FACTORS AFFECTING PARAMEDICS' ASSESSMENT AND JUDGEMENT ABOUT PAIN EXPERIENCED BY PATIENTS IN A COMMUNITY BASED HEALTH SETTING

William Lord
BHlthSc(Pre-HospCare), Grad.Dip.CBL, MEd

A thesis submitted in fulfilment
of the requirement of the
Doctor of Philosophy

Monash University
Victoria, Australia

17 December, 2010

Copyright notices

ERRATA

p 52 para 1, 6th line: “principal” replaces “principle”.

ADDENDUM

p 14 para 4: The heading “Research Questions” should be replaced with “Research Aims and Objectives”. This change should also be reflected in the Table of Contents (p ii).

p 16 para 2: Insert: “The research questions underpinning the quantitative research presented in Chapter 4 are listed on pages 70 and 71. Research questions underpinning the qualitative study of paramedics’ attitudes and beliefs are listed on page 141.”

p 143 para 2: Insert: The first line under the heading “Study Design and Rationale” - “The research used a purposive sample of paramedics and student paramedics attending different courses of study at Monash University stratified by level of clinical experience as detailed on page 149.”

p 149 para 1: Comment: The use of homogenous groups was a function of purposive sampling to stratify focus groups by clinical experience. This was achieved by recruiting students attending different levels of on-campus clinical education to compare the participants’ attitudes and beliefs by level of clinical experience. The results of this analysis are presented in Chapter 5.

p 149 para 1: Comment: Focus group participants were stratified to identify differences in attitudes and beliefs that may be associated with clinical experience. The comparative analysis was presented in the form of descriptive differences (Chapter 5). Further analysis was limited by Group 1.1 and 1.2 participants’ lack of experience in caring for patients with pain.

p 152 para 4: Comment: Opening questions were developed by the author and used by the facilitator to initiate focus group discussions. These were similar for the initial round of focus groups and are outlined on page 152. Subsequent questions within each focus group, were informed by the prior quantitative study but were more determined by the participants’ response to the opening question, with questions shaped by the issues and ideas that emerged from the focus group discussions. Analysis of the initial focus group transcripts guided the development of new open-ended questions that were put to subsequent groups to clarify issues previously raised at related stratified levels. Additional focus groups were conducted until saturation of themes was reached at each clinical level. This general open-ended question and subsequent questions enabled a detailed exploration of the participants’ experience. As such, the focus group questions did not follow a predetermined format, which may have constrained the direction and content of the discussions.

p 156 para 2: Comment: Analysis of the transcripts was undertaken line-by-line, with concepts coded as they were identified “in vivo”, so that the word or phrase became the node. Subsequent analysis identified relationships between nodes and higher order themes that were developed by the author. For example, the term “drug seeking” was identified in several of the focus group transcripts. Memos made at the time of the coding served to identify the context in which the references occurred, and included an initial analysis of meaning of the coded reference. The memos enabled the establishment of relationships between the nodes, so that “drug seeking” was identified as an explanation for pain-related behaviour. Subsequent analysis led to the theory that the patient’s behaviour was associated with the paramedic’s willingness to believe the patient’s report of pain. Further analysis resulted in the development of other higher-order categories and the development of a theory that attempts to explain how paramedics behave in the presence of patients reporting pain. The factors affecting actions are presented as a theory of paramedic clinical decision making in cases involving pain, which is illustrated on p 290.

p 159 Figure 5.1: Comment: The figure “Themes associated with the central construct of dealing with pain” shows NVivo nodes and relationships between the nodes that were determined by the author following analysis of the focus group transcripts. “Tree nodes” were established when a central theme was associated with several related nodes. The relationships between the nodes were also developed by the author as the analysis progressed.

Table of Contents

Appendices

Abstract

Objective: This study aims to locate, analyse and understand data relating to the management of pain by paramedics in a community emergency health setting in Australia, and to compare this with contemporary standards of care. An analysis of patient care records was performed to gain evidence of the incidence of pain in cases attended by paramedics and current practice regarding the paramedic management of pain. Focus groups involving paramedics were subsequently convened to understand factors affecting pain management. Analysis of focus group transcripts was undertaken to identify paramedics' attitudes and beliefs relating to their role in pain assessment and pain management.

Methods: This retrospective cohort study of patient care records included all adult patients with a Glasgow Coma Score (GCS) >12 transported to hospital by ambulance in a major metropolitan area over a seven-day period in 2005. Data collected included demographics, patient report of pain and its type and severity, provision of analgesia by paramedics and type of analgesia provided. The outcomes of interest were gender differences in the provision of analgesia. Data analysis was by descriptive statistics, χ^2 test and logistic regression. A qualitative study was also undertaken to identify paramedics' and student paramedics' beliefs, attitudes and experiences regarding pain and the assessment and management of patients reporting pain. Data was obtained through the involvement of paramedics and student paramedics in focus groups that discussed the concept of pain and paramedic pain management practice. Grounded Theory methodology was used to enable the development of theories that account for variables that influence paramedics' clinical judgements in cases involving a patient reporting pain.

