samuel Lapkin and Dr Kerith Duncanson and Dr. David Schmidt.

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Appendices

Appendix 1: Executive Summary

Appendix 2: Data Collection Tool Variables

Appendix 3: Data Collection Tool

Executive Summary:

Post-operative pain management in cognitively impaired people with a fractured hip.

Over 19,000 Australians are hospitalised each year with a fractured hip. This number is set to rise by up to 37,000 cases in NSW by 2036.

Dementia and delirium are common amongst fractured neck of femur patients with over a quarter of patients experiencing cognitive impairment on admission and up to 40% going on to be diagnosed with delirium post-operatively.

Self-reported pain has historically been seen as the gold standard for pain assessment for patients. Cognitive impairment can alter communication style and act as a barrier to verbalising the pain experienced by these patients.

The aim of the study was to investigate the current pain management practices for patients with a fractured neck of femur and to characterise the pain assessment and management strategies and pain-related outcomes between cognitively intact and cognitively impaired individuals.

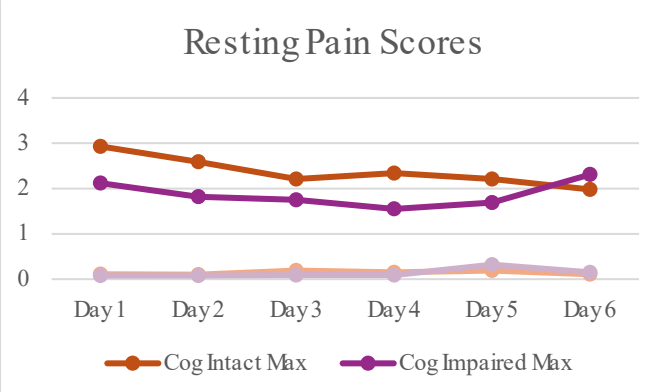
The study design was a retrospective observational cohort study using patient record analysis.

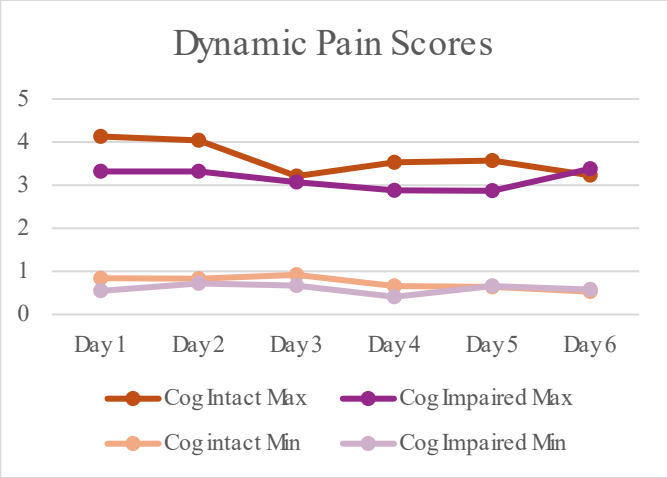
TOTAL STUDY GROUP: 206 PATIENTS		
	Cognitively Intact	**Cognitively Impaired**
Age	76	87
Female	69%	70%
Cognition	56%	44%
LOS	8.2	10.1

