

2008

The effect of nurse initiated paracetamol on emergency department patients with pain from low acuity injury

Joanne G. Wilson
Edith Cowan University

Recommended Citation

Wilson, J. G. (2008). *The effect of nurse initiated paracetamol on emergency department patients with pain from low acuity injury*. Retrieved from <http://ro.ecu.edu.au/theses/29>

This Thesis is posted at Research Online.
<http://ro.ecu.edu.au/theses/29>

Edith Cowan University

Copyright Warning

You may print or download ONE copy of this document for the purpose of your own research or study.

The University does not authorize you to copy, communicate or otherwise make available electronically to any other person any copyright material contained on this site.

You are reminded of the following:

- Copyright owners are entitled to take legal action against persons who infringe their copyright.
- A reproduction of material that is protected by copyright may be a copyright infringement. Where the reproduction of such material is done without attribution of authorship, with false attribution of authorship or the authorship is treated in a derogatory manner, this may be a breach of the author's moral rights contained in Part IX of the Copyright Act 1968 (Cth).
- Courts have the power to impose a wide range of civil and criminal sanctions for infringement of copyright, infringement of moral rights and other offences under the Copyright Act 1968 (Cth). Higher penalties may apply, and higher damages may be awarded, for offences and infringements involving the conversion of material into digital or electronic form.

**THE EFFECT OF NURSE INITIATED PARACETAMOL ON EMERGENCY
DEPARTMENT PATIENTS WITH PAIN FROM LOW ACUITY INJURY**

By Joanne Wilson, RN, BSc

A Thesis Submitted in Fulfilment of the Requirements for the Award of
Master of Nursing (Research)
Faculty of Computing, Health and Science
Edith Cowan University
Churchlands, Western Australia

Date of Submission: 08/05/08

USE OF THESIS

The Use of Thesis statement is not included in this version of the thesis.

ABSTRACT

Early identification and management of pain was identified at the commencement of this study as a key area requiring research in emergency departments. Prolonged waiting times for analgesia especially, was highlighted in the National Institute of Clinical Studies emergency department collaborative in 2003. Many barriers exist for a patient to receive analgesia. In Western Australia this is compounded by the legislation which restricts prescribing rights for nurses. Three considerations guided the development of the research project. Firstly, the patient has initial contact with the emergency department from the nurse at triage. Secondly, paracetamol was recognised as a potentially effective analgesic that a nurse could administer in the study hospital without having to first seek a medical prescription. Finally, the group of patients who waited the longest for any pain relief were those with low acuity presentations placed in the waiting room until medical review. Within this group, patients with musculoskeletal injury to limbs were identified as the most likely to gain benefit from determining the effectiveness of paracetamol as a means of pain relief for their injury. No literature was identified at the commencement of the study which examined the effectiveness of paracetamol administered at triage by nurses for patients with recent musculoskeletal injury.

A prospective quasiexperimental design was used with a comparison group. The setting was an emergency department in a metropolitan tertiary teaching hospital of 955 beds located across two campuses. A convenience sample of patients was selected to receive either of two treatments. The first group received standard care (SC) consisting of rest, ice, compression and elevation of affected limb. The second group received standard care (SCP) plus the administration of one gram of oral paracetamol. The two main outcomes for the study were pain and satisfaction with treatment in the waiting room. Pain outcomes were measured at three time points, presentation, pretreatment and 45 minutes post treatment. Satisfaction was measured upon the patient leaving the waiting room or at two hours depending on which occurred first.

The two groups were similar in terms of background characteristics except for the Australasian triage score (ATS) in which case the SCP group had 33 patients with an ATS of four and seven patients with an ATS of five, compared to the SC group having all patients with an ATS of four. Chi square analysis was performed and revealed a significant difference (Fishers exact test, $p = .012$). Differences existed

between groups in regards to cause of injury with the SC group having only six (15%) and the SCP group having 14 (35%) of their participants injured through sporting activity. Statistical analyses for the differences in cause of injury could not be undertaken due to low frequencies in subgroups.

Most patients had pain levels between 31.00 mm and 80.00 mm on the VAS. For the combined groups, the median pain level at presentation to triage was 55.00 mm indicating that the patients had a moderate level of pain. Pain outcomes after the intervention (measured by visual analogue scale (VAS) and verbal categorical rating) differed between groups with the SCP group reporting significantly better outcomes than the SC group. Between-group analysis was conducted to determine whether differences existed between the VAS score for the SC and SCP groups at the three time points. There was no significant difference between the groups at presentation and at pretreatment. At 45 minutes, however, the VAS score for the SCP group was significantly lower than that for the SC group (Mann-Whitney $U = 477.50$, $p = .002$) indicating that the SCP group had reported significantly less pain 45 minutes after receiving paracetamol. Although this difference (12.50mm) was statistically significant, it did not meet the recognized standard for visual analogue score minimum clinical significance of 13.00mm.

Within-group analysis of VAS scores using the Friedman test was also conducted for each group. Within the SCP group significant differences existed over time (χ^2 ($n = 40$) = 46.91, $p = .00$). Pairwise testing between the timepoints revealed a significant difference in median VAS scores between presentation and 45 minutes (Wilcoxon, $Z = -5.05$, $p = .00$) and between pretreatment and 45 minutes (Wilcoxon $Z = -5.11$, $p = .00$). Standard care did not indicate statistically significant improvement in VAS scores over time.

In conjunction with collection of the VAS score at 45 minutes, patients pain was assessed using a verbal categorical rating. Between-group analysis confirmed that a statistically significant difference existed between the SC and SCP groups at 45 minutes ($U = 396.50$, $p = .00$) with the SCP group reporting significantly less pain than the SC group.

Satisfaction with pain management in the waiting room was high for the participants involved in this study irrespective of whether or not they received standard care or standard care plus paracetamol.

Pain as a result of injury continues to be one of the primary reasons people seek medical assistance from emergency departments. Paracetamol when used in conjunction with standard care has been shown to be effective in providing statistically significant pain relief and positive pain outcomes for those patients who are in the waiting room with musculoskeletal injury. Standard care did not provide statistically significant improvement in pain outcomes.

This study has identified that it is possible for nurses to measure a patient's pain at triage and implement pain control measures including oral analgesics. Future research needs to further explore the value of triage as a first point of contact for patients with pain and the potential for this area to be used for early implementation for analgesics.

DECLARATION

I certify that this thesis does not, to the best of my knowledge and belief:

(i) incorporate without acknowledgement any material previously submitted for a degree or diploma in any institution of higher education;

(ii) contain any material previously published or written by another person except where due reference is made in the text; or

(iii) contain any defamatory material.

I also grant permission for the Library at Edith Cowan University to make duplicate copies of my thesis as required.

Signed:

Date:

ACKNOWLEDGMENTS

Associate Professor Sue Nikoletti as my principal supervisor whose infinite patience with my hot and cold progress is astounding. Her persistence, tenacity and kindness never ceases to amaze me.

My work colleagues at Royal Perth Hospital Emergency who encouraged and assisted when they could. Special thanks to Dr Daniel Fatovich as associate supervisor for his time and assistance in developing the project and to Kelly Ann Hahn for her assistance during the data collection phase.

To Sue and Megan who always had faith and made me believe I could get it done.

This study was supported financially from the Office of the Chief Nurse, Helen Bailey Scholarship, whose funding was invaluable.

TABLE OF CONTENTS

USE OF THESIS.....	ii
ABSTRACT.....	iii
DECLARATION.....	vi
ACKNOWLEDGEMENTS.....	vii
LIST OF APPENDICES.....	x
LIST OF FIGURES.....	xi
LIST OF TABLES.....	xii
CHAPTER 1.....	1
INTRODUCTION.....	1
Background and Significance.....	1
Purpose.....	4
Hypothesis.....	4
Research questions.....	4
Definition of terms.....	4
CHAPTER 2.....	6
LITERATURE REVIEW.....	6
Introduction.....	6
Definition.....	6
Prevalence.....	7
Waiting times.....	7
Typology of pain.....	8
Barriers to receiving pain relief.....	9
Race, culture and language.....	9
Gender.....	10
Elderly.....	10
Nursing and Medical Perceptions.....	12
Knowledge.....	13
Diagnosis.....	13
Fear of changing client's condition.....	15
Legislation.....	15
Nurse Initiatives.....	15
Nurse Initiated Analgesia.....	16
Summary.....	17
CHAPTER 3.....	18
THEORETICAL FRAMEWORK.....	18
CHAPTER 4.....	20
METHODOLOGY.....	20
Design.....	20
Sample and Setting.....	20
Instruments.....	23
Visual Analogue Scale (VAS).....	23

Verbal Categorical Rating.....	23
Satisfaction Score.....	23
Data Collection Sheet.....	24
Interventions.....	24
Standard Care.....	24
Standard Care and Paracetamol.....	24
Procedure.....	24
Education of Nursing Staff.....	24
All Participants.....	25
Standard Care Participants.....	27
Standard Care & Paracetamol Participants.....	27
Ethical Considerations.....	27
CHAPTER 5.....	29
RESULTS.....	29
Characteristics of Participants.....	29
Age.....	31
Gender.....	32
Cultural Background.....	33
Triage Score.....	33
Cause of Injury.....	33
Location of Injury.....	35
Treatment Prior to Presentation.....	36
Analgesia Other Than Paracetamol.....	37
Family and Friends Present.....	37
Waiting Room Characteristics.....	38
Time From Injury to Presentation.....	38
Waiting Times.....	39
Patient Destination.....	40
Analgesia.....	40
Diagnosis.....	41
RESEARCH QUESTIONS AND HYPOTHESIS TESTING	41
Visual Analogue Scale Pain Scores.....	41
Verbal Categorical Rating of Pain Level.....	42
Satisfaction with Pain Management.....	43
Summary.....	47
CHAPTER 6.....	49
DISCUSSION.....	49
Limitations.....	55
Implications for Clinical Practice.....	56
Considerations for Future Studies.....	57
Conclusion.....	59
REFERENCES.....	60

LIST OF APPENDICES

Appendix A. Australasian Triage Scale.....	71
Appendix B. Stage 1 Participant Information Sheet and Consent Form.....	73
Appendix C. Stage 2 Participant Information Sheet and Consent Form.....	78
Appendix D. Visual Analogue Score Instrument.....	83
Appendix E. Data Collection Sheet.....	85
Appendix F. Participant Characteristics.....	89

LIST OF FIGURES

Figure 1. Model showing relationship between theoretical framework and study variables.....	19
Figure 2. Methodology flow chart.....	26
Figure 3. Age profile of participants classified by gender.....	32
Figure 4. Cause of injury.....	34
Figure 5. Location of injury.....	35
Figure 6. Treatments used by each group prior to emergency department presentation.....	36

LIST OF TABLES

Table 1. Inclusion and Exclusion Criteria.....	21
Table 2. Reasons for Exclusion from the Study.....	30
Table 3. Reasons for Withdrawal from the Study.....	31
Table 4. Destination after treatment for all groups.....	40
Table 5. Frequency (%) data for VAS Scores.....	42
Table 6. Summary of VAS Pain scores at three time points for all patients.....	43
Table 7. Summary of VAS Pain scores at three time points for SC group.....	43
Table 8. Summary of VAS Pain scores at three time points for SCP group.....	44
Table 9. Verbal categorical rating of pain for all groups.....	45
Table 10. Frequency (%) data for satisfaction scores.....	46
Table 11. Satisfaction scores for all groups.....	47
Table 12. Participant characteristics.....	89

CHAPTER 1

INTRODUCTION

Background and Significance

Pain management is often a contentious issue in emergency departments, with patients, relatives, medical and nursing staff expressing concerns about the length of time a patient waits for analgesia. In 2002 the National Institute of Clinical Studies (NICS) developed an Australia wide emergency department collaborative aiming to address patient waiting times. Forty-five out of forty-seven hospitals identified time to analgesia as a major concern (NICS, 2003).

Current emergency nursing and medical research conducted on pain management identifies that patients are waiting a long time, sometimes one to two hours from presentation to administration of analgesia, despite nursing and medical staff being aware of the patient's discomfort (Fry, Holdgate, Baird, Silk & Ahern, 1999; Tcherny-Lessenot, Karwowski-Soulie, Lamarche-Vidal, Ginsburg, Brunet & Vidal-Treccan, 2003). Tanabe and Buschmann (1999) evaluated pain management practices for 203 participants in an American tertiary emergency department. They reported an average waiting time between initial triage presentation and first administration of analgesia as 74 minutes. Fry et al. (1999) in a similar study with 77 participants analysed pain practice in an Australian setting. The findings from this research revealed an average waiting time from time of presentation to first analgesia of 85.5 minutes, with a standard deviation of 76.8 minutes. Anecdotal evidence suggests that waiting times may be longer in some emergency departments.

A nurse is the first person that a patient presenting to an emergency department will encounter. The nurse's role is to perform a primary assessment and allocate a triage score according to the severity of that patient's condition. Patients with low acuity, mild to moderate painful conditions attract an Australasian triage score of four or five (Appendix A). These patients are often required to wait in the department's waiting area until medical staff are available.

Given the likelihood that patients may have long waiting times, Teanby (2003) emphasises the importance of developing pain management strategies at triage. Graham (2002) in a qualitative study examined the perceptions of pain management at triage in adult participants. Sixteen of the eighteen participants regarded pain management at triage as important. Waiting for pain relief and treatment was highlighted as a problem for some participants. Huckson (2003) reported that patients would like to be offered analgesia within an average of 24 minutes of presentation and to receive analgesia within an average of 27 minutes. Byrne and Heyman (1997) examined anxiety in the emergency department. Of the 96 participants interviewed, 88 patients indicated feeling pain as a potential source of anxiety. Fry et al. (1999), Tcherny-Lessenot et al. (2003) and Ferma, Taylor and Geluk (2003) highlight the importance of early analgesia and recognise the potential for nurses to play an active role in reducing time to analgesia in the emergency department.

A need has been highlighted for earlier intervention for patients who require analgesia for a low acuity condition. Nurse led administration of analgesia in emergency waiting rooms may improve patient pain management and improve patient satisfaction. To date, research to examine the effects of nurse led analgesia has concentrated primarily on compound analgesia (paracetamol/codeine mixtures), non-steroidal antiinflammatory drugs (NSAIDs), ice or distraction therapies (Tanabe, Thomas, Paice, Spiller & Marcantonio, 2001). No published literature has been identified on the use of paracetamol in the emergency setting, despite recognition of the efficacy of this analgesic in other settings. Paracetamol has been acknowledged as effective single dose analgesia, with few adverse effects in the management of postoperative pain (Moore, Collins, Carroll, McQuay & Edwards, 1998). Its use and efficacy needs to be explored further in the context of emergency department pain management.

This is particularly relevant in the Western Australian tertiary emergency department setting because nurses registered under Division one of the Western Australian Nurses Act 1992 (WA) are currently limited by the Western Australian Poisons Act 1964 (WA). This prohibits the administration of all Schedule four to eight drugs without a medical practitioner's prescription. Paracetamol is a schedule two medication that a registered nurse working at Royal Perth Hospital (the planned study setting) is permitted to administer as an initial single dose without seeking a doctor's prescription. This permission is granted by the Nurses Board of Western Australia,

within guidelines that allow registered nurses to administer certain schedule two and three medications as determined by policies of the healthcare organisation (NBWA, 2001).

Tertiary emergency departments in the Perth metropolitan region are predominantly staffed with nurses registered under Division one of the Nurses Act 1992 (WA). These nurses are skilled practitioners and are usually the first point of contact for any patient presenting to an emergency department for emergency care. This situation may change when the nurse practitioner role becomes established, but even if this occurs, tertiary emergency departments (where the role of nurse practitioner is currently not utilised and to date has not been clearly defined) will still be staffed primarily with division one registered nurses.

In other Australian states with different legislation, nurse led analgesia has proven to be successful (Fry et al., 1999; Fry & Holdgate, 2002). However nursing research has concentrated on groups of patients with stronger pain requiring narcotic or compound analgesia. No research was located exploring the benefits or limitations of paracetamol only, given by nurses as an initial analgesic in the emergency department waiting room setting.

In recent decades, increasing pressures have been placed on emergency departments with increased presentations, overcrowding and prolonged inpatient bed waiting times, therefore increasing length of stay in the emergency department (Fatovich & Hirsch, 2003). This has made the waiting room an integral part of everyday emergency patient management rather than simply a waiting area for family or friends. Therefore this study focused on patients who were allocated to the waiting room as a result of low acuity injuries associated with mild to moderate levels of pain.

To date the majority of research and new initiatives has concentrated on groups with moderate to severe pain. Assumptions are made that less severe pain is not as important. Time to analgesia reduction should be a priority for all patients, not selected groups. It is from personal experience, anecdotal evidence and exploration of the available literature that a need has been identified to explore the effects of early, simple analgesia administration for patients triaged to the waiting room.

Purpose

The purpose of this study was to determine whether nurse led analgesia (using paracetamol) could reduce pain and increase satisfaction with pain management, in the emergency department waiting room for those patients with injury causing mild to moderate pain.

Research Questions

1. What is the level of pain experienced by those patients triaged to the waiting room with a triage score of four to five?
2. What are the pain scores, patient characteristics and potentially confounding variables (age, gender, triage score, demographics, location of injury, cause of injury, waiting times, distraction, family and friends present) for the participants in this study.

Hypotheses

1. At 45 minutes after the intervention, mean pain scores measured on the visual analogue scale will be lower in the standard care plus paracetamol group than the standard care group.
2. At 45 minutes after the intervention, pain rating measured on the verbal categorical rating scale will be lower in the standard care plus paracetamol group than the standard care group.
3. Satisfaction with pain management in the emergency department waiting room will be greater in the standard care and paracetamol group than the standard care group.

Definition of Terms

Pain - An "unpleasant sensory and emotional experience associated with actual or potential tissue damage" (Merskey & Bogduk, 1994, p 210). Measured through use of the visual analogue scale (VAS) on a scale of 0-100mm and a verbal descriptor scale

(five point categorical scale – a lot better, a little better, much the same, a little worse or much worse).

Satisfaction – A patient self-report of how acceptable pain management has been within the emergency department setting rated on a scale of 0-10.

Standard Care – Rest, Ice, Compression, Elevation (RICE) to affected limb. Legs were elevated on a support provided by the emergency department. Arms were elevated using a sling.

Triage Score – An Australasian wide scale applied to prioritise people attending the emergency department according to their presenting complaint and acuity of their condition (Appendix A).

Nurse Initiated Analgesic - Paracetamol administered by nurses for patients with pain resulting from injury triaged category four or five.

CHAPTER 2

LITERATURE REVIEW

Introduction

This chapter examines published literature related to pain management for patients in emergency departments. Databases used to locate relevant literature were Medline, Ingenta, and Cumulative Index to Nursing & Allied Health Literature databases from 1990 to 2007. Search terms used were pain, emergency, analgesia, injury and nursing. The major themes to emerge from the literature include: (1) pain is the primary reason people seek assistance at an emergency department; (2) patients have prolonged waiting times from presentation at emergency departments to analgesia; (3) barriers exist to the patient receiving analgesia; and (4) nurse initiated therapies are effective.

Definition

The International Association for the Study of Pain (IASP) defines pain as "An unpleasant sensory and emotional experience associated with actual or potential tissue damage" (Merskey & Bogduk, 1994, p 210). Pain is a subjective, complex, multifactorial experience. Schweitzer (1948, p.62) describes pain as "a more terrible lord of mankind than even death himself". The physiology of pain is poorly understood and to date many theories have been put forward to explain this phenomenon, the most recent being Melzack and Walls' 1965 Gate Control theory of pain as described in the theoretical framework (Cailliet, 1993; Melzack & Wall, 1996; Park, Fulton & Senthuran, 2000; Renn & Dorsey, 2005).