Results: Of the 3357 patients transported by paramedics 1766 (52.6%) had pain. The mean initial pain score using a 0-10 numeric pain scale was 5.5. The proportion of patients with pain that did not receive analgesia was 44.8% (n=791). Logistic regression analysis found that patients with cardiac pain were more likely to receive analgesia than those with trauma related pain (OR 4.14; 95% confidence interval [CI], 2.37 to 7.23; $P < 0.001$), after adjusting for age, gender, initial pain score, cause of pain and duration of pain. Patients with duration of pain >24 hours and <1 week were less likely to receive analgesia than patients with pain duration <6 hours (OR

0.60; 95% CI, 0.38 to 0.94; P = 0.026). Gender was a predictor of the type of analgesia administered, with males more likely to receive morphine (17%, 95% CI 15-20%) than females (13%, 95% CI 11-15%); p = 0.01. The difference remains significant when controlled for type of pain, age and pain severity (OR 0.61, 95% CI 0.44-0.84). Focus group analysis found a complex matrix of themes, with a dominant theme relating to paramedics' willingness to believe the patient's report of pain, particularly where the patient's behaviour was inconsistent with the paramedic's expectations of pain-related behaviour. The patient's motives in reporting pain were found to influence paramedics' clinical judgements. A connected theme involved paramedics' uncertainties about the validity and reliability of pain measurement tools.

Conclusion: Duration of pain and cause of pain are associated with significant differences in rates of paramedic-initiated analgesia. Consideration should be given to educating paramedics to identify subgroups of patients who might otherwise not receive adequate analgesia, and to recognise the effect that personal beliefs and attitudes have on clinical reasoning and decision making. However, organisational factors have a significant effect on paramedic practice and organisations employing paramedics have an obligation to identify barriers to effective pain management and develop strategies that enable paramedics to make unbiased judgements about care for patients reporting pain.

General Declaration

In accordance with Monash University Doctorate Regulation 17/ Doctor of Philosophy and Master of Philosophy (MPhil) regulations the following declarations are made:

I hereby declare that this thesis contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and that, to the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

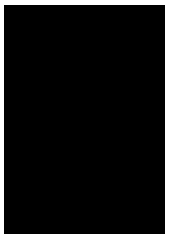
This thesis includes five (5) original papers published in peer reviewed journals that are based on the research comprising this thesis. I was the sole author of two of these papers (Appendices D and H). The core theme of the thesis is pain management in the Australian paramedic practice setting. The ideas, development and writing up of all the papers in the thesis were the principal responsibility of myself, the candidate, working within the Department of Community Emergency Health and Paramedic Practice under the supervision of Professor Frank Archer.

The inclusion of co-authors reflects the fact that the work came from active collaboration between researchers and acknowledges input into team-based research.

In the case of Appendices D, E, F, G and H my contribution to the work involved the following:

Thesis Appendix	Publication title	Publication status	Nature and extent of candidate's contribution
D	The paramedic's role in pain management	Published	Sole author responsible for 100% of concept development, data review and analysis, manuscript compilation.
E	The impact of patient sex on paramedic pain management in the prehospital setting	Published	70% - Concept development, data review and analysis, manuscript compilation

Thesis Appendix	Publication title	Publication status	Nature and extent of candidate's contribution
F	Ambulance call triage outcomes for patients reporting pain: a retrospective cross sectional analysis of pain score versus triage level	Published	80% - Concept development, data review and analysis, manuscript compilation
G	The reliability of vital signs in estimating pain severity among adult patients treated by paramedics	Published	80% - Concept development, data review and analysis, manuscript compilation.
H	Paramedic assessment of pain in the cognitively impaired adult patient.	Published	Sole author responsible for 100% of concept development, data review and analysis, manuscript compilation.