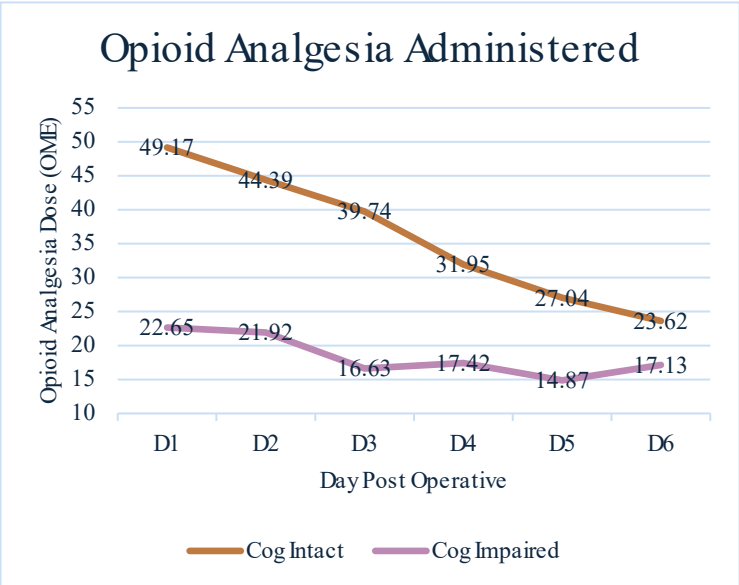
RESULTS

Pain Assessment

- The number of pain assessments attended each day for both cognitively intact patients and cognitively impaired patients was similar. There was a statistical difference only on day one with cognitively impaired people being reviewed on average once less per day.
- Cognitively impaired patients had less likelihood of a single pain assessment tool being used per day and a greater chance of 3 or more different pain assessment tools being used in a single day.
- Minimum pain scores were similar between the two groups.
- Maximum pain scores showed a significant difference most days, particularly for dynamic pain scores, showing a lower score documented for cognitively impaired patients.





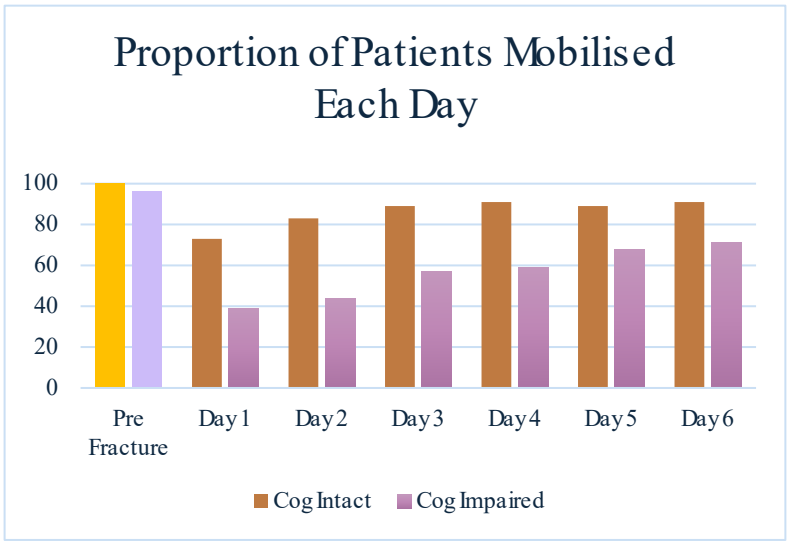


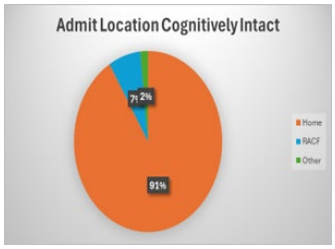
Analgesia Administered

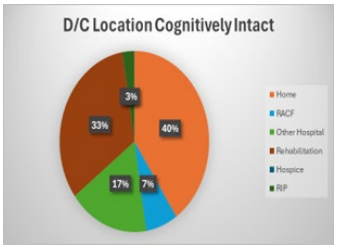
- Similar amounts of simple analgesia was administered to both groups.
- Opioid analgesia administered showed a significant difference between cognitively intact and cognitively impaired patients from day one to day five of the study.
- This difference in opioid analgesia administered abated on day 6 with the cognitively intact group trending down to meet the cognitively impaired group.