Prevalence

Pain is the major presenting complaint for attendance at emergency departments (Fosnocht, Swanson & Barton, 2005; Garbez & Puntillo, 2005; Holleran 2002; Nelson et al., 2004; Ricard-Hibon et al., 2004; Stalnikowicz, Mahamid, Kaspi & Brezis, 2005; Wilsey, Fishman, Rose & Papazian, 2004). Starck, Sherwood and Adams-McNeill

(2000) describe pain management as one of the most common unresolved complaints, which continues to concern health care providers.

In an American, descriptive, quantitative study Tanabe and Buschmann (1999) sought to reveal the prevalence of pain in the emergency department and demonstrated the under-treatment of pain in this setting. They reported that 78 % of people who present to an emergency department have pain. Of the 160 patients with a primary complaint of pain only 47 % (n=64) received any pharmacological intervention to relieve their pain. This is not a unique finding and is not isolated to emergency departments (Arnstein, 2002; Green, Wheeler, Marchant, LaPorte & Guerrero, 2001; Jones & Machen, 2003).

Rupp and Delaney (2004) in a review found a paucity of research related to pain in the emergency department setting. They indicate this is improving but admit a challenge exists to find clinically relevant data regarding pain relief strategies despite the well recorded evidence of high pain prevalence in emergency departments.

Waiting Times

Lewis, Lasater and Brooks (1994) retrospectively reviewed the records of over 400 patients with a confirmed diagnosis of fracture and revealed only 30 percent of these patients received any analgesia in the emergency department. Vassiliades, Hitos and Hill (2002) in a similar study revealed a delay in analgesia administration for those with a fractured neck of femur. Average waiting time for analgesia was over two hours. Fernandes, Daya, Barry and Palmer (1994) reported prolonged waiting times as the major reason people leave the emergency department without being seen by a physician or having any treatment implemented. Patients perceive long waiting times as a major barrier to obtaining health services (Thompson, Yarnold, Adams & Spacone, 1996). Researchers have identified that patients are experiencing prolonged waiting times despite nursing and medical staff awareness of the patient's discomfort (Fry, Holdgate, Baird, Silk & Ahern 1999; Tanabe & Buschmann, 1999; Tcherny-Lessenot et al., 2003).

Prolonged waiting times have been linked with poor patient satisfaction (Bar-dayan, 2002; Fernandes, et al., 1994; Fry, 2001; Katzmann, 1999; Luker, Austin, Hogg, Ferguson & Smith, 1998; Strinko et al., 2000). Many have identified that unrelieved pain can lead to anxiety, inappropriate behaviour and ultimately poor patient outcomes

such as ongoing pain and dissatisfaction with care delivered by that emergency department (National Health and Medical Research Council (NHMRC), 1999; Graham, 2002; Tcherny-Lessenot et al., 2003; Blank et al., 2001).

Typology of pain

Emergency departments predominantly treat patients with acute pain (i.e. pain with identifiable cause and recent onset). Chronic pain sufferers (those who have pain of longer than six months duration with often unidentifiable cause) do attend emergency departments however are often viewed unfavourably (Renn & Dorsey, 2005).

Tanabe and Buschmann, (1999) indicate that not all pain in emergency departments is poorly acknowledged. In their study of 203 patients, 78% (n = 160) were identified as presenting because of a painful condition. Those with chest pain were rapidly attended to and pain treated promptly with 73% (n = 21/29) of patients with chest pain receiving pharmacological treatment to relieve pain. Adequate pain management in emergency departments seems isolated to this group of patients. A recent study by Silka, Roth, Moreno, Merrill and Geiderman (2004) emphasises that healthcare personnel are recognising the need to implement efficient measures for specific groups of patients with pain. They examined the effect of pain scoring on analgesic management of trauma patients. Of the 150 participants that met the inclusion criterion only 53 % received analgesia in the emergency department. Those who had pain scoring performed as a part of their assessment were more likely to receive analgesia. Neighbor, Honner and Kohn (2004) retrospectively reviewed the records of 540 trauma patients (requiring trauma team activation). Of this group, only 47.8% received analgesia within three hours of presentation to the emergency department. Singer and Thode (2002) retrospectively reviewed 138 patients with burns. Of this group, only half received any pharmacological pain relief.

There is little evidence to suggest that other groups of patients receive adequate analgesia (Johnston et al., 1998; LoVecchio et al., 1997; Spurlock, 1999; Tcherny-Lessenot et al., 2003). Recognition of these deficits is a starting point for improvement of pain management.

Barriers to receiving pain relief

It is widely recognised that there are barriers to effective and rapid pain relief in emergency departments.

Race, Culture and Language

Researchers have identified cultural barriers towards delivery of analgesia (Todd, 2000). A comparative study by Todd, Samaroo and Hoffman (1993) found that Hispanics were less likely to receive analgesia than non-Hispanics in a major American emergency department. Todd, Deaton, D'Adamo and Goe (2000) examined the effects of ethnicity in another American emergency setting. It was found after retrospective review that black patients were less likely to receive analgesia than white patients, despite similar pain rating in both groups.

Fuentes, Kohn, and Neighbor (2002), in a retrospective cohort study of 323 participants sought to investigate the generalisability of Todd and colleagues (2000) results. No significant difference in analgesic administration was identified for any ethnic group. All groups were as likely to receive no analgesia. Choi, Yate, Coats, Kalinda and Paul (2000) retrospectively reviewed data for patients with long bone fractures. Twenty percent of their patients were of an ethnic (non-white) background. No significant difference was found in analgesia delivery for white or ethnic groups.

Salerno (1995) believes nurses need to be aware of the effects that ethnocentrism can have in their ability to make non-judgemental decisions about a patient's pain management. This point is emphasised in Jones and Machen's (2003) qualitative study into prehospital pain management in which paramedics indicated that patients' cultural backgrounds would influence their pain response. In view of conflicting evidence about potential cultural barriers towards delivery of analgesia further research is needed to determine the extent of this phenomenon in Australian settings.

Language is also cited as a major reason for inadequate pain management yet the majority of identified researchers have used language barriers as an exclusion criterion in participant selection for their studies (Tanabe & Buschmann, 1999; Harris, Cameron & Ugoni, 2001; Tanabe et al., 2001).

Gender

Gender has been shown to influence analgesia delivery and interpretation of pain by healthcare providers (Unruh, 1996). Fillimgim, Browning, Powell and Wright (2002) examined the effects of pain on men and women and concluded that men had a higher tolerance to pain. Fuentes, Kohn, and Neighbor (2002) incidentally found a possible gender bias in their investigation of patients with long bone fractures. Men were less likely to receive analgesia than women. Robinson et al. (2003) indicate that men and women perceive pain experiences differently for the opposite sex and suggests this could be related to education about gender roles.

McCaffery and Ferrell (1992) surveyed whether nurses thought there was a disparity in pain response between men and women. Their findings indicate that nurses perceive that men experience more distress from pain, but are more likely to underreport pain. They express concern that nurses may unintentionally withhold analgesia based on gender bias. As indicated in the limitations of McCaffery and Ferrells (1992) study, the survey participants were predominantly female, so it must be asked whether the results would have differed if the participants were male.

Raftery, Smith-Coggins and Chen (1995) sought to determine whether caregiver or patient gender influenced the treatment of emergency department patients with pain. One hundred and ninety participants (male n= 80, female n=110) met the inclusion criteria for this prospective cohort study. Caregiver (male n=60, female n=24) gender was found not to influence analgesia administration, however the study was limited by the lack of a comparison group for accurate matched analysis. Female patients described more pain and were perceived to have more pain than male patients. They also received stronger and higher dosages of analgesia than male patients.

Research on gender differences to date has focussed primarily on the differences between men and women experiencing pain. More research is required to determine the true effects of caregiver gender on pain interpretation and management.

Elderly

All groups of healthcare workers are implicated in the undertreatment and underassessment of pain in elderly people (Ardery, Herr, Titler, Sorofman & Schmitt,

2003; Closs, 1994; Lusic, 1996). In a study reviewing the analgesia administered to patients with fractures, Jones, Johnson and McNinch (1996) noted differences in the type and timeliness of analgesia given to elderly patients (65 years or older). Younger patients (20 -50 years of age) were more likely to receive analgesia than the elderly patients (70 years or older). Neighbor, Honner and Kohn (2004) highlighted that trauma patients who were older were less likely to receive opioid analgesia than their younger counterparts.

The elderly may require special attention to attain an accurate assessment of their pain in the emergency department. They are unique in that they often have preexisting comorbidities, visual or hearing difficulties, cognitive impairment or underlying pain from other ailments (Arderly et al., 2003; Briggs, 2003; Closs, 1994; Larsen, 2000; Lusic, 1996; Tanabe, 1995).

Elderly patients have been noted to underreport pain. This occurs because of learnt behaviours such as stoicism, rationalising that it should be right to expect pain with certain conditions and fear of adverse effects from analgesic medications (Closs, 1994; Larsen, 2000). Evans (2004) suggests that elderly people need to be encouraged to express pain.

The literature highlights that perceptions exist that elderly people experience less pain. Li, Greenwald, Gennis, Bijur and Gallagher (2001) found a significant difference in elderly patients' pain perceptions when compared with a younger sample. Both groups received an intravenous cannula and rated the pain they perceived during insertion. Pain was reported using the visual analogue scale. Elderly patients were found to report significantly less pain than their younger counterparts. The sample size from this study was small (> 65 years, n = 32; 18-64 years, n = 68) so it is not possible to generalise this to the remainder of the elderly population.

This finding is acknowledged by other authors, who confirm these pain perceptions but identify that pain will be interpreted differently in older people based on physiological changes and life experiences (Arderly, et al., 2003; Closs, 1994; Larsen, 2000).

Bruce (2001) recognises that nursing staff may be reluctant to give analgesia to elderly patients because of potential for adverse effects and medication interactions. It is

suggested that slow careful titration of analgesia and increased drug awareness by nurses would resolve this issue (Ardery et al., 2003; Bruce, 2001; Larsen, 2000). Analgesia can be used safely in the elderly even with the risk of adverse effects (NHMRC, 1999).

Nursing and Medical Perceptions

Ducharme (2001) sought to understand why pain management is delayed, suggesting that we never doubt a patient who is short of breath asking for oxygen, so why do emergency staff almost inevitably doubt the patient in pain asking for analgesia? Fosnocht, Swanson and Barton (2005) suggest that healthcare personnel allow this to happen as they concentrate on diagnosis rather than pain relief.

Guru and Dubinsky (2000) compared patient pain ratings with nurse and medical staff pain ratings. Nursing and medical staff ratings were significantly lower than those of the patients. Nurses' ratings were lower than those of medical staff. Puntillo, Neighbor, O'Neil and Nixon (2003), compared patient pain scores and nurse rated patient pain scores. At all times measured the nurses gave the pain a lower rating than the patient at the same time. In similar research, patients, nurses and doctors were asked to rate pain. Significant differences were found between the patients' score and the nursing and medical staff's pain score (Stalnikowicz, Mahamid, Kaspi & Brezis, 2005). Underestimation of what pain the patient is experiencing is a recurring theme.

Tanabe and Buschmann (2000) recognise that in a busy emergency department pain management may not be as highly prioritised as treatment of a critically ill patient. A major finding to arise from their research is that emergency nurses tend not to believe a patient's pain rating score if the patient does not display physical signs of pain. Ducharme (2001) implied that this is because we cannot visualise pain. It is suggested this occurs because the patient's subjective experience does not match the objective data (Jones & Machen, 2003). Byrne and Heyman (1997) indicated that 64% of patients expressed anxiety that the staff in the emergency department would not believe them. Spurlock (1999) states that we are asking patients to prove they have pain before we administer analgesia.

It has been put forward that health professionals' underestimation of pain may be due to exposure to patients with drug seeking behaviours (Jones, 2001). McCaffery and

Ferrell (1992) examined lifestyle factors and found that nurses would be dubious about claims of pain and may undertreat those patients exhibiting drug seeking behaviour. Conversely Raftery, Smith-Coggins and Chen (1995) did not find any statistically significant bias in the treatment of patients exhibiting drug-seeking behaviours. McCreaddie (2002) indicates undertreatment of pain for this group of patients is related more to lack of knowledge and to beliefs and attitude which shape our ideas about drug abuse, making it difficult for healthcare personnel to make an unbiased decision regarding a patient's pain experience.

Knowledge

De Rond et al. (2000) acknowledges the importance of attitudes and knowledge in nurses and the influence of these factors on the pain management received by the patient. Fry and Holdgate (2002) successfully implemented a nurse initiated narcotic analgesia program in their emergency department. They acknowledge that they have a knowledgeable and experienced group of nurses and their findings may not be generalisable to all emergency departments. This contrasts with Jastrzab, Fairbrother, Kerr and McInerney (2004) who sought to determine the level of knowledge of nurses in regards to various aspects of caring for the patient in pain. Knowledge regarding pain management and assessment was favourable, but drug knowledge was poor. Of particular importance in their survey was that younger, less experienced nurses had greater knowledge. Knowledge deficits have been acknowledged in several studies regarding pain management principles for both medical and nursing staff (Blank et al., 2001; de Rond, de Wit & van Dam, 2001; Green et al., 2001; Kelly, 2000; Tanabe, 1995; Tanabe & Buschmann, 2000; Teanby, 2003).

Diagnosis

Misconceptions exist about the need to withhold analgesia because it may interfere with making a diagnosis (Ducharme, 2001). McQuay, Moore and Justins (1997) acknowledge the difficulties of making a diagnosis, but advocate the treatment of acute pain. Attard, Corlett, Kidner, Leslie and Fraser (1992) studied the effects of analgesia on diagnosis of acute abdominal pain. They found that administration of analgesia did not mask the signs and symptoms required for diagnosis. This was further supported by Pace and Burke (1996) who examined 75 patients with abdominal pain. They found that administration of analgesia did not interfere with the ability to make a

diagnosis. Mahadevan and Graff (2000) found that the main change after analgesia administration is the reduction in the amount of pain the participant is experiencing not the clinical indicators supporting the diagnosis of acute abdomen, however this study is compromised by a small sample size (n=69). Wolfe, Lien Smithline and Lenkoskis (2000) surveyed emergency physicians to determine whether they were supportive of giving analgesia to those patients with an acute abdomen. Of the 443 emergency physicians who responded, 80% indicated that patients with acute abdomen received analgesia, however of this group 76% stated that the patients often did not receive it until after the surgical examination. Despite the evidence that administration of analgesia prior to examination of patients with abdominal pain does not alter physical signs apart from pain, treatment with analgesia remains controversial (Chong, Wang, Chen, Ma & Chang, 2004; Lee et al., 2000; Wolfe et al., 2004). It is an area of research in which collaboration between surgical and emergency medicine involving more rigorous controls and larger patient numbers is required.

In another study, nurses identified failure to administer analgesia until diagnosis was confirmed as a barrier to providing effective pain management (Tanabe & Buschmann, 2000). Starck et al. (2000) recounted a personal experience in which a nurse had asked a doctor for an order for analgesia for a patient with a fracture. The request was declined until the confirmation of the fracture. No other research was identified which examined how long patients had to wait because a diagnosis had not been made. Keszler (1994) in a personal view reported having to wait over four hours, with an acute abdomen, before effective analgesia was given.

Fear of changing clients' clinical condition

Fear of the client's condition changing as a result of administration of analgesia, particularly narcotics, has been cited as a reason for non-administration of analgesia. This has been highlighted earlier in the discussion regarding abdominal pain. Certainly clients with pre-existing disease, especially respiratory, renal or liver diseases pose a problem when considering analgesia (McQuay et al., 1997). Ardery et al. (2003) suggests the use of alternative methods of analgesia, particularly for elderly patients who are more likely to have preexisting comorbidities. New initiatives (eg. acupuncture, cutaneous stimulation), are developing yet still require more research into their efficacy and suitability for the emergency department setting (Kubsch, Neveau & Vandertie,

2001; Kober et al., 2002; Milton, 1998). These initiatives may provide analgesic alternatives for patients with pre-existing comorbidities and pain.

Legislation

In Australian settings legislation has been one of the largest barriers to overcome in relation to early administration of analgesia by nurses (Fry et al., 1999). Current Western Australian state legislation does not allow the division one registered nurse that is not a nurse practitioner to prescribe or administer any schedule four to schedule eight analgesia without a medical practitioner's prescription (Poisons Regulations 1965 (WA), Poisons Act 1964 (WA)). Hospitals are able to develop policies for schedule two and schedule three drugs that may be initiated by registered nurses. These policies may differ between healthcare organisations (NBWA, 2001). Nurse practitioner training is only in its infancy in Western Australia with the first intake in early 2003 (Kucera, 2002). The advent of the nurse practitioner may improve pain management but positions are currently restricted to remote nurses and the roles in 2006 are yet to be defined in tertiary settings.

Nurse Initiatives

New roles have been introduced which in some cases have facilitated the advent of improved patient outcomes, for example, nurse initiated diagnostics and treatments, nurse practitioner and advanced practice nurse. Improved patient outcomes (eg. reduced waiting times and time to first analgesia) have been the chief motivator in the promotion of these positions (Coman & Kelly, 1999; Fry, 2001; Lindley-Jones & Finlayson, 2000; Qasim, Malpass, O'Gorman & Heber, 2002; Smallwood & Chadwick, 2000; Wilmhurst, Purchase, Webb, Jowett & Quinn, 2000).

Reluctance to embrace nursing role changes continues to occur in many hospital and primary care settings (Alcolado, 2000; Tye & Ross, 2000). However the general public has embraced new roles in some settings primarily because of reduced waiting times (Shum et al., 2000). As forementioned, prolonged waiting times have been linked to patient dissatisfaction (Bar-dayan, 2002; Katzmann, 1999; Strinko et al., 2000).

Nurse Initiated Analgesia

In a recent Australian emergency department collaborative, waiting time to first analgesia was identified as an area of priority that should be addressed (NICS, 2003). Nurse initiated analgesia is suggested as a way to reduce waiting times for pain relief in emergency department settings.

In Australian states without severe legislative restrictions nurse led analgesia has been proven to be of benefit, particularly in relation to narcotic analgesia (Coman & Kelly, 1999; Fry & Holdgate, 2002; McCallum, 2004). Finckh, Walsh and Newman (2003) showed a significant reduction in time to narcotic analgesia using nurse initiated narcotics. The median time for nurse initiated narcotic analgesia was 18 minutes. Prior to this, time to narcotic analgesia had a median time of 104 minutes. Nurse led administration of narcotic analgesia is yet to be explored within the Western Australian context as the current state legislation prohibits the use of standing orders for schedule eight medications. In other states standing orders for such medications can be utilised to facilitate early analgesia administration. Fry et al. (1999) emphasises the importance of establishing standing orders for triage nursing staff to initiate pharmacological pain management. In an American emergency department, nurse initiated triage protocols demonstrated safe and effective early analgesia for select patients (Seguin, 2004).

Nurse prescribing in an emergency setting is advocated for nurse practitioners within a restricted formulary utilising protocols for administration (Marshall, Edwards & Lambert, 1997). Luker et al. (1998) evaluated nurse prescribing, interviewing 148 patients in community settings. This qualitative report indicated that patients supported nurse prescribing and preferred dealing with the nurse particularly for lower acuity conditions. Blank et al. (2001) surveyed 68 patients with low acuity conditions. Over half of the patients surveyed would be satisfied with nurse administered analgesia prior to being seen by medical personnel.