Signed: 

Date: 30 November 2010

Tables

Figures

Glossary of Terms

ALS	Advanced Life Support
AMPDS	Advanced Medical Priority Dispatch System
ASNSW	Ambulance Service of New South Wales
ARS	Adjective Response Scale
AV	Ambulance Victoria
BLS	Basic Life Support
CAA	Council of Ambulance Authorities
CI	Clinical Instructor
CPG	Clinical Practice Guideline
ED	Emergency Department
EMS	Emergency Medical Service
EMSOP	Emergency Medical Services Outcome Project
IM	Intramuscular (injection)
IV	Intravascular (injection)
JCAHO	Joint Commission on Accreditation of Healthcare Organizations
MAS	Metropolitan Ambulance Service
MICA	Mobile Intensive Care Ambulance
MCSD	Minimum Clinically Significant Difference (in pain score)
NICS	National Institute of Clinical Studies
NOF	Neck of femur (fracture)
NICS	National Institute of Clinical Studies
PCR	Patient Care Record
RAV	Rural Ambulance Victoria
VAS	Visual Analogue Scale
VNRS	Verbal Numerical Rating Scale

Acknowledgments

I would like to acknowledge the assistance provided by Ambulance Victoria in facilitating access to data and research participants, and to Daria West and Daniel Cudini who assisted with data transcription.

I also acknowledge the support and advice provided by my supervisors, Professor Frank Archer, Professor Paul Komesaroff and Professor Anne-Marie Kelly.

The feedback provided by colleagues was also invaluable. In particular Mal Boyle and Amee Morgans offered to read drafts and provide feedback.

Finally, I acknowledge the support and tolerance of my wife Judith and daughters Breanna and Emma for putting up with my frequent physical and mental absences during this long journey.

Chapter 1: Study Background

Introduction

An ability to recognise and respond to threats to an individual's health and wellbeing is a biological imperative for survival. As a universal human experience, pain is a noxious sensation that signals tissue damage, thus enabling the individual to take action to avoid further injury. The ability to recognise pain in others through the interpretation of vocalisations, body posture and other behaviour cues is also an important evolutionary adaptation that may signal threats to self and enable beneficent behaviour to protect others from threats.

Although pain may be seen as a threat to self and an experience to be avoided, pain also has positive connotations when the ability to bear pain is seen as a positive trait. This is evidenced through axioms such as "no pain, no gain", which are sometimes associated with human endurance and performance in sport. An associated concept is "breaking through the pain barrier", which suggests that pain in sport is inevitable, and that achievement of excellence in physical performance requires the ability to transcend pain. Although the origin of these terms is unknown, this concept has been linked to beliefs that pain is a prerequisite to excellence in performance. Pain in this context may be seen as an important attribute that may possess character building properties. Indeed, elite athletes may believe pain to be an inevitable accessory of high performance rather than an indicatory of injury,[1] and consider submission to pain a form of personal weakness. Pain is also seen as a positive spiritual experience among individuals who believe that ritualised infliction of pain on self achieves a greater identification with their God.[2]

With the exception of a few individuals who are unable to perceive pain due to a congenital insensitivity to pain, virtually every person will experience pain at points across their lifespan. Some of this pain will be as a result of minor injuries and will resolve without the need for interventions as the injured tissue heals. Other episodes may involve severe or unremitting pain that causes the individual to seek medical help to find the cause and to alleviate the pain. In health settings, the relief of an individual's pain is generally seen as an integral part of a clinician's overall role in healing and maintaining health. The obligation to help those in pain and to prevent

harm is embodied in the ethical principles of beneficence and non-maleficence, with these principles guiding the practice of all health professionals. In this context the alleviation of pain can be considered a humanitarian imperative.

Health care professionals will encounter individuals who may report pain as their chief complaint, some of whom will live with pain on a daily basis. In other cases the sensation of pain will be a component of a constellation of symptoms, and a report of pain will be an important diagnostic cue that guides the clinical examination. Patients who seek medical care may understandably expect relief from pain, with a study of patients presenting to an emergency department finding a majority expected relief from their pain, with a significant proportion expecting complete relief.[3] Regardless of the health care setting, pain is inevitably encountered by those providing care, and for paramedics providing care for individuals in the community an encounter with a patient reporting pain will be a common event. However, little is known about the epidemiology of pain in populations cared for by paramedics, and the evidence relating to paramedic pain management practice is also limited.

As the highest level of evidence should be used to inform health care – including the care provided by paramedics – this study aims to locate, analyse and understand data relating to pain management in this setting. This will involve a retrospective analysis of de-identified patient care records, with the aim of describing the incidence and nature of pain as well as the paramedics' management of pain. Once this data has been analysed and described, trends can be explored and compared with extant data from similar health domains such as emergency medicine and nursing. This will inform the design of the second stage of this research, which involves a qualitative study of paramedics' perceptions and beliefs about pain in patients they care for.

This introduction provides an overview of this research through a discussion of the rationale for the study of pain in the paramedic practice setting and the paramedics' beliefs and attitudes associated with pain. The study aims and objectives and the methods used to undertake this study are described. The following chapter (Chapter 2) expands the rationale for the study through a literature review that encompasses pain management practice in medicine and nursing, with specific emphasis on the evidence relating to the factors affecting pain management practice and the influence that these factors may play in the paramedic practice setting.