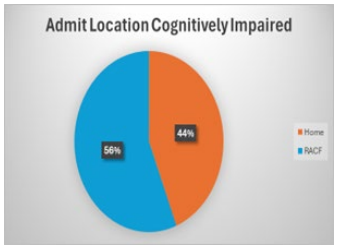
Outcomes

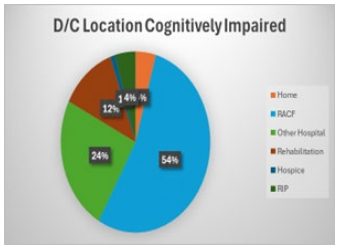
- Mobility rates were significantly lower on all days for cognitively impaired patients.
- Improved analgesia is associated with improved mobilisation post hip fracture.
- LOS was 2 days longer for cognitively impaired patients.
- Cognitively impaired patients admitted from home had 10% chance of being discharged home.











Recommendations

- Further analysis of data collected for this research project including analgesia prescribing across the entire acute care presentation to identify further factors influencing the amount of analgesia administered in cognitively impaired patients with a fractured neck of femur.
- Interventional RCT providing pain management training to family and carers of cognitively impaired patients with a fractured neck of femur to enhance family and carer involvement in pain assessment to improve recognition of pain.
- Education for nurses to improve knowledge of pain assessment and pharmacology to support confidence in decision-making for analgesia administration in cognitively impaired patients with a fractured neck of femur.

Acknowledgements

Research designed by CNS Orthopaedics Belinda Lincoln with contributions from Conjoint Assoc. Prof. Christina Aggar, Assoc. Prof. Samuel Lapkin and Dr. David Schmidt.

Appendix 2: Data Collection Tool Variables.

Variable	**Definition**	**Measured**
Age	Age on admission to hospital.	Whole years.
Gender	Gender registered at triage.	Male, Female, Other.
Primary Language	Primary language spoken at home identified on admission.	Used to account for potential for English to be a second language.
Setting Admit from	Patient address will be reviewed and categorised as Home, RACF, Hospice, Other Hospital.	Coded as Home, RACF, Hospice, Other Hospital.
Setting Discharge to	Location discharged to categorised as Home, RACF, Hospice, Other Hospital.	Coded as Home, RACF, Rehabilitation, Hospice, Other Hospital.
Length of stay	Number of days admitted to the hospital.	Whole days with day of triage listed as day 0.
Mobility	Patient's mobility on each day post op.	Yes mobilised, No not mobilised
Pre-hospital analgesia	Analgesia used prior to admission.	List of any analgesia used categorised as simple analgesia (paracetamol) and opioid based analgesia measured in oral morphine equivalents.
Cognitive Screening	Abbreviated Mental Test Score (AMTS), Delirium Risk Assessment Tool (DRAT), Confusion Assessment Method (CAM).	AMTS scored 0 – 10 indicates current cognitive function. DRAT Yes / No indicates risk of delirium. CAM Yes / No indicates if delirium is currently present.
Pain assessment	The frequency, type of pain assessment tool used and the minimum and maximum resting and dynamic pain score.	Numeric value of the number of times a pain assessment is documented in EMR and what tool was used for the first six day post operatively (midnight to midnight) whilst on the ward. Name of the pain assessment tool used and the minimum and maximum values for resting and dynamic pain scored 0 - 10.
Analgesia administered	Amount of analgesia administered.	Analgesia administered listed as simple, parental or oral opioid. Opioid based analgesics will be calculated into an Oral Morphine Equivalent using the ANZCA opioid calculator. Collected for the same time periods as listed for pain assessment.

Appendix 3: Data Collection Tool.

					PRE HOSPITAL			
Information on Stay					Pre operative assessments			
Admit From	D/C To	LOS	L/R	MOI	Pre Cog Impair	Pre # Mobility	D/C Mobility	PMHx

Pre hosp analgesia analgesia			
Pre Simple	Pre NSAID	Pre OPIOD	Pre Other

DAY 1

DAY 1			PAIN		REST		DYNAMIC		A
AMTS	DRAT	CAM	No of Pain Ax	Pain Scales	Min Score	Max Score	Min Score	Max Score	R

Analgesia Prescribed					
Regional	SC / IM	Simple	NSAID	OPIOD	Other

Analgesia Administerred						OME	Mobilise
Regional	SC / IM	Simple	NSAID	OPIOD	Other	OME	Mobilise