Nurse initiated analgesia is still in its infancy in the Australian emergency setting. Research to date has focussed on nursing pain assessment and nurse titrated narcotic programs. Protocols are being developed in some Australian states to expedite the management of pain for the emergency department patient but are yet to be fully evaluated and tested over time (Ferma et al., 2003).

Summary

Pain management in the emergency department is an issue of critical importance that is ongoing. Many have identified that unrelieved pain can lead to anxiety, inappropriate behaviour and poor patient outcomes such as ongoing pain and dissatisfaction with care delivered by that emergency department (NHMRC, 1999; Graham, 2002; Tcherny-Lessenot et al., 2003; Blank et al., 2001).

The unresolved issue is that patients presenting to the emergency department continue to wait in pain, particularly when staff perceive their pain to be mild to moderate (Tcherny-Lessenot et al., 2003). Early assessment and management of pain prior to medical examination and intervention needs to be addressed.

Within Western Australian emergency departments and the boundaries of current state legislation, it is important to explore management of pain, the impact nurses can have on improving pain management and ultimately whether these interventions do affect patient satisfaction in a positive manner.

CHAPTER 3

THEORETICAL FRAMEWORK

Pain is associated with both physiological and psychological responses and is influenced by many variables (Figure 1). Medical research into the physiological aspects of pain originates from as far back as Aristotle (Melzack & Wall, 1996). The most recent literature into pain physiology draws from Gate Control theory research performed in 1965 by Melzack and Wall (Cailliet, 1993; Melzack & Wall, 1996; Park, Fulton & Senthuran, 2000).

The Gate Control theory of pain suggests that impulses from injured or inflamed tissue must pass through the dorsal horn of the spinal cord. Dependent on the nerve fibres involved, certain pathways are activated and the nerve impulse relayed or not relayed to the cerebral cortex. All painful stimuli are regulated at spinal cord level (Cailliet, 1993; Melzack & Wall, 1996; Park, Fulton & Senthuran, 2000; Suchdev, 2002).

Excess mechanical pressure, thermal exposure and/or chemical mediators activate peripheral pain receptors. Pain receptors then convert the stimuli into an impulse that is transmitted via nerve tracts to the spinal cord. The introduction of non-pharmacological and/or pharmacological treatment has been shown to be of benefit in studies in the early treatment of painful injury or inflammation (Fry et al., 1999; Kelly 2000). For example paracetamol is thought to inhibit prostaglandin synthesis and therefore reduce the impact of chemical mediators upon pain receptors (Karch, 2000; Rossi, 2004; Smith, 2003). No research has been identified which examines the effects on patient outcomes of early administration of paracetamol as a single drug therapy combined with standard nursing care in emergency departments. Earlier introduction of analgesia may improve patient outcomes and patient satisfaction with pain management practices in the emergency department.

Physiological needs may also be addressed through earlier intervention with analgesia. However as indicated by Melzack and Wall (1996) pain is not purely a physiological response that can be controlled with only pharmacological or non-pharmacological care. Differing dimensions are evident when assessing the individual's

psychological pain response. Variables that contribute to a patient's pain experience and may impact on their personal pain outcomes and satisfaction with pain management strategies include: presence of family, demographics, prehospital treatment, past pain experiences, prior administration of other analgesia (eg NSAID, aspirin), television and waiting times (Graham, 2002). For this reason it will be important to collect data on these variables and analyse the impact on patient outcomes. Other psychosocial variables affecting pain include anxiety but it is beyond the scope of this study to control the effects of these variables.

Through the introduction of a nurse initiated analgesia program at triage, it may be possible to improve pain management and patient satisfaction with pain management in emergency departments.

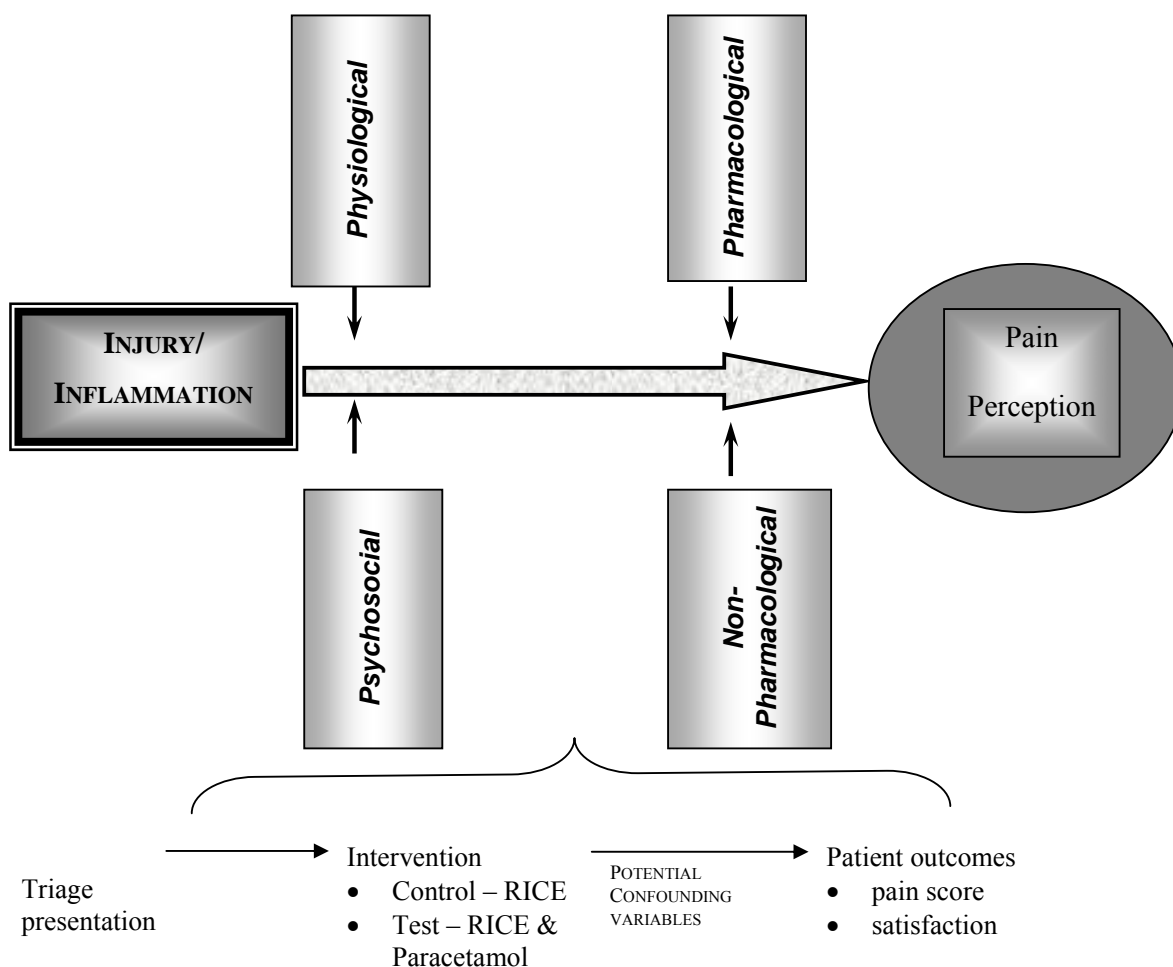


Figure 1: Model showing relationship between theoretical framework and study variables

CHAPTER 4

METHODOLOGY

Design

This study used a prospective quasi-experimental design with two groups; a comparison and an intervention group. Data collection from the comparison group was undertaken in a nine week period prior to recruitment of the intervention group. The comparison group received standard care whereas the intervention group received standard care and paracetamol. Data were collected at four time points; at triage, just before intervention (standard care or standard care plus paracetamol), 45 minutes after intervention and upon leaving the waiting room or at two hours, depending upon which occurred first. Data were also collected on demographics and other potentially confounding variables as described in the theoretical framework and the procedure section.

Sample and Setting

Participants were recruited from those presenting to Royal Perth Hospital Emergency Department. The Hospital is located within the central business district of Perth. It services the Perth metropolitan area and referrals from rural and remote locations. Some 55,000 people attend the Emergency Department per year (Fatovich, 2003).

A convenience sample of participants was prospectively drawn from the population of emergency department patients presenting with injury causing pain, who required a standard care intervention (Rest, Immobilisation, Compression, Elevation - RICE). Eligible patients were those with an Australasian Triage Score (ATS) of four or five who were allocated to the emergency department waiting room. An ATS score of four indicates that a patient could wait up to one hour before medical assessment. An ATS score of five indicates that a patient could wait for up to two hours until medical assessment. Inclusion and exclusion criteria are as listed in Table 1.

Table 1

Inclusion and Exclusion criteria

Inclusion Criteria.	Exclusion criteria.
Aged 18 years or older.	Aged less than 18 years.
Presented to emergency with injury related pain and required one or more elements of RICE.	Affected by alcohol or drugs.
Triaged ATS 4 or 5.	Paracetamol administered within last four hours.
Allocated to waiting room.	Participants with an allergy or contraindication to paracetamol (Stage two participants only).
Able to read and understand English.	Unable to read and understand English.
Pain score greater than or equal to 20mm on a 100mm Visual Analogue Scale.	Pain score less than 20mm on a 100mm Visual Analogue Scale.
	Inability to understand Visual Analogue Scale.
	Patients receiving medical attention or additional analgesics prior to 45 minutes after receiving initial treatment.

Enrolment occurred during the working hours of the chief investigator 0700 to 1800 hours Monday to Friday and 0700 to 1200 hours on Saturday and Sunday. A research assistant was used to cover the times during working hours the chief

investigator could not be present due to competing work interests. Patients presenting with minor complaints after 1800 hours Monday to Friday and after 1200 hours on Saturday or Sunday are sent to the after hours general practitioner service which is linked to the hospital. On all days this service is open until 2200 hours. It was not feasible for the chief investigator to be present at all times and therefore after hours patients were not included in the study.

Sample size calculations were based on the ability to detect a minimum difference of 20 (SD =30) in the mean VAS score between the two groups (standard care or standard care plus 45 minutes after the intervention (Power and Sample Size Calculations. Version 2.1.31). Using the independent samples t-test, with alpha = .05 and a two-tailed test, the sample size required was 40 per group to achieve 84% power. Subsequent data analysis revealed a non-normal distribution. Consequently, the independent samples t-test was unable to be used and the non-parametric alternative, Mann Whitney U was performed.

Interventions

Standard Care

Rest, Ice, Compression, Elevation (RICE) to affected limb. Legs were elevated on a support provided by the emergency department. Arms were elevated using a sling.

Standard Care plus Paracetamol

Standard care plus one gram of oral paracetamol.

Instruments

Four instruments were used to collect data for this study.

Visual Analogue Scale (VAS)

Participants had their pain score measured according to the Visual Analogue Scale (VAS). The VAS is an established, validated, self-report measure consisting of a 100 mm line on paper or a slide rule (a slide rule was used for this study) marked at one end with “no pain” and at the other end “worst pain ever” (Breivik, Bjornsson &

Skovlund, 2000; ICSI, 2004; Kelly, 2001; NHMRC, 1999; Todd, Funk, Funk & Bonacci, 1996) (Appendix D). Patients did not see their previous VAS when marking the new VAS.

The VAS is considered a sensitive measure of pain (Frank-Stromborg & Olsen, 1997). Given that the study dealt with patients with low acuity problems with perceived mild to moderate pain a sensitive scale was required. The VAS is considered relatively easy to use and has been validated in the emergency department setting, producing interval level data (Kelly, 2001). A high correlation ($r=0.97$, $p < 0.001$) for repeated measures by Grossman, Sheildman and McGuire (1992) was cited in Frank-Stromborg and Olsen (2004) when examining the test-retest reliability of the VAS.

Verbal Categorical Rating

After treatment (standard care or standard care plus paracetamol), participants were asked to indicate if their pain was 'a lot better', 'a little better', 'much the same', 'a little worse' or 'much worse'. This verbal categorical rating has been used in previous studies to assist in determining the minimum clinically significant difference in pain score (Kelly, 2001; Todd & Funk et al., 1996). The key objective for the use of the two pain measurement instruments was to measure pain intensity. Reliability and validity indicates that when verbal categorical rating is used with the VAS it correlates well but is not conclusive (Frank-Stromborg & Olsen, 2004).

Satisfaction Score

Satisfaction with pain management in the waiting room was measured using a single item measure. Patients were asked the following question. On a scale of zero to ten, zero being not satisfied and ten being very satisfied, how satisfied are you with the management of your pain in the waiting room?

Data Collection Sheet

A data collection sheet (Appendix E) was used to collect demographic data (gender, age, triage score, affected limb, cause of injury, diagnosis, destination, need for further or other analgesia), and identify potentially confounding variables (distraction, time between injury and presentation, prior treatment, length of stay in waiting room).

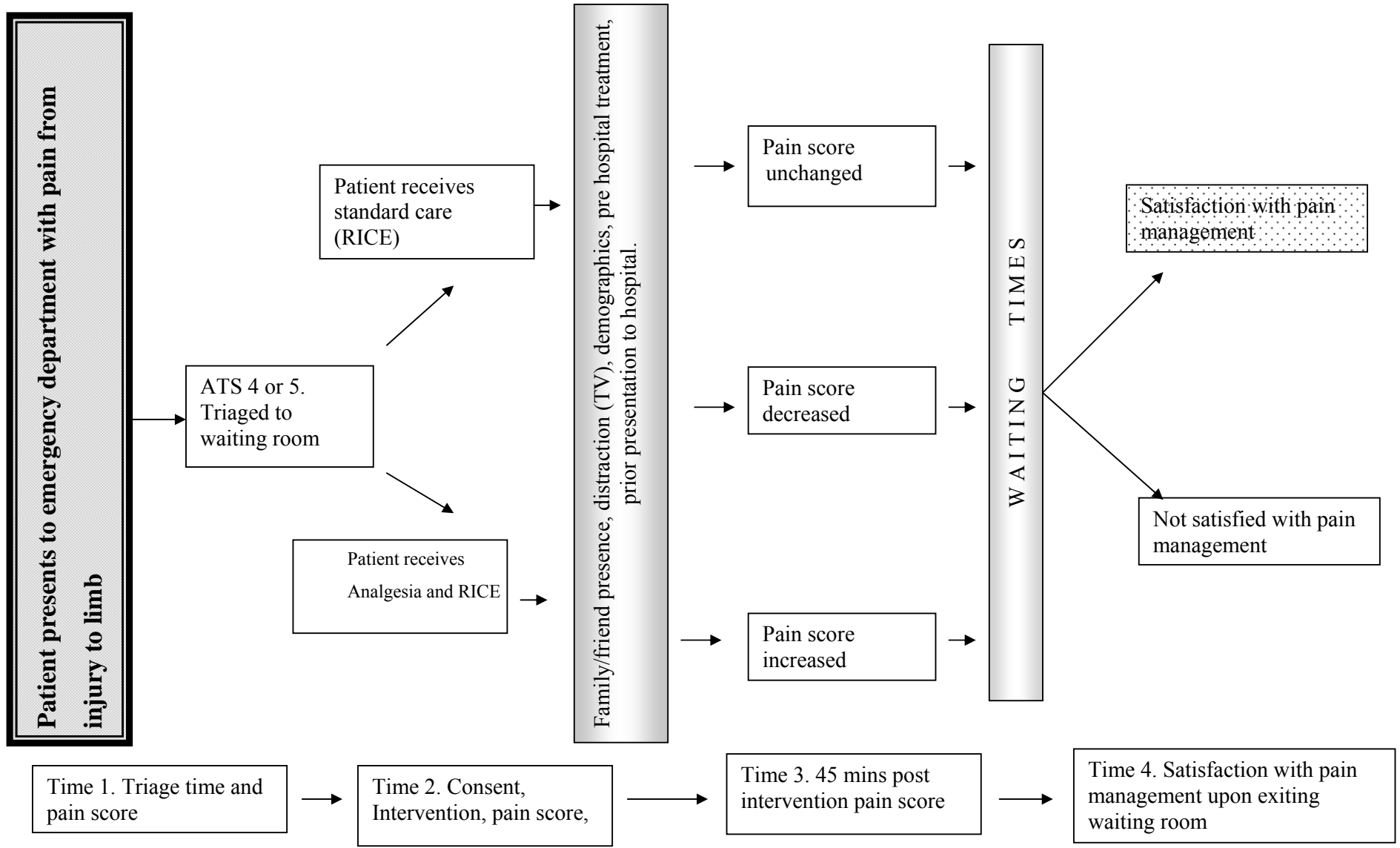


Figure 2. Methodology Flow Chart

Procedure

Education of Nursing Staff

Educational sessions were held for the nursing staff to inform them of the trial, inclusion and exclusion criteria, teach them how to approach candidates suitable for trial participation and how to contact the chief investigator. Nurses were given education on how to use the visual analogue scale, as it was not previously used in the study setting. On a daily basis the chief investigator rechecked with the individual triage nurses to ensure their understanding of how to use the instrument and how to approach the potential participants. An explanation of the procedure involved in the study was given using a flow chart describing the methodology (see Figure 2).

The chief investigator recruited a research assistant, who was trained in the use of all instruments and in the approach to patients. The research assistant was recruited to cover the periods during the day when the chief investigator was not available due to a change in work commitments. The research assistant was a senior emergency nurse with a similar emergency background to the chief investigator. To ensure correct and consistent use of terminology, and procedures several participants were approached together. Ethical approval for the use of the research assistant was sought and granted by the Edith Cowan University Ethics Committee.

All Participants

All participants meeting the inclusion criteria were approached by the triage nurse and/or chief investigator to ascertain whether or not they would be interested in participating in the study. If triage nurses identified patients they referred them to the chief investigator who provided an information sheet, obtained consent and enrolled patients (Appendix B and C). Consent was obtained prior to inclusion in the trial.

All participants had VAS pain scores collected at triage (time one) to determine eligibility for the study, prior to implementation of standard care (time two) and again 45 minutes post-intervention (time three). Patients did not see their previous VAS score when marking the new VAS. The effect of the independent variables (standard care or standard care plus paracetamol) upon the dependent variable of pain score was

measured using the VAS. A verbal categorical rating of pain was obtained at the 45 minute mark (time three).

Observations and interventions that are part of standard emergency care were recorded on the patient's triage documentation. All research data including interventions were recorded on a separate data collection sheet kept by the chief investigator (Appendix E).

Standard care was implemented after consent and in conjunction with measurement of the first pain score by the chief investigator. Patients who declined participation received standard care. Satisfaction with pain management in the waiting room was measured upon exiting the waiting room for medical assessment or after two hours, whichever occurred first (time four). The limit of two hours was set to minimise potential for the satisfaction score to be biased by prolonged waiting times.

To rule out the effects of the confounding variable of nurse attention, all participants received equal time with the chief investigator or research assistant. Comprehensive measurement of the impact of distraction on pain score was beyond the scope of this study but was recognised as a potentially confounding variable. To address this issue the waiting room at the study site had a television, which remained on at all times during data collection.

The presence of family members/ significant others may also affect the participants' pain perception and was documented as a potentially confounding variable. Demographic data (age, sex, and ethnicity) were also collected from the patient or from the medical record. Other data collected included pre-hospital analgesia or treatment for pain, triage code, cause of injury, diagnosis and time spent in waiting room. Waiting time and satisfaction were recorded to enable the chief investigator to determine whether waiting times impact on patient satisfaction with pain management in the waiting room.

The chief investigator collected some of the data from the patient notes. The notes were tagged with a Pain Study sticker for the clerks to identify and keep on hold in the emergency department. Upon review of the data by the chief investigator the sticker was removed and the notes returned to medical records. Participants were asked

at the time of consent if the chief investigator could review their notes to obtain demographic data, collect study information, and determine waiting times to first administration of analgesia (comparison group) and to ascertain admission or discharge.

Standard Care Participants (Comparison Group)

In addition to procedures described above, data were collected to determine the length of time participants had to wait until first administration of analgesia. If this occurred prior to data collection at 45 minutes, patients were excluded from the study.

Standard Care plus Paracetamol Participants (Intervention Group)

Recruitment commenced once sufficient sample numbers were collected in the comparison group (n=40). Paracetamol (1g) was administered orally in conjunction with standard care by the chief investigator. The pain score was measured just prior to administration of the paracetamol and then 45 minutes afterwards. If patients received medical attention or additional analgesia prior to data collection at 45 minutes they were excluded from the study.

Ethical Considerations

A research proposal was submitted to the Edith Cowan University Committee for the conduct of ethical research and approval to commence the research was given. The major ethical considerations were informed consent, patient confidentiality and management and storage of data.

An information sheet and consent form (Appendix B) were given to the standard care participants at triage upon identification of potential inclusion based upon VAS pain score and injury site. The chief investigator then approached the participant and further explained the details in the information sheet and consent form. All participants were assured that refusal to participate in the research would not impact on their treatment during their time at the emergency department. The standard care plus paracetamol participants followed the same process but received an information sheet and consent form (Appendix C) which explained the potential benefits and risks associated with the taking of oral paracetamol.

All patient notes used were tagged with a pain study sticker which was removed upon collection of additional data. Participant information and data are stored in a locked cabinet in the chief investigators office at Royal Perth Hospital. Data will be stored for five years then destroyed. No identifying details will be released in this or any other document pertaining to this research.

CHAPTER 5

RESULTS

The results chapter is divided into two sections. In the first section the characteristics of participants is examined including recruitment of participants, demographics and clinical characteristics on presentation at the ED. In the second section, the research questions and hypotheses are addressed. Analyses of visual analogue pain score, verbal categorical rating of pain and satisfaction score with pain management are examined between groups. This is followed by a summary outlining the key difference within and between the groups and whether the hypotheses are supported or not supported.

Characteristics of Participants

Recruitment of Participants

This study was conducted from 21st March 2005 to 24th September 2005 (188 days). Data collection for the group receiving SC occurred from 21st March 2005 to 23rd May 2005 (63 days). Data collection for the group receiving SCP occurred from 25th May 2005 to 24th September 2005 (120 days). It took almost twice as long to collect the data for the SCP group due to changes in procedures for assessment and treatment of low acuity patients in the ED. These changes began in May 2005 and involved the design and establishment of a quick assessment and care area to expedite the treatment of this group of patients. From May 2005 patients with low acuity condition (ATS 4 or 5) were not available for recruitment to this study during the hours of 1200 to 2000 during week days. Consequently the data collection period for the SCP group was protracted.

In total 154 patients were approached to participate in the study, 85 during the SC group's period of data collection and 69 during the SCP group's period of data collection. A total of 80 patients were included in the study and had complete data sets, 40 in the SC group and 40 in the SCP group. In total 61 patients were excluded (see Table 2) and a further 13 withdrew or were withdrawn after enrolment (see Table 3).

Table 2.

Reasons for Exclusion from the Study

Reason	<i>n</i>
Paracetamol within last four hours	16
Pain score less than 20 mm at triage	10
Unable to understand English	10
Under 18 years	6
Substance abuse (drugs or alcohol)	4
Refused after initial visual analogue scale	3
Injury over 2 weeks old not requiring RICE	2
Paraesthesia from injury	2
Triaged to area other than waiting room	2
Treatment commenced by triage staff	2
More than one area of body injured	2
Did not wait after seeing triage nurse	1
Did not understand visual analogue scale	1
Total	61

Table 3.

<i>Reasons for Withdrawal from the Study</i>	
Reason	<i>n</i>
Taken out of waiting room for other treatment within 45 minutes	11
Unable to understand satisfaction score.	1
Did not wait once enrolled	1
Total	13

All the following patient characteristics are described in text and summarised within a table (Appendix F).

Age

The age of participants ranged from 18 to 75 years with a mean of 33 years ($SD = 14.94$) and a median of 27 years. The most common age (mode) was 24 years. The distribution of patient ages is biased towards younger age groups with 75% of participants aged 40 years or younger (see Figure 3).

The age of males ranged from 18 to 73 years with a mean of 30 years ($SD = 13.36$) and a median of 26 years. The age of females ranged from 19 to 75 years with a mean of 37 years ($SD = 16.33$) and a median of 32 years.

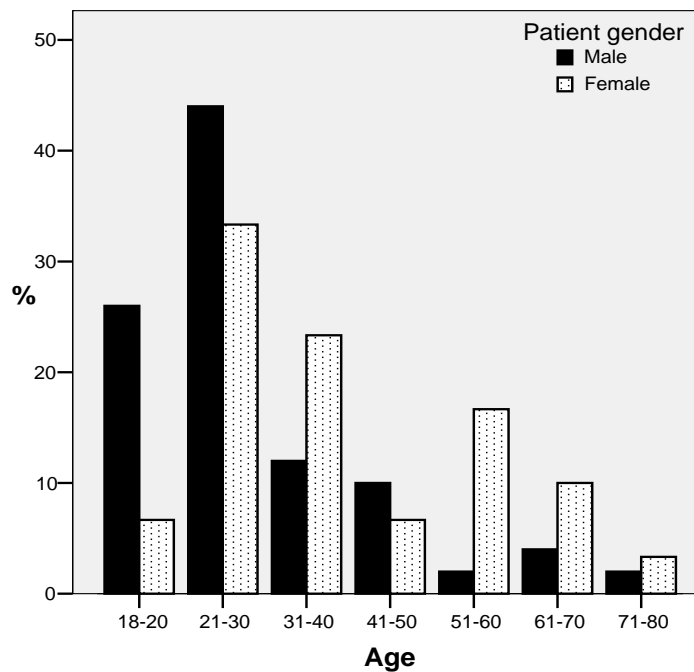


Figure 3. Age profile of participants classified by gender

The mean age of the SC group was 34 years ($SD = 15.43$) (males, $M = 31$ years, $SD = 14.28$; females, $M = 40$ years, $SD = 15.94$). The median age was 30 years (males = 28 years; females = 38 years).

The SCP group had a mean age of 31 years ($SD = 14.43$) (males, $M = 28$ years, $SD = 12.56$; females, $M = 35$ years, $SD = 16.81$). The median age was 25 years (males = 25 years; females = 31 years).

Both groups had similar mean ages. The median age was lower for the SCP group than the SC group. The Mann-Whitney U test revealed that the difference was not significant ($U = 678.00$, $p = .24$).

Gender

The majority of participants were male, comprising 62.5% ($n = 50$) of the study sample compared with 37.5% ($n = 30$) female patients. Both treatment groups had equal numbers of males (62.5%, $n = 25$) and females (37.5%, $n = 15$).

Cultural Background

The majority of participants were of Caucasian origin (88%, $n = 71$). Other cultural groups represented in the sample were Asian (6.3%, $n = 5$), Aboriginal/Torres Strait Islander (2.5%, $n = 2$) and African (2.5%, $n = 2$).

There was a similar percentage of Caucasians in each group (SC group 90%, $n = 36$; SCP group 87.5%, $n = 35$). Small numbers of other cultural groups made it impractical to perform statistical analysis to determine differences based on ethnicity.

Triage Score

The most frequently allocated ATS for patients in this study was four (91.2%, $n = 73$) with only 8.8% ($n = 7$) allocated an ATS of five.

All patients in the SC group were allocated an ATS of four (100%, $n = 40$). Seven (17.5%) patients in the SCP group were triaged into ATS category five, the remainder of the group (82.5%, $n = 33$) received an ATS of four. A Chi square test was performed and revealed a significant difference (Fishers exact test, $p = .012$) between the treatment groups in relation to ATS category.

Cause of Injury

The majority of patients' injuries occurred due to falls (55%, $n = 44$). Sport related injury (e.g., soft tissue injury to ankle) accounted for 25% ($n = 20$) of presentations in the study group, and 7.5% ($n = 6$) of injuries occurred due to a domestic incident (e.g., soft tissue injury to hand from falling object). Work related incidents accounted for 6.3% ($n = 5$) of injuries. Injuries caused by rare or unusual events (e.g., hand injury due to punching wall) were categorised as "other" and accounted for 6.3% ($n = 5$) of the study group.

When comparing the two treatment groups, both exhibited similar characteristics in regards to falls as a cause of injury (SC group = 57.5%, $n = 23$; SCP group = 52.5%, $n = 21$) (See Figure 4). However the SCP group had a larger percentage of injuries related to sporting incidents than the SC group (SC = 15%, $n = 6$; SCP = 35%, $n = 14$).

Three (7.5%) patients from each group were injured in a domestic incident. Work related incidents accounted for 7.5% ($n = 3$) of injury in the SC group and 5% ($n = 2$) in the SCP group. Rare or unusual causes of injury occurred in only five (12.5%) of the SC group. None of the SCP group experienced this category of injury. Chi square analysis to compare the injuries between treatment groups could not be conducted due to low frequencies in subgroups.

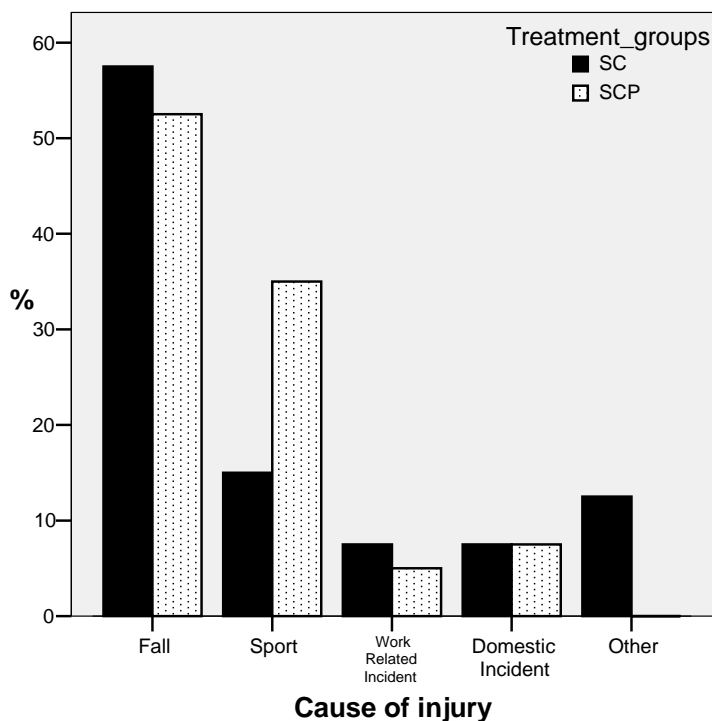


Figure 4 . Cause of injury

Location of Injury

Ankle/foot injuries were experienced by 46.3% ($n = 37$) of patients. Wrist/hand injuries occurred in 22.5% ($n = 18$) of patients. Knee injuries (13.8%, $n = 11$), shoulder (10%, $n = 8$) and elbow injury (7.5%, $n = 6$) accounted for all other limb areas affected. Left sided injury (53.8%, $n = 43$) occurred more often than right sided injury (46.2%, $n = 37$).

The ankle or foot was the most frequently injured area in both study groups (SC = 55%, $n = 22$; SCP = 37.5%, $n = 15$) (see Figure 5). The SC group had five (12.5%) wrist/hand injuries, five (12.5%) elbow, four (10%) knee and four (10%) shoulder

injuries. The SCP group had 13 (32.5%) wrist/hand injuries, seven (17.5%) knee, four (10%) shoulder and one (2.5%) elbow injury presentations.

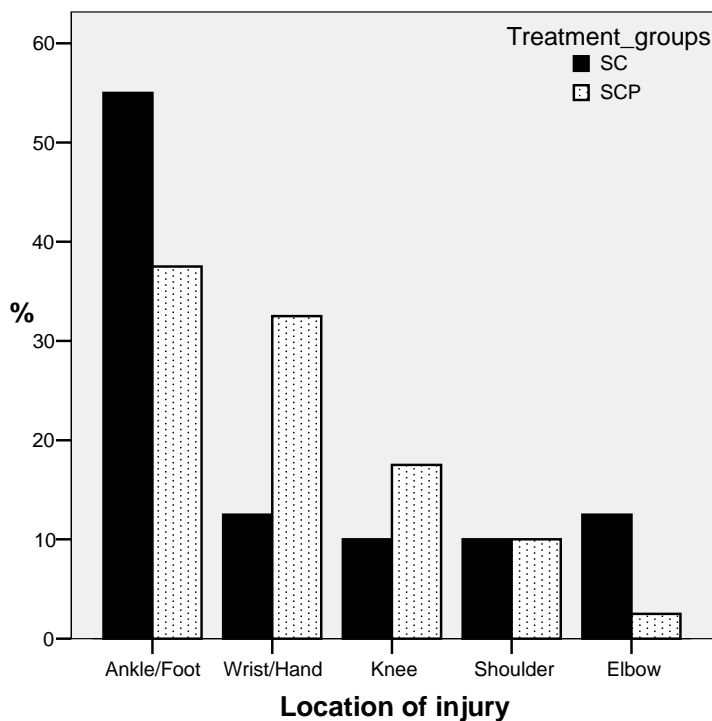


Figure 5. Location of injury

Within each group, a higher percentage of left sided injury (SC, 55%, $n = 22$; SCP, 52.5%, $n = 21$) occurred than right sided injury (SC, 45%, $n = 18$; SCP, 47.5%, $n = 19$). Chi square analysis was performed and revealed no significant difference ($\chi^2 = .00$, $df = 1$, $p = 1.00$) between the treatment groups in relation to left or right sided location of injury.

Treatment Prior to Presentation

Ice was the predominant treatment used by patients prior to presentation (43.8%, $n = 35$) (See Figure 6). Other treatments administered before arrival at the emergency department included compression (8.8%, $n = 7$), rest (6.3%, $n = 5$), liniments such as Voltaren gel and Lasonil (2.5%, $n = 2$) and elevation of the affected limb (1.3%, $n = 1$). No patient combined therapies. A large percentage (37.5%, $n = 30$) of patients presenting had neither received nor self administered any treatments prior to presentation.

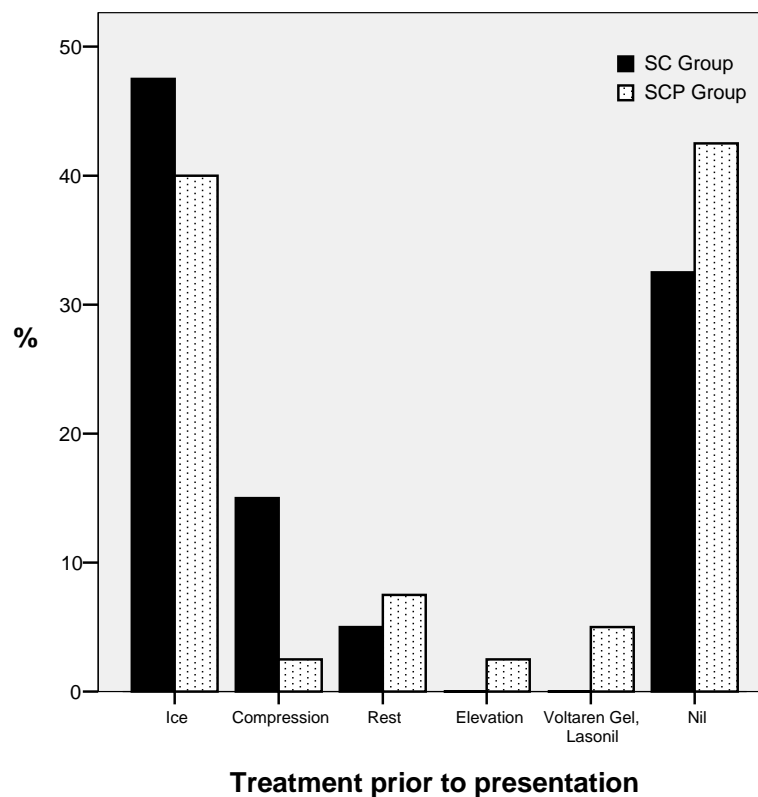


Figure 6. Treatments used by each group prior to emergency department presentation

A higher percentage (67.5%, $n = 27$) of patients in the SC group had treatment prior to presentation in comparison to the SCP group (57.5%, $n = 23$). Chi square analysis was performed and revealed no significant difference between the groups in relation to treatment prior to presentation ($\chi^2 = .48$, $df = 1$, $p = .48$). Ice (47.5%, $n = 19$) was the most commonly applied treatment in the SC group with compression (15%, $n = 6$) and rest (5%, $n = 2$) being the only other treatments applied by this group. Thirteen patients (32.5%) did not have any form of treatment prior to presentation.

Ice (40%, $n = 16$) was the most predominant form of treatment administered in the SCP group. Other therapies utilized by SCP patients included rest (7.5%, $n = 3$), application of Lasonil or Voltaren gel (5%, $n = 2$), compression (2.5%, $n = 1$) and elevation (2.5%, $n = 1$). Seventeen people in this group (42.5%) presented without any prior treatment.

Chi square analysis to compare the treatments used by the two groups could not be conducted due to low frequencies in subgroups.

Analgesia Other Than Paracetamol

Ten patients (12.5%) took oral medication to alleviate their pain before presentation to the emergency department. Nonsteroidal anti-inflammatory drugs (NSAIDs) accounted for the highest percentage of drugs taken (70%, $n = 7$). Other medication taken by patients included aspirin (20%, $n = 2$) and herbal remedy (10%, $n = 1$).

The use of medication was evenly distributed between both groups with five (12.5%) in each group taking a medication which they perceived may alleviate their pain. Three (7.5%) patients in the SC group and four (10%) in the SCP group took NSAIDs. One (2.5%) patient in the SC and one (2.5%) in the SCP group took aspirin. One patient (2.5%) in the SC group had an herbal remedy.

Chi square analysis to compare analgesia used by the two groups could not be conducted due to low frequencies in subgroups.

Family and Friends Present

Most patients arrived unaccompanied at the emergency department (62.5%, $n = 50$). Thirteen (16.3%) were accompanied by a family member and 17 (21.3%) were accompanied by friends. The patients with an accompanying person were most frequently attended by one other person (27.6%, $n = 22$). Of those attended by family only three patients (23.0%) were accompanied by more than one member of their family.

The two treatment groups were similar in relation to presence of family or friends. Of the SC group six (15%) and eight (20%) patients had family or friends present respectively. Eight patients (20%) in the SCP group had a family member present and nine patients (22.5%) had a friend present.

Chi square analysis was performed and revealed no significant difference between the treatment groups in relation to presence of family ($\chi^2 = .09$, $df = 1$, $p = .76$) or friends ($\chi^2 = .07$, $df = 1$, $p = .78$).

Waiting Room Characteristics and Distractions

A full waiting room was defined as having ten or more people in it and an empty waiting room as having nine people or less. During the study 66.3% ($n = 53$) of patients were in a full waiting room. One patient witnessed a violent incident in the waiting room in which a visitor was restrained and removed from the waiting room by security personnel and police for unacceptable and violent behaviour. At all times during the study the television remained on in the waiting room.

When comparing treatment groups, results revealed identical numbers of patients in an empty waiting room (32.5%, $n = 13$ per group) and in a full waiting room (67.5%, $n = 27$ per group). The patient who witnessed the perceived violent event was from the SCP group. This patient was also part of a full waiting room.

Time from Injury to Presentation at the Study Hospital

The time from injury to presentation at the emergency department ranged from 21 to 5100 minutes ($M = 805.14$, $SD = 1010.38$, $Mdn = 562.50$). Nine patients had prolonged times between injury and presentation (2229 to 5100 minutes, $M = 3181.67$, $SD = 957.15$, $Mdn = 2881.00$). With these outliers removed the time between injury and presentation ranged from 21 to 1628 minutes ($M = 503.89$, $SD = 478.77$, $Mdn = 302.00$).

The time from injury to presentation for the SC group ranged from 30 to 5100 minutes ($M = 785.20$, $SD = 1162.55$, $Mdn = 228.00$). Four patients had prolonged times between injury and presentation (2729 to 5100 minutes, $M = 3784.25$, $SD = 1114.49$, $Mdn = 3654.00$). With these outliers removed the time between injury and presentation ranged from 30 to 1628 minutes ($M = 451.97$, $SD = 507.33$, $Mdn = 186.00$).

The time from injury to presentation for the SCP group ranged from 21 to 3440 minutes ($M = 825.08$, $SD = 845.93$, $Mdn = 696.50$). Five patients had prolonged times between injury and presentation (2229 to 3461 minutes, $M = 2699.60$, $SD = 497.12$, $Mdn = 2610.00$). With these outliers removed the time between injury and presentation ranged from 21 to 1434 minutes ($M = 557.29$, $SD = 603.00$, $Mdn = 448.55$).

When comparing groups each had similar numbers of patients with prolonged times from injury to presentation. Although the median time for the SCP group was greater than that for the SC group, the Mann-Whitney U test revealed that this difference was not significant ($U = 717.50, p = .42$).

Waiting times

Data were collected to determine the length of stay for patients in the waiting room before entry into the main emergency department. The minimum waiting time had to be 45 minutes to enable all data to be collected.

Waiting time for all patients ranged from 45 to 523 minutes ($M = 118.55, SD = 69.55, Mdn = 100.00$). The waiting time for patients with ATS four ($n = 73$) and five ($n = 7$) ranged from 45 to 279 minutes ($M = 111.42, SD = 51.92, Mdn = 99.00$) and 70 to 523 minutes ($M = 192.86, SD = 60.92, Mdn = 145.00$) respectively. One ATS five patient had a prolonged time of 523 minutes. With this outlier removed the waiting time for ATS five patients ($n = 6$) ranged from 70 to 234 minutes ($M = 137.83, SD = 60.92, Mdn = 134.50$).

Waiting time for the SC group ranged from 45 to 279 minutes ($M = 105.38, SD = 50.35, Mdn = 98.00$). All patients ($n = 40$) in this group were triaged ATS four.

Waiting time for the SCP group ranged from 50 to 523 minutes ($M = 131.73, SD = 83.11, Mdn = 111.00$). One patient within the SCP group had a prolonged wait of 523 minutes. With this outlier removed waiting times ranged from 50 to 246 minutes ($M = 121.69, SD = 54.38, Mdn = 100.00$). The waiting time for ATS four patients ($n = 33$) ranged from 50 to 246 minutes ($M = 118.76, SD = 54.38, Mdn = 103.00$). Data for ATS five patients ($n = 7$) are as described above for the whole group (all ATS five patients were in the SCP group).

When comparing groups, each had a similar range of waiting times when the outliers were removed despite the SC group having no patients in the ATS five category. Although means differed the medians were similar. A Mann-Whitney U test confirmed that the difference in waiting times between the SC and SCP groups was not significant ($U = 634.00, p = .11$).

Patient Destination

Information on patient destination was collected to determine the number of discharges and admissions for this group of patients after they had received treatment in the waiting room. Destinations are shown in Table 4. Patients classified as “did not wait for further treatment” had fully participated in the study and informed the investigator they were leaving but chose not to wait for medical review.

Table 4

Destination after treatment for all groups

	Combined Group n = 80	SC Group n = 40	SCP Group n = 40
Admission to hospital	5 (6.3%)	3 (7.5%)	2 (5.0%)
Discharge to Community	68 (85.0%)	33 (82.5%)	35 (87.5%)
After Hours General Practitioner Service	4 (5.0%)	3 (7.5%)	1 (2.5%)
Specialist Outpatient Clinic	1 (2.5%)	1 (2.5%)	0 (0.0%)
Did not wait for further treatment	2 (2.5%)	0 (0.0%)	2 (5.0%)

Most patients were discharged back into the community. Of the cohort of patients discharged back into the community 23 (33.8%) required outpatient appointments for ongoing care needs, fifteen (22.0%) from the SC group and eight (11.8%) from the SCP group. Chi square analysis to compare destinations between the two groups could not be conducted due to low frequencies in subgroups.

Analgesia

Data were recorded on whether patients in the SC group had received analgesia in the emergency department to determine whether existing patterns of time to analgesia were consistent with those in the literature.

Of the forty patients in the SC group 16 (40.0%) received analgesia once they had secondary assessment from nursing or medical staff. Time to analgesia administration ranged from 54 to 218 minutes ($M = 133.37$, $SD = 49.05$). Twenty four (60%) patients received no analgesia in the emergency department.

Diagnosis

Diagnosis was recorded when the patient's notes were completed by the attending doctor prior to the patient leaving the emergency department.

Soft tissue injury was the most common diagnosis ($n = 42$, 52.5%) with fracture the next most common ($n = 25$, 31.3%). Five (6.3%) patients did not wait for diagnosis once they had received their initial medical assessment after data collection was completed. Four (5.0%) patients were referred to the After Hours General Practitioner service and a diagnosis was not obtained. One (1.3%) patient had an insect bite and another, a dislocation (1.3%).

The most common diagnosis for the SC group was soft tissue injury ($n = 20$, 50.0%) followed by fracture ($n = 15$, 37.5%). Insect bite was the only other diagnosis given to a patient in the SC group ($n = 1$, 2.5%). Two (5.0%) patients did not wait for diagnosis and two had been referred to the After Hours General Practitioner service and a diagnosis was not available to the investigator.

The most common diagnosis for the SCP group was soft tissue injury ($n = 22$, 55.0%) followed by fracture ($n = 10$, 25.0%). One (2.5%) patient experienced a finger dislocation. Five (12.5%) patients did not wait for a diagnosis. Two patients (5.0%) were referred to the After Hours General Practitioner service and a diagnosis was not available to the investigator.

Research Questions and Hypothesis Testing

Visual Analogue Scale Pain Scores

VAS were recorded in millimetres at three different time points, presentation, pretreatment and at 45 minutes after treatment. Frequency data for each time point are presented in Table 5. Summary results for the collective group of SC and SCP are

shown in Table 6. Overall, the mean and median scores were similar and most patients experienced a moderate level of pain (31-69mm) based on the criteria set by Kelly (2001). Twenty (25.0%) patients in both groups experienced severe pain (71-100mm) on presentation, among the SC group 11 (27.5%) reported severe pain at 45 minutes.

Table 5
Frequency (%) data for VAS scores

Pain Score (mm)	Presentation VAS		Pretreatment VAS		VAS at 45 minutes	
	SC n(%)	SCP n(%)	SC n(%)	SCP n(%)	SC n(%)	SCP n(%)
0-10	0	0	0	0	1 (2.5)	1 (2.5)
11-20	0	0	0	0	2 (5.0)	5(12.5)
21-30	6(15.0)	6(15.0)	7(17.5)	5(12.5)	3 (7.5)	7(17.5)
31-40	5(12.5)	4(10.0)	5(12.5)	4(10.0)	5(12.5)	5(12.5)
41-50	8(20.0)	7(17.5)	4(10.0)	8(20.0)	2 (5.0)	8(20.0)
51-60	3 (7.5)	9(22.5)	5(12.5)	6(15.0)	7(17.5)	8(20.0)
61-70	7(17.5)	5(12.5)	9(22.5)	9(22.5)	9(22.5)	3 (7.5)
71-80	10(25.0)	6(15.0)	7(17.5)	6(15.0)	9(22.5)	3 (7.5)
81-90	0	2 (5.0)	3 (7.5)	1 (2.5)	2 (5.0)	0
91-100	1 (2.5)	1 (2.5)	0	1 (2.5)	0	0

Table 6

Summary of VAS Pain Scores at Three Time Points for All Patients.

	M	SD	Median	Minimum Score	Maximum Score
VAS at presentation	54.60	19.43	55.00	21.00	100.00
Pretreatment VAS	54.40	19.28	57.50	21.00	100.00
VAS at 45 minutes	48.86	21.33	51.00	5.00	85.00

Results for the SC and SCP groups are shown in Table 7 and Table 8 respectively. VAS scores are similar across the three time points for the SC group. In contrast the VAS score for the SCP group at 45 minutes is lower than the pretreatment score, indicating reduced sensation of pain.

Table 7

Summary of VAS Pain Scores at Three Time Points for SC Patients.

	Mean	Standard Deviation	Median	Minimum Score	Maximum Score
VAS at presentation	55.00	20.10	60.00	21.00	92.00
Pretreatment VAS	54.13	20.27	58.00	21.00	89.00
VAS at 45 minutes	55.83	21.50	61.00	5.00	85.00

Table 8

Summary of VAS Pain Scores at three time points for SCP Group.

	Mean	Standard Deviation	Median	Minimum Score	Maximum Score
VAS at Presentation	54.20	18.98	53.50	23.00	100.00
Pretreatment VAS	54.68	18.50	55.50	21.00	100.00
VAS at 45 minutes	41.90	18.97	41.00	10.00	78.00

Nonparametric statistical tests were used for data analysis because basic assumptions for parametric testing (random sampling, normal distribution) were not met. To address the first hypothesis, a Mann-Whitney U test was conducted to determine whether differences existed between the SC and SCP groups at the three individual time points. Because the Mann Whitney U test involved multiple tests a more stringent Bon Feroni correction ($0.05 \div 3$, $p = .016$) alpha level was used. At presentation and pretreatment, there were no significant differences between the two groups' VAS scores ($p = .88$ and $p = .90$ respectively). At 45 minutes, the VAS score for the SCP group was significantly lower than that for the SC group ($U = 477.50$, $p = .002$) indicating that the SCP group reported significantly less pain at 45 minutes than the SC group.

Friedman's tests were conducted to determine whether there were significant differences in median VAS scores over the three time points for each of the groups. The test for the SC group was not significant, χ^2 ($n = 40$) = 2.23, $p = .32$ and the Kendall coefficient of concordance of .02 indicated a very small effect size. In contrast, the result for the SCP group was significant χ^2 ($n = 40$) = 46.91, $p = .00$ and the Kendall coefficient of concordance was .58 indicating a large effect size (Cohen, 1988).

Follow-up pairwise comparisons were conducted using the Wilcoxon signed-ranks test to compare VAS scores for each pair of timepoints within the SCP group. Results showed that there was no significant difference between the median presentation VAS score and pretreatment VAS score (Wilcoxon, $Z = -.10$, $p = .91$). Significant differences existed between the median presentation VAS score and the

median VAS score at 45 minutes (Wilcoxon, $Z = -5.05$, $p = .00$) and between the median pretreatment VAS score and median VAS score at 45 minutes (Wilcoxon $Z = -5.11$, $p = .00$) indicating that the SCP group had significantly less pain 45 minutes after receiving paracetamol. Pairwise comparisons were not performed with the SC data as the Friedman's test had indicated no significant difference across the three time points in this group.

Verbal Categorical Rating of Pain Level

In conjunction with collection of the VAS score at 45 minutes, patients were asked to rate their pain level as a lot better, a little better, same, a little worse or much worse since treatment began.

Table 9

Verbal Categorical Rating of Pain for all groups

	n	A Lot Better n(%)	A Little Better n(%)	Same n(%)	A Little Worse n(%)	Much worse n(%)
Combined SC and SCP Group	80	10(12.5)	26(32.5)	25(31.3)	13(16.3)	6(7.5)
SC Group	40	2(5.0)	9(22.5)	12(30.0)	11(27.5)	6(15.0)
SCP Group	40	8(20.0)	17(42.5)	13(32.5)	2(5.0)	0(0.0)

Differences were noted particularly in regard to the fact that the SC group had a greater percentage of patients in which the verbal categorical rating was either “a little worse” ($n = 11$, 27.5%) or “much worse” ($n = 6$, 15.0%) as opposed to the SCP group which had only two (5.0%) patients reporting pain “a little worse” and no patients reporting pain that was “much worse”.

Comparatively the SCP group also had more patients reporting a verbal categorical rating of “a little better” ($n = 17$, 42.5%) and “a lot better” ($n = 8$, 20.0%) than the SC group (“a little better” $n = 9$, 22.5%; “a lot better”, $n = 2$, 5.0%).

Both groups had similar numbers of patients with no change in verbal categorical rating pain. Twelve (30%) from the SC group and 13 (32.5%) from the SCP group reported “much the same” verbal categorical rating for their pain.

A Mann-Whitney U test confirmed that a statistically significant difference existed between the verbal categorical ratings of the SC and SCP groups at 45 minutes ($U = 396.50, p = .00$) with the SCP group reporting significantly less pain than the SC group.

Satisfaction with Pain Management.

Patients’ satisfaction scores were measured on a scale of 1 - 10 when they left the waiting room for entry into the main ED for treatment or at two hours depending on which occurred first. Frequency data for satisfaction is presented in Table 10.

Table 10

Frequency (%) data for satisfaction scores

Satisfaction Score	SC n (%)	SCP n (%)
1	1 (2.5)	0
2	0	0
3	1 (2.5)	1 (2.5)
4	3 (7.5)	1 (2.5)
5	5(12.5)	1 2.5)
6	3 (7.5)	9 (22.5)
7	9(22.5)	10(25.0)
8	6(15.0)	11(27.5)
9	5(12.5)	6 (15.0)
10	7(17.5)	1 (2.5)

Results indicate that mean scores were similar for both groups and that overall level of satisfaction was high (see Table 11).

Table 11
Satisfaction Scores for all groups

	n	Mean	Standard Deviation	Median	Minimum Score	Maximum Score
Combined SC and SCP Group	80	7.16	1.85	7.00	1	10
SC Group	40	7.13	2.20	7.00	1	10
SCP Group	40	7.20	1.43	7.00	3	10

A Mann-Whitney U test confirmed that there was no significant difference in satisfaction scores between the two groups ($U = 785.50, p = .88$).

Summary

The two groups were similar in terms of background characteristics except for the Australasian Triage Score in which case the SCP group had 33 patients with an ATS of four and seven patients with an ATS of five, compared to the SC group having all patients with an ATS of four. This difference was statistically significant ($p = .012$). Differences existed between groups in regards to cause of injury with the SC group having only six (15%) and the SCP group having 14 (35%) of their participants injured through sporting activity.

Upon presentation, most patients experienced moderate pain (VAS pain score = 31 – 69 mm) upon presentation ($n = 48, 60.0\%$) and pain scores were similar between groups. Of concern is the 20 (25.0%) patients who experienced severe pain (71 – 100 mm) and yet were triaged an ATS of four or five at presentation.

Findings support the first two hypotheses proposed in this study. The key finding of the between groups analysis demonstrated that pain scores at 45 minutes (measured by VAS) differed between groups with the SCP group reporting significantly better outcomes than the SC group (VAS, $U = 477.50, p = .002$), after showing no significant difference at presentation. Although the difference in VAS (12.50mm) was

statistically significant, it did not meet the recognized standard for visual analogue score minimum clinical significance of 13.00mm.

The key finding of the between-group analysis supporting the second hypothesis also demonstrated significant difference for verbal categorical rating ($U = 396.50$, $p = .000$) at 45 minutes with the SCP group reporting less pain than the SC group.

However the third hypothesis was not supported by this study's finding. Despite the improved pain scores for the SCP group there was no significant difference between the two groups satisfaction scores with both groups indicating a high level of satisfaction with pain management ($p = .88$).

CHAPTER 6

DISCUSSION

This study aimed to compare outcomes between those patients presenting to the emergency department with pain from low acuity injury who received standard care (RICE) and those who received standard care and paracetamol. Acuity was determined according to the Australasian Triage Score. It was hypothesised that the patients receiving paracetamol in conjunction with standard care would have better pain and satisfaction outcomes.

Demographic information obtained from participants during the study revealed that the participants' ages ranged from 18 to 75 years, with 75% of participants aged 18 to 40 years. More males ($n = 50$, 62.5%) than females ($n = 30$, 37.5%) were enrolled in the study. Males accounted for the majority of injury presentations for those patients aged 18 to 30 years ($n = 35$, 74.4%) and females accounted for the majority of injury presentations among those patients over 31 years ($n = 18$, 54.5%). No significant differences were found between genders or age groupings in relation to pain scoring. Analysis of data collected relating to physiological and pharmacological factors as outlined in the theoretical framework did not reveal a significant difference between the treatment groups with regard to cultural background, presence of family or friends or location of injury.

In this study falls accounted for 55% of the cause of injury, whereas falls account for 44% of injuries in national statistics (Berry & Harrison, 2007). The high prevalence of falls in this group is concerning but may be due to the fact that this study recruited patients with minor trauma as opposed to all trauma presentations. Over 50% of patients had lower limb injuries. This is not consistent with the study of Berry and Harrison (2007) which demonstrates greater incidence of upper limb injury. However they reported that their results may be biased due to sampling technique.

Although 34.8% of patients had some treatment prior to presentation at the ED, a high percentage of patients did not use any form of therapy to minimise their pain before going to the hospital. It was beyond the scope of this study to examine this area, however the findings highlight a need for further exploration into patient factors and

barriers to pain relief. Research to date, although minimal, predominantly focuses on medical and nursing barriers or the impact of a patient's race, culture, language difficulties, gender or age on preventing the patient from receiving analgesia (Fillingim, Browning, Powell & Wright, 2002; Harris, Cameron & Ugoni, 2001; Jones & Machen, 2003; Neighbor, Honner & Kohn, 2004; Tanabe et al., 2001; Todd, 2000; Todd, Deaton, D'Adamo & Goe, 2000; Salerno, 1995).

Three hypotheses were tested in this research. The first two were assessments of pain, using the Visual Analogue Scale (VAS) and verbal categorical rating. The third outcome was satisfaction with pain management delivered in the waiting room.

The VAS is measured using a well established and validated tool in which patients move a marker along a slide rule 100mm in length to indicate their level of pain (ICSI, 2004; Kelly, 2001; NHMRC, 1999; Todd, Funk, Funk & Bonacci, 1996). Initial mean VAS pain scores for all participants at presentation to the emergency department was 54.60 mm with a median of 55.00 mm indicating that most patients experienced moderate pain. Interpretation of these results is based on the work of Kelly (2001) which rates scores of 31 mm to 69 mm as moderate pain. The groups were comparable upon initial pain assessment at triage with no significant difference noted in the median VAS scores. At 45 minutes no change was found in the median VAS score for the standard care group when compared with the presentation score. After commencement of treatment, statistically significant ($p = .00$) changes in the VAS score were found for the group that had received standard care and paracetamol. The key finding of between-groups analysis demonstrated that VAS pain scores at 45 minutes differed with the SCP group reporting significantly better outcomes than the SC group (VAS, $U = 477.50$, $p = .002$). The median VAS score at 45 minutes for the standard care and paracetamol group was 41.00 mm compared with the presentation VAS (median 53.50). This created a difference of 12.50 mm which sits below the acceptable value (13.00 mm) determined by Todd, Funk, Funk and Bonacci (1995) for minimum clinical significance.

The reduction in VAS pain score is statistically but not clinically significant. Despite this, in real terms the group had moderate pain upon presentation (range for moderate pain - VAS 31 to 69mm) and was still experiencing moderate pain at 45 minutes despite a reduced VAS score. The fact that the patients did have a reduction in

pain score is encouraging, however, further exploration is required to understand the meaning of the term minimum clinical significance and how it relates to the patient's subjective experience. As forementioned within the theoretical framework, pain is a multifaceted experience incorporating physiological and psychological changes.

More research is required to determine the most effective analgesia for patients with moderate pain from musculoskeletal injury. Previous studies have predominately examined the effects of stronger analgesia formulations such as paracetamol and codeine in combination or nonsteroidal anti-inflammatory drugs (Fry et al., 1999; Tanabe et al., 2001). These studies have demonstrated statistically and clinically significant reductions in patient pain scores, however they did not examine paracetamol as a sole analgesic. The exception to this was a study by Woo et al. (2005) which examined a variety of analgesia including paracetamol. Paracetamol was found to be as effective as nonsteroidal anti-inflammatory drugs in achieving statistically and clinically significant reduction in VAS pain scores for those patients with limb pain from blunt injury.

Verbal categorical rating was assessed in conjunction with the VAS at 45 minutes. Verbal categorical rating involved the patient indicating whether their pain was 'a lot better', 'a little better', 'the same', 'a little worse' or 'much worse'. This tool has previously been used to validate the VAS (Flaherty, 1996; Kamel et al., 2001). Although patients in both groups reported improved pain outcomes, statistically significant differences were found between the standard care and standard care plus paracetamol groups, with the latter having a higher percentage (62.5%) of patients who rated their pain as 'a lot better' (20%) or 'a little better' (42.5%). Only 27.5% of patients in the SC group reported pain that was either 'a lot better' (5%) or 'a little better' (22.5%). This positive outcome for the SCP group supports the use of paracetamol in the waiting room as an adjunct to standard care for those patients experiencing pain from musculoskeletal injury.

Both groups included patients who experienced no change in their pain. A key finding was the difference in the number of patients who had worsening pain whilst waiting. The standard care and paracetamol group had only 5.0% of patients experiencing pain that was 'a little worse'. Notably no patients in the standard care plus paracetamol group had pain that was much worse. In comparison, the standard care

group had a higher percentage (42.5%) reporting having pain that was either 'a little worse' (27.5%) or 'a lot worse' (15%).

The third outcome, patient satisfaction with pain management, was measured either upon exit from the waiting room for medical assessment, or at two hours. The limit of two hours was set to minimise potential for the satisfaction score to be biased by prolonged waiting times. No significant differences were found between the standard care and standard care plus paracetamol group. The overall level of satisfaction with pain management in the waiting room was high (mean satisfaction score, 7.16). The potential confounding variable, distraction, was accounted for by ensuring the television was kept on at all times at a constant volume. Data were collected to determine if presence of family and friends or prolonged waiting times were similar between groups. No significant differences were found.

Unexpectedly, the level of satisfaction with pain management in the waiting room was high for the standard care group, despite the lack of any significant change in pain outcomes. Additionally 42.5% of the participants of this group reported worsening pain whilst in the waiting room. This finding is consistent with the results of Kelly (2000) who examined data from 54 patients who had pain in the emergency department and found no correlation between verbal rating of pain and the level of satisfaction with pain management. Correlations between pain scores and level of satisfaction were not performed for the standard care or standard care plus paracetamol groups. However in light of Kelly's (2000) findings, further research is needed to determine whether or not other factors such as nurse attention, are more significant than pain scores in affecting level of satisfaction with pain management.

Tanabe et al. (2001) noted patients were satisfied with pain management despite still experiencing moderate pain from musculoskeletal injury. Tanabe et al. (2001) examined the rationale behind the high level of satisfaction and found that patients were satisfied because of the high priority given to their need for pain relief at the first point of contact, the triage area. Contrary to Kelly's (2000) findings, Tanabe et al (2001) revealed that patients with higher levels of pain were not as satisfied with their pain management as those with lower levels of pain.

The patients' assessment of pain, as measured by the VAS pain score did not appear to affect triage score allocation in that the majority of patients had an ATS of

four or five despite 42.5 % ($n = 34$) having pain scores above 50 on a scale of zero to 100. It was expected that patients with a higher pain score at triage would receive a higher category of ATS and thus a higher priority for treatment. Due to low numbers of patients with ATS category five ($n = 7$) it is not possible to draw firm conclusions about the findings for this category of patient. Data were not collected on why this inconsistency between pain score and triage classification may have occurred. It has been reported in the literature that health care providers may not believe the amount of pain reported by a patient even if a pain score is given by the patient, if the patient does not display physical signs of pain (Guru & Dubinsky, 2000; Jones & Machen, 2003; Tanabe & Buschmann, 1999). This could explain the reason why disparity occurred between the patients' reported pain level and allocated triage score. Prior to the commencement of this research, pain scoring at triage was not routine practice at the study hospital, which could further explain the allocation of low triage score. Pain is only one variable that determines the ATS allocated to a patient with a limb injury. Other factors such as level of immobility, vascular and neurological impairment, presence of other injuries and mechanism of injury warrant exploration in future research studies.

One of the key aims of this study was to examine a way of introducing analgesia at an earlier point of contact for patients presenting with pain. For the standard care group, the average waiting time to receive analgesia from presentation to when they were reviewed medically was 133.37 minutes ($SD = 49.05$). Through the introduction of analgesia by nurses after triage presentation the waiting time for the standard care plus paracetamol group was reduced to less than ten minutes after triage assessment.

Prolonged waiting time between initial presentation and receipt of analgesia has been well highlighted in other research. The National Institute of Clinical Studies (2003) emphasised this as a priority area for research and implementation of realistic and maintainable change to practice within emergency departments. Tanabe and Buschmann (1999) evaluated pain management practices for 203 participants in an American tertiary emergency department. They reported an average waiting time between initial triage presentation and first administration of analgesia as 74 minutes. This prolonged waiting time is not unique. Fry et al. (1999) in a similar study with 77 participants analysed pain practice in an Australian setting. Their findings indicate an average waiting time from time of presentation to first analgesia of 85.5 minutes, with a standard deviation of 76.8 minutes. In another study, Vassiliades, Hitos and Hill (2002)

reported a waiting time of over two hours for patients waiting for analgesia for a fractured femur.

The waiting time experienced by the standard care group was prolonged (mean, 133.37 minutes; $SD = 49.05$) when compared with the other studies previously identified. The most likely explanation is that patients from other studies included those allocated to all areas of the emergency department whereas the focus for this study was to examine the outcomes of only those patients who were allocated to the waiting room area of the emergency department.

One of the concerns arising from the findings for the standard care group is that 24 (60%) patients in this group did not receive any analgesia for their injury during their emergency department visit. The low percentage of patients receiving analgesia in this study is concerning as the need for early analgesia has been well documented and discussed within the study setting and within emergency nursing and medical literature (Campbell et al., 2004; Ferma, Taylor & Geluk, 2003; Fry et al., 1999; Huckson, 2003; NICS, 2003; Tcherny-Lessenot et al., 2003; Teanby, 2003). Tanabe and Buschmann (1999) reported similar findings with 47% ($n = 64$) of 150 patients presenting to their emergency department with a primary complaint of pain, not receiving any pharmacological intervention to relieve their pain.

Three patients refused analgesia (paracetamol) when offered during the data collection phase for the standard care and paracetamol group. These patients were excluded from the study. As the standard care group were not offered analgesia during the data collection period and the investigator had no contact with patients after they left the waiting room it is not possible to determine the number who refused analgesia when offered upon subsequent medical assessment and treatment. This result has highlighted the need for further study into administration and refusal of analgesia in the study department. Similar findings have been reported in the literature. Tanabe et al. (1999) revealed that 15% of participants in their study refused analgesia. Axelband, Lopez-Rodriguez, Jacoby and Heller (2004) reported that 36 % of participants with musculoskeletal pain less than 60mm on a visual analogue scale did not want analgesia. Additionally 63% of the patients in their study with fractures ($n = 22$) did not want analgesia. No explanation is provided for why this phenomenon occurred.

Limitations

This study represents a convenience sample of patients. Convenience sampling was used due to the limited time available to the investigator for access to the emergency department population. As a result this does not represent the total population potentially eligible for inclusion in the study. It was not possible during the study to identify the total population presenting with musculoskeletal pain because of injury due to limitations with the emergency department database classification for people with this type of problem. This may have led to the distribution not being normal or representative in regards to age, gender and triage score and therefore results may not be generalisable to other populations. This sampling technique in addition to practice changes within the study hospital could explain why a higher number of patients with sporting injuries were present in the standard care plus paracetamol group. The practice changes involved the establishment of a quick assessment and care area to expedite the treatment of ATS 4 or 5 patients during the hours of 1200 to 2000 Monday to Friday. Consequently the population available to the chief investigator for recruitment of the SCP group was predominantly on the weekends, when a higher likelihood of sporting injuries occurs.

Data for the standard care group was collected first as it represented the current practice that occurred in the study hospital at that time. When all data were collected for 40 participants in the standard care group data collection commenced for the standard care plus paracetamol group. It would have been impractical to run this as a randomised study offering one group standard care and another standard care plus paracetamol. This is because it was considered likely that on some occasions, patients sitting side by side in the ED would have similar injuries and pain scores. In such cases it would be difficult to offer one patient paracetamol and not the other. The lack of random assignment to the SC and SCP groups could have biased the study outcomes, but upon statistical analysis, differences in patient characteristics and potentially confounding variables such as family and friends present, distraction and amount of people in waiting room were not found to be significant (with the exception of the ATS). The ATS is unlikely to have biased the study findings because the SCP group had better pain outcomes (contrary to what would be expected if pain was affected by a higher ATS) and the median waiting time for the patients was not found to be significant between the groups. A potentially confounding variable that should have been considered but was beyond the scope of this study was the interaction that the patient may have had with the other

nursing staff whilst in the waiting room. At the study hospital a nurse is allocated to care for the relatives in the waiting room who have a family member or friend in the emergency department receiving treatment. Inadvertently the nurse may have interacted with the patient enrolled in the study providing a distraction to the pain which was not measured.

Sample size was determined based on power analysis for the VAS pain score, consequently the sample may not have been large enough to accurately determine significant differences between patient satisfaction scores.

In summary, early administration of simple analgesia (paracetamol) in conjunction with standard care (RICE) improved patient pain outcomes statistically, but the improvement in VAS scores was just below the level considered to be clinically significant. Satisfaction with pain management was high in both groups. As the study sample size was chosen based on the ability to detect minimum differences in VAS scores, the findings for patient satisfaction with pain management should be interpreted with caution.

In addition to the main findings, two key issues were identified. Firstly, triage score allocation did not necessarily match pain severity in that a patient might have been identified as having significant pain which needed addressing, but did not receive urgent attention because of undetermined variables which affected the way a nurse made a triage decision. Secondly the subsequent wait associated with that triage score meant significant delays to analgesia for some patients and no analgesia for other patients in the SC group.

Implications for Clinical Practice

Early analgesia for patients with pain can be provided by nurses at triage. Using established pain assessment tools, nurses can evaluate and manage patients' pain from musculoskeletal injury in the waiting room. It is imperative that nurses assess the effectiveness of the pain relieving measure they implement for the patient in the waiting room and determine if further strategies are required to alleviate the patient's discomfort.

Prior to this study analgesia practice in the study setting was variable and many patients did not receive analgesia even after medical assessment despite pain scores indicating moderate levels of pain. The findings from this study support the possibility for development of protocol driven standard pain assessment and management at triage in the study setting. Clearly as the nurse is the first point of contact for the patient at triage they are in the ideal position to commence treatment of that patient's pain.

Paracetamol has been shown to be effective in improving pain outcomes for a substantial proportion of patients with musculoskeletal injury. It has the added benefit of having less adverse events than other analgesia (Moore et al., 1998) therefore providing a safe alternative for patients with preexisting comorbidities which may preclude them from having other forms of pain relief such as nonsteroidal anti-inflammatory or codeine based analgesia.

Considerations for Future Studies

This study examined the effects of standard care or standard care plus paracetamol on pain and satisfaction outcomes. It has demonstrated that administration of paracetamol at an early stage of treatment for patients with minor injury who wait achieved statistical significance however not clinically significant change in visual analogue scores. The difference between minimum clinically significant difference and adequate pain relief is poorly defined in the literature and is an area of pain research which needs to be examined in more detail (Lee, 2001). Reduction in pain score certainly signifies a desired result however the adequacy of the effect is poorly defined most likely due to the subjectivity of the whole pain experience. Determining a minimum score for clinical significance as has been reported by Todd et al. (1995) as a useful scientific measure, however may not necessarily reflect whether or not the patient perceives the pain management as being valuable and of benefit to them as the recipient of that care. This is further highlighted with the statistically significant differences between treatment groups with regard to verbal categorical rating. Both groups had improved verbal categorical rating however only the group receiving the paracetamol had statistically significantly improvement. No literature was identified which solely looked at the use of verbal categorical ratings as a pain outcome to determine adequacy of analgesia and pain management strategies.

The effect of paracetamol upon limb injury pain needs to be explored further. The minimal side effects from this medication make it a safe option for patients with pre-existing comorbidities who may have problems taking other analgesics. Paracetamol effectiveness as an analgesic for musculoskeletal injury needs further investigation especially when looking at the acute phase of injury. This study looked at those patients presenting within 72 hours. In future studies it would be useful to look at patients who present in the first 24 to 48 hours after injury to determine if there is a difference in pain outcomes as compared to those who present after 48 hours from initial injury. Patient factors affecting pain response and the offering, giving or refusal of analgesia is a vastly unexplored area with few studies examining the effects of patient demographics and analgesia preference.

Nurse perceptions of patients' pain levels may have been a contributing factor to triage score allocation. Some patients were allocated different Australasian triage scores despite similar pain scores and presentation history. Fosnocht, Swanson and Barton (2005) suggest that healthcare personnel allow this to happen as they concentrate on diagnosis rather than pain relief. Tanabe and Buschmann (2000) recognised that pain management is not given as higher priority as acute illness. Ducharme (2001) suggests this is because we cannot visualise pain. Likewise Jones and Machen (2003) suggest that it is because healthcare personnel do not match the patient's subjective experience with the objective data. Despite the identified research, little is available which examines strategies that have looked into why patients are not receiving timely pain relief and subsequently implemented programs to address these issues. Of those studies that have been identified few have reported on whether their solution is sustainable or ongoing (Campbell et al., 2004; Fry & Holdgate., 2002; Tanabe et al., 2001).

Waiting time to analgesia continues to be a concern. This study clearly outlines serious deficits in the current practice within the study hospital, however it has prompted the development of pain protocols that are still currently under review to address this issue. This does not detract from the need to further review waiting times to analgesia for other patient groups and examine the potential for further pain relief initiatives to be developed at triage, the patient's first point of contact with the emergency department.

Satisfaction was measured at time of entry to the assessment area or at two hours of waiting room time dependent on which occurred first. It captured the satisfaction with pain management in the waiting room during that time as opposed to the patients' entire pain management journey. Prolonged waiting times in emergency departments for patients with unrelieved pain have been clearly associated with poor patient outcomes and dissatisfaction (Bar-dayan, 2002; Fernandes, et al., 1994; Fry, 2001; Katzmann, 1999; Luker, Austin, Hogg, Ferguson & Smith, 1998; Strinko et al., 2000). Many have identified that unrelieved pain can lead to anxiety, inappropriate behaviour and ultimately poor patient outcomes such as ongoing pain and dissatisfaction with care delivered by that emergency department (National Health and Medical Research Council (NHMRC), 1999; Graham, 2002; Tcherny-Lessenot, et al., 2003; Blank et al., 2001). With the conflicting results from this study, where patients reported high levels of satisfaction despite unresolved pain, further research is required to determine what patients actually want in regards to pain management and satisfaction with that management.

Conclusion

Pain as a result of injury continues to be one of the primary reasons people seek medical assistance from emergency departments. Paracetamol has been shown to be effective in providing statistically significant pain relief and positive pain outcomes for those patients who are in the waiting room with musculoskeletal injury when used in conjunction with standard care (rest, ice, compression and elevation). Standard care did not provide statistically significant improvement in pain outcomes when used in isolation.

Satisfaction with pain management in the waiting room was high for the participants involved in this study irrespective of whether or not they received standard care or standard care plus paracetamol.

Early relief of patient pain is a priority for emergency department personnel. This study has identified that it is possible for nurses to measure a patient's pain at triage and implement pain control measures including oral analgesia. Future research needs to further explore the value of triage as a first point of contact for patients with pain and the potential for this area to be used for early implementation for analgesia.

REFERENCES

- Alcolado, J. (2000). Nurse practitioners and the future of general practice. *British Medical Journal*, 320(7241), 1084.
- Ardery, G., Herr, K. A., Titler, M. G., Sorofman, B. A., & Schmitt, M. B. (2003). Assessing and managing acute pain in older adults: a research base to guide practice. [Electronic version]. *Medsurg Nursing*, 12(1), 7-19.
- Arnstein, P. (2002). Optimizing perioperative pain management. *AORN Journal*, 76(5), 812-818.
- Attard, A. R., Corlett, M. J., Kidner, N. J., Leslie, A. P., & Fraser, I. A. (1992). Safety of early pain relief for acute abdominal pain. *British Medical Journal*, 305, 554-556.
- Australasian College for Emergency Medicine. (2000). *Guidelines for the Implementation of the Australasian Triage Scale in Emergency Departments. ACEM Policy Document*. Retrieved April 27, 2004, from the World Wide Web: <http://www.acem.org.au/open/documents/triageguide.htm>
- Axelband, J., Lopez-Rodriguez, M., & Heller, J.J. (2004). Do emergency department patients with musculoskeletal pain really want analgesics? *Annals of Emergency Medicine*, 44(4), S87.
- Bar-dayan, Y. (2002). Waiting time is a major predictor of patient satisfaction in a primary military clinic. *Military Medicine*, 167(10), 842-845.
- Berry, J., & Harrison, J. (2007). *Hospital separations due to injury and poisoning Australia 2003-2004*. Adelaide: Australian Institute of Health and Welfare.
- Blank, F., Mader, T. J., Wolfe, J., Keyes, M., Kirschner, R., & Provost, D. (2001). Adequacy of pain assessment and pain relief and correlation of patient satisfaction in 68 ED fast-track patients. *Journal of Emergency Nursing*, 27(4), 327-334.
- Breivik, E. K., Bjornsson, G. A., & Skovlund, E. (2000). A comparison of pain rating scales by sampling from clinical trial data. *The Clinical Journal of Pain*, 16(1), 22-28.
- Briggs, E. (2003). The nursing management of pain in older people. *Nursing Standard*, 17(18), 47-53.
- Bruce, A. (2001). Pain experienced by older people. *Professional Nurse*, 16(11), 1481-1485.
- Byrne, G., & Heyman, R. (1997). Patient anxiety in the accident and emergency department. *Journal of Clinical Nursing*, 6(4), 289-295.
- Cailliet, R. (1993). *Pain: mechanisms and management*. Philadelphia: F. A. Davis Company.

- Campbell, P., Dennie, M., Dougherty, K., Iwaskiw, O., & Rollo, K. (2004). Implementation of an ED protocol for pain management at triage at a busy level 1 trauma center. *Journal of Emergency Nursing*, 30(5), 431-438.
- Choi, D. M. A., Yate, P., Coats, T., Kalinda, P., & Paul, E. A. (2000). Ethnicity and prescription of analgesia in an accident and emergency department: cross sectional study. *British Medical Journal*, 320(7240), 980-981.
- Chong, C. F., Wang, T., Chen, C., Ma, H., & Chang, H. (2004). Preconsultation use of analgesics on adults presenting to the emergency department with acute appendicitis. *Emergency Medicine Journal [Electronic Version]*, 21(1), 41-43.
- Closs, S. J. (1994). Pain in elderly patients: a neglected phenomenon? *Journal of Advanced Nursing*, 19, 1072-1081.
- Coman, M., & Kelly, A. M. (1999). Safety of a nurse-managed, titrated analgesia protocol for the management of severe pain in the emergency department. *Emergency Medicine*, 11, 128-132.
- de Rond, M., de Wit, R., & van Dam, F. (2001). The implementation of a pain monitoring programme for nurses in daily clinical practice: results of a follow-up study in five hospitals. *Journal of Advanced Nursing*, 35(4), 590-598.
- de Rond, M. E. J., de Wit, R., van Dam, F. S. A. M., van Campen, B. T. M., den Hartog, Y. M., & Klievink, R. M. A. (2000). A pain monitoring program for nurses: effects on nurses' pain knowledge and attitude. *Journal of Pain and Symptom Management*, 19(6), 457-467.
- Ducharme, J. (2001). Whose pain is it anyway? Managing pain in the emergency department [Electronic Version]. *Emergency Medicine*, 13, 271-273.
- Evans, C. (2004). Improving assessment of pain in older people. *Emergency Nurse [Electronic Version]*, 12(5), 18-21.
- Fatovich, D. M. (2003). Responses to access block in Australia: Royal Perth Hospital. *Medical Journal of Australia*, 178(3), 108-109.
- Fatovich, D. M., & Hirsch, R. L. (2003). Entry overload, emergency department overcrowding and ambulance bypass. *Emergency Medicine Journal*, 20, 406-409.
- Ferma, M., Taylor, S. E., & Geluk, M. (2003 August). *Comprehensive nurse initiated analgesia program - improving timeliness of analgesia provision*. Paper presented at the National Institute of Clinical Studies - Evidence to Excellence in Emergency Care, Sydney.
- Fernandes, C., Daya, M., Barry, S., & Palmer, N. (1994). Emergency department patients leave without seeing a physician: The Toronto hospital experience. *Annals of Emergency Medicine*, 24, 1092-1096.

- Fillingham, R. B., Browning, A. D., Powell, T., & Wright, R. A. (2002). Sex differences in perceptual and cardiovascular responses to pain: the influence of a perceived ability manipulation. *Journal of Pain*, 3(6), 439-445.
- Finckh, A., Walsh, M., & Newman, D. (2003 August). *Improving emergency care: time to analgesia*. Paper presented at the National Institute of Clinical Studies - Evidence to Excellence, Sydney, Australia.
- Fosnocht, D. E., Swanson, E. R., & Barton, E. D. (2005). Changing attitudes about pain and pain control in emergency medicine. *Emergency Medicine Clinics of North America [Electronic Version]*, 23, 297-306.
- Frank-Stromborg, M., & Olsen, S. J. (1997). *Instruments for clinical health-care research* (2nd ed.). Massachusetts: Jones and Bartlett.
- Frank-Stromborg, M., & Olsen, S. J. (2004). *Instruments for clinical health-care research* (3rd ed.). Massachusetts: Jones and Bartlett.
- Fry, M. (2001). Triage nurses order xrays for patients with isolated distal limb injuries: a 12 month ED study. *Journal of Emergency Nursing*, 27(1), 17-22.
- Fry, M., & Holdgate, A. (2002). Nurse-initiated intravenous morphine in the emergency department: efficacy, rate of adverse events and impact on time to analgesia. *Emergency Medicine*, 14, 249-254.
- Fry, M., Holdgate, A., Baird, L., Silk, J., & Ahern, M. (1999). An emergency department's analysis of pain management patterns. *Australian Emergency Nursing Journal*, 2(1), 31-36.
- Fuentes, E. F., Kohn, M. A., & Neighbor, M. L. (2002). Lack of association between patient ethnicity or race and fracture analgesia. *Academic Emergency Medicine*, 9(9), 910-915.
- Garbez, R., & Puntillo, K. (2005). Acute Musculoskeletal Pain in the emergency Department: A review of the literature and Implications for the Advanced Practice Nurse. *AACN Clinical Issues [Electronic Version]*, 16(3), 310-319.
- Government of Western Australia. (1964). *Poisons Act*. Perth, Western Australia: State Law Publishers.
- Government of Western Australia. (1965). *Poisons Regulations*. Perth, Western Australia: State Law Publishers.
- Government of Western Australia. (1992). *Nurses Act*. Perth, Western Australia: State Law Publishers.
- Graham, J. (2002). Adult patients' perceptions of pain management at triage: a small exploratory study. *Accident and Emergency Nursing*, 10, 78-86.

- Green, C. R., Wheeler, J. R. C., Marchant, B., LaPorte, F., & Guerrero, E. (2001). Analysis of the physician variable in pain management. *Pain Medicine, 2*(4), 317-327.
- Grossman, S.A., Sheilder, V.R., & McGuire, D. B. (1992). A comparison of the Hopkins pain rating instrument with standard visual analogue and verbal descriptor scales in patients with cancer pain. *Journal of Pain and Symptom Management, 7*, 196-203.
- Guru, V., & Dubinsky, I. (2000). The patient vs. caregiver perception of acute pain in the emergency department [Electronic Version]. *Journal of Emergency Medicine, 18*(1), 7-12.
- Harris, T., Cameron, P. A., & Ugoni, A. (2001). The use of pre-cannulation local anaesthetic and factors affecting pain perception in the emergency department setting. *Emergency Medicine Journal, 18*, 175-177.
- Holdgate, A., Asha, S., Craig, J., & Thompson, J. (2003). Comparison of a verbal numeric rating scale with visual analogue scale for the measurement of acute pain. *Emergency Medicine, 15*, 441-446.
- Holleran, R. S. (2002). The problem of pain in emergency care. *Nursing Clinics of North America, 37*(1), 67-78.
- Huckson, S. (2003, February). *Emergency Demand - Thinking Outside Access Block*. Paper presented at the National Institute of Clinical Studies, Emergency Department Collaborative. ARCHI Toolkit Seminar, Perth, Australia.
- ICSI. (2004). *Healthcare guideline: Assessment and management of acute pain. Institute of Clinical Systems improvement*. Retrieved April 7 2004, from the World Wide Web:
<http://www.icsi.org/knowledge/detail.asp?catID=29&itemID=152>
- Jastrzab, G., Fairbrother, G., Kerr, S., & McInerney, M. (2004). Profiling the pain aware nurse: acute care nurses' attitudes and knowledge concerning adult pain management. *Australian Journal of Advanced Nursing, 21*(2), 27-32.
- Johnston, C. C., Gagnon, A. J., Fullerton, L., Common, C., Ladores, M., & Forlini, S. (1998). One week survey of pain intensity on admission to and discharge from the emergency department: a pilot study. *Journal of Emergency Medicine, 16*(3), 377.
- Jones, G. E., & Machen, I. (2003). Pre-hospital pain management: the paramedics' perspective. *Accident and Emergency Nursing, 11*, 166-172.
- Jones, J. B. (2001). Pathophysiology of acute pain: implications for clinical management. *Emergency Medicine, 13*, 288-292.
- Jones, J. S., Johnson, K., & McNinch, M. (1996). Age as a risk factor for inadequate emergency department analgesia. *American Journal of Emergency Medicine [Electronic Version], 14*(2), 157-160.

- Karch, A. M. (2000). *Focus on Nursing Pharmacology*. Philadelphia: Lippincott Williams and Wilkins.
- Katzmann, C. N. (1999). N.J. hospital works to satisfy customers. *Modern Healthcare*, 29(51), 48.
- Kelly, A. (2000). A process approach to improving pain management in the emergency department: development and evaluation. *Journal of Accident and Emergency Medicine*, 17, 185-187.
- Kelly, A. (2001). Setting the benchmark for research in the management of acute pain in emergency departments. *Emergency Medicine*, 13, 57-60.
- Keszler, H. (1994). A cruel practice experienced. *British Medical Journal*, 308, 1577.
- Kober, A., Scheck, T., Greher, M., Lieba, F., Flieschhackl, R., Flieschhackl, S., Randunsky, F., & Hoerauf, K. (2002). Prehospital analgesia with acupuncture in victims of minor trauma: a prospective, randomized, double-blinded trial. *Anesthesia & Analgesia*, 95(3), 723-727.
- Kubsch, S. M., Neveau, T., & Vandertie, K. (2001). Effect of cutaneous stimulation on pain reduction in emergency department patients. *Accident and Emergency Nursing*, 9, 143-151.
- Kucera, B. (2002, November 20, 2002.). *State Government announces major new role for highly skilled WA nurses [Media statement November 6, 2002]*. Retrieved, from the World Wide Web:
<http://www.mediastatements.wa.gov.au/media/media.nsf/9dbd10dc05971ee348256a76000cc002/2fdcf74da7deea4b48256c690018f78e?OpenDocument>
- Larsen, P. D. (2000). Effective pain management in older patients. *AORN Journal*, 71(1), 205-209.
- Lee, J. S., Stiell, I. G., Wells, G. A., Elder, B. R., Vandemheen, K., & Shapiro, S. (2000). Adverse outcomes and opioid analgesic administration in acute abdominal pain. *Academic Emergency Medicine [Electronic Version]*, 7(9), 980-987.
- Lewis, L., Lasater, L., & Brookes, C. (1994). Are emergency physicians too stingy with analgesics? *Southern Medical Journal*, 87, 7-9.
- Li, S. F., Greenwald, P. W., Gennis, P., Bijur, P. E., & Gallagher, E. J. (2001). Effect of age on acute pain perception of a standardized stimulus in the emergency department. *Annals of Emergency Medicine*, 38(6), 644-647.
- Lindley-Jones, M., & Finlayson, B. J. (2000). Triage nurse requested x rays-are they worthwhile? *Emergency Medicine Journal*, 17(2), 103-107.
- LoVecchio, F., Oster, N., Sturmman, K., Nelson, L. S., Flashner, S., & Finger, R. (1997). The use of analgesics in patients with acute abdominal pain. *Journal of Emergency Medicine*, 15(6), 775-779.

- Luker, K. A., Austin, L., Hogg, C., Ferguson, B., & Smith, K. (1998). Nurse-patient relationships: the context of nurse prescribing. *Journal of Advanced Nursing*, 28(2), 235-242.
- Lusis, S. A. (1996). The challenges of nursing elderly surgical patients. *AORN Journal*, 64(6), 954-962.
- Mahadevan, M., & Graff, L. (2000). Prospective randomized study of analgesic use for ED patients with right lower quadrant abdominal pain. *American Journal of Emergency Medicine [Electronic Version]*, 18(7), 753-756.
- Marshall, J., Edwards, C., & Lambert, M. (1997). Administration of medicines by emergency nurse practitioners according to protocols in an accident and emergency department. *Journal of Accident & Emergency Medicine*, 14(4), 233-237.
- McCaffery, M., & Ferrell, B. R. (1992). Does the gender gap affect your pain control decisions? *Nursing*, 22(8), 48-51.
- McCallum, T. (2004). Pain management in Australian emergency departments: A critical appraisal of evidence based practice. *Australian Emergency Nursing Journal*, 6(2), 9-13.
- McCreadie, M. (2002). Pain management in drug users. *Nursing Standard*, 16(19), 45-55.
- McQuay, H., Moore, A., & Justins, D. (1997). Fortnightly review: treating acute pain in hospital. *British Medical Journal*, 314(7093), 1531-1535.
- Melzack, R., & Wall, P. D. (1996). *The challenge of pain* (2nd ed.). London: Penguin.
- Merskey, H., & Bogduk, N. (Eds.). (1994). *Classification of chronic pain: descriptions of chronic pain syndromes and definitions of pain terms / prepared by the Task Force on Taxonomy of the International Association for the Study of Pain*. (2nd ed.). Seattle: Iasp Press.
- Milton, D. (1998). Using alternative and complementary therapies in the emergency setting. *Journal of Emergency Nursing*, 24(6), 500-508.
- Moore, A., Collins, S., Carroll, D., McQuay, H., & Edwards, J. (1998). Single dose paracetamol (acetaminophen), with and without codeine, for postoperative pain. *The Cochrane Database of Systematic Reviews*(4), Art. No.: CD001547.DOI:001510.001002?14651858.CD14001547.
- National Health & Medical Research Council. (1999). *Acute pain management: scientific evidence*. Canberra: NHMRC.
- NBWA. (2001). *Medication Administration Guidelines*. Nurses Board of Western Australia. Retrieved, March 31st, 2004, from the World Wide Web: <http://www.nbwa.org.au/standard/index.asp?page=standard>

- Neighbor, M. L., Honner, S., & Kohn, M. A. (2004). Factors affecting emergency department opioid administration to severely injured patients. *Academic Emergency Medicine [Electronic Version]*, 11(12), 1290-1296.
- Nelson, B. P., Cohen, D., Lander, O., Crawford, N., Viccellio, A. W., & Singer, A. J. (2004). Mandated pain scales improve frequency of ED analgesic administration. *American Journal of Emergency Medicine [Electronic Version]*, 22(7), 582-585.
- NICS. (2003). *Annual Report 2002/03, National Institute of Clinical Studies*. Retrieved, April 27th, 2004, from the World Wide Web:
http://www.nicssl.com.au/pdf/Final_annual_report_high_res.pdf
- Pace, S., & Burke, T. (1996). Intravenous morphine for early pain relief in patients with acute abdominal pain. *Journal of Emergency Medicine [Electronic Version]*, 3, 1086-1091.
- Park, G., Fulton, B., & Senthuran, S. (2000). *The management of acute pain* (2nd ed.). Oxford: Oxford Medical Publications.
- Puntillo, K., Neighbor, M., O'Neil, N., & Nixon, R. (2003). Accuracy of emergency nurses in assessment of patients' pain. *Pain Management Nursing [Electronic Version]*, 4(4), 171-175.
- Qasim, A., Malpass, K., O'Gorman, D. J., & Heber, M. E. (2002). Safety and efficacy of nurse initiated thrombolysis in patients with acute myocardial infarction. *British Medical Journal*, 324, 1328-1331.
- Raftery, K. A., Smith-Coggins, R., & Chen, A. H. M. (1995). Gender associated differences in emergency department pain management. *Annals of Emergency Medicine*, 26(4), 414-421.
- Renn, C. L., & Dorsey, S. G. (2005). The physiology and processing of pain. A review. *AACN Clinical Issues [Electronic Version]*, 16(3), 277-290.
- Ricard-Hibon, A., Ducasse, J., Ravaud, P., Wood, C., Viel, E., Chauvin, M., Brunet, F., & Bleichner, G. (2004). Quality control programme for acute pain management in emergency medicine: a national survey. *European Journal of Emergency Medicine [electronic Version]*, 11(4), 198-203.
- Robinson, M. E., Gagnon, C. M., Dannecker, E. A., Brown, J. L., Jump, R. L., & Price, D. D. (2003). Sex differences in common pain events: Expectations and anchors. *Journal of Pain*, 4(1), 40-45.
- Rossi, S. (Ed.). (2004). *Australian Medicines Handbook* (5th ed.). Adelaide: AMH.
- Rupp, T., & Delaney, K. A. (2004). Inadequate analgesia in emergency medicine. *Annals of Emergency Medicine [Electronic version]*, 43(4), 494-503.
- Salerno, E. (1995). Race, culture, and medications. Pharmacogenetic variations. *Journal of Emergency Nursing*, 21(6), 560-562.

- Schweitzer, A. (1948). *On the edge of the primeval forest; and more from the primeval forest*. New York: Macmillan.
- Seguin, D. (2004). A nurse initiated pain management advanced triage protocol for ED patients with extremity injury at a level 1 trauma center. *Journal of Emergency Nursing, 30*(4), 330-335.
- Shum, C., Humphreys, A., Wheeler, D., Cochrane, M. A., Skoda, S., & Clement, S. (2000). Nurse management of patients with minor illnesses in general practice: multicentre, randomised controlled trial. *British Medical Journal, 320*(7241), 1038-1043.
- Silka, P. A., Roth, M. M., Moreno, G., Merrill, L., & Geiderman, J. M. (2004). Pain scores improve analgesic administration patterns for trauma patients in the emergency department. *Academic Emergency Medicine, 11*(3), 264-270.
- Singer, A. J., & Thode, H. C. J. (2002). National analgesia prescribing patterns in emergency department patients with burns. *Journal of Burn Care & Rehabilitation, 23*(6), 361-365.
- Smallwood, A., & Chadwick, R. (2000). Nurse-initiated thrombolysis in coronary care. *Nursing Standard, 15*(2), 38-40.
- Smith, H. S. (2003). *Drugs for Pain*. Philadelphia: Hanley and Belfus Inc.
- Spurlock, P. (1999). An emergency nurses pain management initiative: Mercy hospital's experience. *Journal of Emergency Nursing, 25*(5), 383-385.
- Stalnikowicz, R., Mahamid, R., Kaspi, S., & Brezis, M. (2005). Undertreatment of acute pain in the emergency department: a challenge. *International Journal for Quality in Health Care, 17*(2), 173-176.
- Starck, P. L., Sherwood, G. D., & Adams-McNeill, J. (2000). Pain management outcomes: Issues for advanced practice nurses. *The Internet Journal of Advanced Nursing Practice 4*(1), May 20.
- Strinko, J., Howard, C., Schaeffer, S. L., Laughlin, J. A., Berry, M., & Turner, S. (2000). Reducing risk with telephone follow-up of patients who leave against medical advice or fail to complete an ED visit. *Journal of Emergency Nursing, 26*(3), 223-232.
- Suchdev, P. K. (2002). Chapter 2. In C. A. Warfield & H. J. Fausett (Eds.), *Pathophysiology of pain in manual of pain management* (2nd ed.). Philadelphia: Lippincott Williams and Wilkins.
- Tanabe, P. (1995). Recognizing pain as a component of the primary assessment: Adding D for discomfort to the ABCs. *Journal of Emergency Nursing, 21*(4), 299-304.
- Tanabe, P., & Buschmann, M. (1999). A prospective study of ED pain management practices and the patient's perspective. *Journal of Emergency Nursing, 25*(3), 171-177.

- Tanabe, P., & Buschmann, M. (2000). Emergency nurses' knowledge of pain management principles. *Journal of Emergency Nursing, 26*(4), 299-305.
- Tanabe, P., Thomas, R., Paice, J., Spiller, M., & Marcantonio, R. (2001). The effect of standard care, ibuprofen, and music on pain relief and patient satisfaction in adults with musculoskeletal trauma. *Journal of Emergency Nursing, 27*(2), 124-131.
- Tcherny-Lessenot, S., Karwowski-Soulie, F., Lamarche-Vadel, A., Ginsburg, C., Brunet, F., & Vidal-Trecan, G. (2003). Management and relief of pain in an emergency department from the adult patients perspective. *Journal of Pain and Symptom Management, 25*(6), 539-546.
- Teanby, S. (2003). A literature review into pain assessment at triage in accident and emergency departments. *Accident and Emergency Nursing, 11*, 12-17.
- Thompson, D. A., Yarnold, P. R., Adams, S. L., & Spacone, A. B. (1996). How accurate are waiting time perceptions of patients in the emergency department? *Annals of Emergency Medicine, 28*(6), 652-656.
- Todd, K. H. (2000). The influence of ethnicity on emergency department pain management. *Emergency Medicine, 13*(274-278).
- Todd, K. H., Deaton, C., D'Adamo, A., & Goe, L. (2000). Ethnicity and analgesic practice [Electronic Version]. *Annals of Emergency Medicine, 35*(1), 11-16.
- Todd, K. H., Funk, K. G., Funk, J. P., & Bonacci, R. (1996). Clinical significance of reported changes in pain severity. *Annals of Emergency Medicine, 27*(4), 485-489.
- Todd, K. H., Samaroo, N., & Hoffman, J. R. (1993). Ethnicity as a risk factor for inadequate emergency department analgesia. *The Journal of the American Medical Association, 269*, 1537-1539.
- Tye, C. C., & Ross, F. M. (2000). Blurring boundaries: professional perspectives of the emergency nurse practitioner role in a major accident and emergency department. *Journal of Advanced Nursing, 31*(5), 1089-1096.
- Unruh, A., Ritchie, J., & Merskey, H. D. M. (1999). Does gender affect appraisal of pain and pain coping strategies? *Clinical Journal of Pain, 15*(1), 31-40.
- Vassiliades, J., Hitos, K., & Hill, C. T. (2002). Factors influencing prehospital and emergency department analgesia administration to patients with femoral neck fractures. *Emergency Medicine, 14*(3), 261-266.
- Wilmhurst, P., Purchase, A., Webb, C., Jowett, C., & Quinn, T. (2000). Improving door to needle times with nurse initiated thrombolysis. *Heart, 84*, 262-266.
- Wilsey, B., Fishman, S., Rose, J. S., & Papazian, J. (2004). Pain management in the ED. *American Journal of Emergency Medicine, 22*(1), 51-57.

- Wolfe, J., Lien, D., Smithline, H. A., & Lenkoski, K. (2000). Analgesic administration to patients with acute abdomen: a survey of emergency medicine physicians. *American Journal of Emergency Medicine [Electronic Version]*, 18(3), 250-253.
- Wolfe, J. M., Smithline, H. A., Phipen, S., Montano, G., Garb, J. L., & Fiallo, V. (2004). Does morphine change the physical examination in patients with acute appendicitis? *American Journal of Emergency Medicine [Electronic Version]*, 22(4), 280-285.
- Woo, W. W. K., Man, S., Lam, P. K. W., & Rainer, T. H. (2005). Randomized double-blind trial comparing oral paracetamol and oral nonsteroidal antiinflammatory drugs for treating pain after musculoskeletal injury. *Annals of Emergency Medicine [Electronic version]*, 46(4), 352-361.

APPENDICES

APPENDIX A

Australasian Triage Scale

APPENDIX A*Australasian Triage Scale*

ATS code	Time to treatment	Description of Category
1	Immediate	Immediately life-threatening
2	≤ 10 minutes	Imminently life-threatening or humane practice mandates the relief of very severe pain or distress within 10 minutes
3	≤ 30 minutes	Potentially life-threatening or situational urgency or humane practice mandates the relief of severe discomfort or distress within thirty minutes
4	≤ 60 minutes	Potentially serious or situational urgency or significant complexity or severity or humane practice mandates the relief of discomfort or distress within one hour
5	≤ 120 minutes	Less Urgent or Clinico-administrative problems

Adapted from: Australasian College for Emergency Medicine (2000) Guidelines for the Implementation of the Australasian Triage Scale in Emergency Departments. ACEM Policy Document. <http://www.acem.org.au/open/documents/triageguide.htm> Retrieved April 27, 2004.

APPENDIX B

Information sheet

**Nurse initiated pain management in the emergency department setting
Stage 1 Participant information sheet and Consent form**

APPENDIX B**Information sheet****Nurse initiated pain management in the emergency department setting****Stage 1 Participant information sheet**

Investigator: Joanne Wilson

You are invited to take part in a study on pain management by nurses. Please read the information below before deciding whether or not you wish to take part.

What is this study about?

Pain is the main reason people come to the emergency department. This study aims to look at whether treatments started by nurses in the waiting room have any effect on pain. It also will look at how satisfied you are with the treatment for pain that you received in the waiting room. The aim is to find out which treatment is the most effective to help provide the best care for future patients.

Patients which are suitable for this study

For this research study we need people who are 18 years or older and can understand English. You must also have pain because of an injury to your leg or arm.

Patients which are not suitable for this study

You must not be under the influence of alcohol, drugs or have taken paracetamol within the last four hours

What will my participation involve?

If you agree to take part, the research nurse will ask you how much pain you have and ask you to rate it using a pain scoring slide ruler. This pain score will be taken just before the nurse begins treatment for your injury. Your treatment will involve resting and elevating your injured leg or arm. The nurse will also apply ice and may put a bandage on the injured area of your leg or arm. After 45 minutes the nurse will come back and see what your pain score is. The nurse will ask you questions about your pain, your time in the waiting room and your background (eg. age and occupation). The research nurse will need to look at your medical record to see when you first received painkillers from the doctor and when you were discharged from the emergency department.

What will happen to the information gathered?

All of the data is collected on a separate sheet kept by the research nurse. Information related to your ongoing care at the hospital will also be recorded in your patient notes.

The information collected will be analysed to work out whether the treatments you received in the waiting room were effective.

How will my privacy be protected?

All of the data collected for research purposes will be kept strictly confidential. Your name will not be on any of the data collection sheets. The data sheets will be coded with a number instead. All data related to this research study will be kept in a locked filing cabinet in a research office at Edith Cowan University (School of Nursing and Public Health) for a period of five years after publication of the results before being destroyed. Only research personnel involved in this study will have access to this data.

What if I decide not to participate?

Your involvement in this study is completely voluntary. If you decide not to participate, we respect your decision. If you change your mind about participating during the study you are free to withdraw, simply by letting the research nurse know when she comes to see you next. Deciding not to take part in this study will not affect your care in any way and you will progress through the emergency department like other patients.

What are the benefits of participating? Are there any risks?

By taking part in this study you will be helping us to find out what is the best treatment nurses can give to people who come to the emergency department with injuries and pain like yours. There are no obvious risks in taking part. In the event that you suffer an adverse event or a medical accident during this study that arises from your participation in the study, you will be offered all full and necessary treatment by Royal Perth Hospital. The Nursing Research Committee has approved this study on the basis (amongst others) that the reported risk of such an event is either small or acceptable in terms of the risk you face as a result of your current illness or the benefit that is possible with the new treatment being tested. No provisions have been made in this trial to offer trial subjects who suffer an adverse reaction monetary compensation, but the absence of such a provision does not remove your rights to seek compensation under common law.

Who can I contact if I have questions about the study?

I would be pleased to answer any questions you have about this study and can be contacted on 0418932787. If you would like to talk to my supervisor Associate Professor Sue Nikoletti Phone: 92738182. If you have concerns about the study and would like to talk to an independent person you can contact the Head of School, Edith Cowan University, Associate Professor Kate White Phone: 92738024.

Who has given permission for this study to proceed?

The ethics committee at Edith Cowan University has approved this study. It is being conducted as part of my studies towards a Master of Nursing by Research.

Thankyou for taking the time to read this information sheet

ECU & RPH logo

Consent form**Nurse initiated pain management in the emergency department setting****Stage one****Consent form**

I _____ (please print name) have read the information sheet for the above named study.

- ◆ Any questions I have, had been answered to my satisfaction.
- ◆ I understand that if I have any concerns or further questions I may contact the research nurse listed on the information sheet given to me.
- ◆ If I agree to take part in this study, I realise that I may withdraw at any time without affecting my current and future access to health services.
- ◆ I understand that by participating in this study my rights to compensation under statute or common law will not be affected.
- ◆ I agree that research data gathered for this study may be published provided my name or other identifying information is not used.

 Your signature

Date

 Investigator signature

Date

If you have any concerns about the ethical conduct of the research nurse or the research study please contact Associate Professor Kate White (92738024)

APPENDIX C

Information sheet

**Nurse initiated pain management in the emergency department setting
Stage 2 Participant information sheet and Consent form**

APPENDIX C**Information sheet****Nurse initiated pain management in the emergency department setting
Stage 2 Participant information sheet**

Investigator: Joanne Wilson

You are invited to take part in a study on pain management by nurses. Please read the information below before deciding whether or not you wish to take part.

What is this study about?

Pain is the main reason people come to the emergency department. This study aims to look at whether treatments started by nurses in the waiting room have any effect on pain. It also will look at how satisfied you are with the treatment for pain that you received in the waiting room. The aim is to find out which treatment is the most effective to help provide the best care for future patients.

Patients which are suitable for this study

For this research study we need people who are 18 years or older and can understand English. You must also have pain because of an injury to your leg or arm.

Patients which are not suitable for this study

You must not be under the influence of alcohol, drugs or have taken paracetamol within the last four hours. If you have taken other painkillers it is important to let the research nurse know.

What will my participation involve?

If you agree to take part, the research nurse will ask you how much pain you have and ask you to rate it using a pain scoring slide ruler. This pain score will be taken just before the nurse begins treatment for your injury. Your treatment will involve resting and elevating your injured leg or arm. The nurse will also apply ice and may put a bandage on the injured area of your leg or arm. The nurse will also give you some paracetamol (two tablets) for your pain. After 45 minutes the nurse will come back and see what your pain score is. The nurse will ask you questions about your pain, your time in the waiting room and your background (eg. age and occupation). The research nurse

will need to look at your medical record to see when you were discharged from the emergency department.

What will happen to the information gathered?

All of the data is collected on a separate sheet kept by the research nurse. Information related to your ongoing care at the hospital will also be recorded in your patient notes. The information collected will be analysed to work out whether the treatment you received in the waiting room were effective.

How will my privacy be protected?

All of the data collected for research purposes will be kept strictly confidential. Your name will not be on any of the data collection sheets. The data sheets will be coded with a number instead. All data related to this research study will be kept in a locked filing cabinet in a research office at Edith Cowan University (School of Nursing and Public Health) for a period of five years after publication of the results before being destroyed. Only research personnel involved in this study will have access to this data.

What if I decide not to participate?

Your involvement in this study is completely voluntary. If you decide not to participate, we respect your decision. If you change your mind about participating during the study you are free to withdraw, simply by letting the research nurse know when she comes to see you next. Deciding not to take part in this study will not affect your care in any way and you will progress through the emergency department like other patients.

What are the benefits of participating? Are there any risks involved?

By taking part in this study you will be helping us to find out what is the best possible treatment nurses can give to people who come to the emergency department with injuries and pain like yours. Paracetamol is a mild analgesic and has proven useful in the treatment of pain in other hospital settings. Reactions to this drug are very rare. Adverse effects include drowsiness, skin rash and nausea. Extremely rare effects are anaemia, kidney and liver problems. These problems tend to only occur in high doses of paracetamol. It is very important that you tell the research nurse if you have had a reaction to paracetamol before or if you have had paracetamol within the last four hours. In the event that you suffer an adverse event or a medical accident during this study that arises from your participation in the study, you will be offered all full and necessary treatment by Royal Perth Hospital. The Ethics Committee has approved this study on the basis (amongst others) that the reported risk of such an event

is either small or acceptable in terms of the risk you face as a result of your current illness or the benefit that is possible with the new treatment being tested. No provisions have been made in this trial to offer trial subjects who suffer an adverse reaction monetary compensation, but the absence of such a provision does not remove your rights to seek compensation under common law.

Who can I contact if I have questions about the study?

I would be pleased to answer any questions you have about this study and can be contacted on 0418932787. If you would like to talk to my supervisor Associate Professor Sue Nikoletti Phone: 92738182. If you have concerns about the study and would like to talk to an independent person you can contact the Head of School, Edith Cowan University, Associate Professor Kate White Phone: 92738024.

Who has given permission for this study to proceed?

The ethics committee at Edith Cowan University has approved this study. It is being conducted as part of my studies towards a Master of Nursing by Research.

Thankyou for taking the time to read this information sheet

Consent form

Nurse initiated pain management in the emergency department setting

Stage two

Consent form

I _____ (please print name) have read the information sheet for the above named study.

- ◆ Any questions I have had been answered to my satisfaction.
- ◆ I understand that if I have any concerns or further questions I may contact the research nurse listed on the information sheet given to me.
- ◆ I understand that paracetamol is a mild analgesic. Reactions to this drug are very rare. Adverse effects include drowsiness, skin rash and nausea. Extremely rare effects are haemolytic anaemia, kidney and liver problems.
- ◆ If I agree to take part in this study, I realise that I may withdraw at any time without affecting my current and future access to health services.
- ◆ I understand that by participating in this study my rights to compensation under statute or common law will not be affected.
- ◆ I agree that research data gathered for this study may be published provided my name or other identifying information is not used.

Your signature

Date

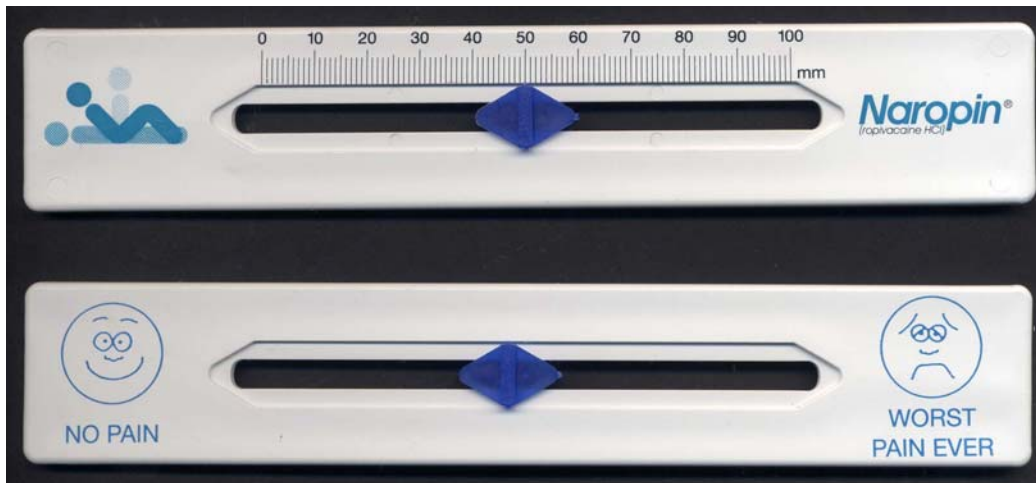
Investigator signature

Date

If you have any concerns about the ethical conduct of the research nurse or the research study please contact Associate Professor Kate White (92738024).

APPENDIX D

Visual Analogue Scale Tool

APPENDIX D**Visual analogue scale**

Donated by AstraZeneca representative Kim Stephens.

APPENDIX E

Data Collection Sheet

Data Collection Sheet

Nurse initiated pain management in the emergency department setting: effect of early intervention on patients with pain from low acuity injury

Treatment No _____

Date _____

Age	Gender 1. Male 2. Female
Cultural Background	Country of Birth
Triage Time _____ Injury Time _____	Triage Score 1 2 3 4 5
Cause of Injury 1. Sport 2. Work related 3. Home 4. Other	Affected Limb 1. LUA 5. RUA 2. LLA 6. RLA 3. LUL 7. RUL 4. LLL 8. RLL
Treatment prior to presentation 1. Nil 2. Rest 3. Ice 4. Compression 5. Elevation	Assistance with First Aid for Injury 1. Nil 2. SJA 3. Volunteer First Aid 4. Self Administered First Aid 5. Bystander First Aid Other _____
Family 1. Yes 2. No If yes how many? _____ Relationship to pt? _____	Friends 1. Yes 2. No If yes how many? _____

<p>Analgesia other than paracetamol.</p> <ol style="list-style-type: none"> 1. Methoxyflourothane 2. NSAID 3. Aspirin 4. Other <hr/> <hr/>	<p>Other Distractions</p> <ol style="list-style-type: none"> 1. Television 2. Full waiting room 3. Empty waiting room 4. Perceived violent incident 5. Other <hr/> <hr/>
--	---

Presentation VAS 0-100mm	Treatment VAS 0-100mm	45 Min VAS 0-100mm	Verbal Categorical Rating (45 min)	Satisfaction Score @ WRE 2/24
			<ol style="list-style-type: none"> 1. a lot better 2. a little better 3. much the same 4. a little worse 5. much worse 	<p>WRE Time out</p> <hr/> <p>2/24</p> <p>Score 0-10</p>

Did the stage one participants receive analgesia?

1. Yes
2. No

If yes what was the time to analgesia for stage one participants?

Diagnosis _____

Time in waiting room (minutes) _____

Destination

1. Home
2. Admitted to Hospital
3. Did not wait for further treatment.

APPENDIX F

Participant Characteristics

Table 12. *Participant Characteristics*

Variable	SC Group	SCP Group	Significance
Age (M, SD)	34(15.43)	31(14.43)	NS
Gender			NS
n(%)Male	25(62.5)	15(37.5)	
n(%)Female	25(62.5)	15(37.5)	
Cultural Background			NT
Caucasian	36 (90)	35(87.5)	
Asian	3 (7.5)	2(5.0)	
Aboriginal/Torres Strait Islander	0(0)	2(5.0)	
African	1(2.5)	1(2.5)	
Australasian Triage Score			p=.012
ATS Four	40(100)	33(82.5)	
ATS Five	0 (0)	7(17.5)	
Cause of Injury			NT
Fall	23(57.5)	21(52.5)	
Sport	6(15)	14(35)	
Work related	3(7.5)	2(5)	
Domestic Incident	3(7.5)	3(7.5)	
Other	5(12.5)	0 (0)	
Location of Injury			NS
Ankle/Foot	22(55)	15(37.5)	
Wrist/Hand	5(12.5)	13(32.5)	
Knee	4(10)	7(17.5)	
Shoulder	4(10)	4(10)	
Elbow	5(12.5)	1(2.5)	
Treatment Prior to Presentation			NT
Ice	19(47.5)	16(40)	
Compression	6(15)	1(2.5)	
Rest	2(5)	3(7.5)	
Elevation	0 (0)	1(2.5)	
Voltaren Gel/ Lasonil	0 (0)	2(5)	
Nil	13(32.5)	17(42.5)	
Analgesia other than Paracetamol			NT
Nonsteroidal anti-inflammatory drug	3(7.5)	4(10)	
Aspirin	1(2.5)	1(2.5)	
Herbal Remedy	1(2.5)	0 (0)	
Family Present	6(15)	8(20)	NS
Friend Present	8(20)	9(22.5)	NS
Waiting Room Characteristics and Distractions			NT
Full Waiting Room	27(67.5)	27(67.5)	
Empty Waiting Room	13(32.5)	13(32.5)	
Time from Injury to ED Presentation (M, SD, Mdn)	785.20 (1162.55) 228.00	825.08 (845.93) 696.50	NS
Waiting Times (M, SD, Mdn)	105.38 (50.35) 98.00	131.73 (83.11) 111.00	NS
Patient Destination			NT
Admission	3(7.5)	2(5)	
Discharge to Community	33(82.5)	35(87.5)	
After Hours GP service	3(7.5)	1(2.5)	
Specialist Outpatient Clinic	1(2.5)	0(0)	
Did not wait for treatment	0(0)	2(5)	
Diagnosis			NT
Soft Tissue Injury	20(50)	22(55)	
Fracture	15(37.5)	10(25)	
Dislocation	0(0)	1(2.5)	
Insect Bite	1(2.5)	0(0)	

NS = Not significant

NT = Not tested. Meaningful analysis could not be undertaken due to low frequencies in subgroups.