The Role of the Paramedic in Managing and Preventing Pain

In this thesis the term "paramedic" is used to describe a person who provides unscheduled care for individuals suffering injury or illness in a community setting. This setting is also described in the literature as the 'prehospital setting', which infers that paramedic care of individuals inevitably results in transfer to hospital. As paramedic care may not always involve transfer to a hospital the term 'prehospital' has become an inaccurate descriptor, particularly as the role of paramedics continues to evolve to encompass broader responsibilities. Paramedics may also be known as ambulance officers, though this title is now less common in Australia due to initiatives by the profession for the job title to focus on the nature of the care provided, rather than a mode of transport (ambulance). Paramedics are defined by the professional association representing paramedics in Australia as "a health care professional providing medical assessment, treatment and care in the out of hospital environment."[4] This rather imprecise definition is partly a function of significant differences in the scope of paramedic practice in Australia and other countries that share similar health systems. For example, there is considerable interest in redesigning the role of the paramedic in the United Kingdom in order to better meet health care needs of the community. This includes the development of an extended scope of practice that would enable paramedics to provide care for some patients in the community rather than simply transport patients to hospital emergency departments for medical consultation, which has previously been the norm.[5]

Paramedics are primarily employed by Emergency Medical Services (EMS). In Australia, EMS are also known as ambulance services, and in each state one EMS agency is responsible for responding to calls to the emergency telephone number (in Australia the number is 000) to provide emergency care and transport of the sick and injured. These agencies are typically statutory providers within the State government infrastructure, but also include charitable organisations such as St John who are currently contracted by government to provide the EMS in the Northern Territory and Western Australia.

In 2007/08 Australian EMS attended 2.88 million incidents, with two thirds of the caseload classified as emergency or urgent incidents. During this period there were 12,344 full time equivalent salaried staff employed by member organisations of the

peak employer body – the Council of Ambulance Authorities (CAA), representing statutory and other providers of ambulance services of Australia and New Zealand – with approximately 82% of staff employed in an operational role.[6] Although volunteers are used to provide emergency care in some jurisdictions – particularly in a basic care or "first responder" role – this thesis will restrict discussion to full time professional staff employed by EMS to provide health care and emergency medical care to patients in the community.

Paramedics have an important role in relieving pain and suffering experienced by patients in the community. Although this role is explained in more detail in the following chapter, it is important to provide a summary at this point in order to explain the rationale and scope of this study. In a critical review of the evidence underpinning paramedic practice, Callaham writes that reassuring and comforting patients by relieving pain and distress should be a primary goal of paramedics and EMS.[7] However, reassurance alone may provide insufficient relief for some cases of pain. Prior to the introduction of pharmacotherapeutic agents to relieve or minimise pain, the management of pain in patients who were injured relied on techniques such as splinting broken bones so that the immobilised limb was less likely to move and exacerbate tissue injury resulting in further pain. Drugs that had pain-relieving or analgesic effects were first introduced by Australian EMS in the mid 1950s, initially in the form of trichloroethylene, a chlorinated hydrocarbon. The vapour was inhaled by the patient where it acted as an analgesic, and as an anaesthetic in higher concentrations. Morphine, a naturally occurring compound that has an extensive history of use for relieving pain since its identification as an active opium alkaloid in 1806,[8] was introduced to paramedic practice in the Australian states of Victoria and New South Wales in the 1980s, but at that time, only the most highly qualified paramedics were authorised to administer the drug to patients with pain, mainly due to concerns regarding the safety profile of the drug. Authority to administer morphine was extended to all paramedics in the state of Victoria following the introduction of Advanced Life Support (ALS) training in 2000, which was established as the base level qualification for all paramedics in Victoria. Authority to possess and administer morphine is typically controlled by state legislation,[9] with the indication for paramedic administration prescribed by treatment protocols or clinical practice guidelines developed by respective state EMS.[10]

Although patients in Victoria treated by paramedics could now receive a drug that is considered the "gold standard" against which other analgesics are measured, information regarding the proportion of patients who require paramedic management of pain is not readily available. Furthermore, there is limited data relating to the efficacy of paramedic-initiated pain management interventions. In 2007/08 the Council of Ambulance Authorities reported that 2,373,000 patients were transported by ambulance.[6] However, the number of patients reporting pain, and the effectiveness of paramedic-initiated pain management strategies is not known. In contrast, a large body of research relating to pain management in emergency medicine and nursing is available, and the outcomes of studies from these disciplines that have relevance to paramedic practice are reported in the following chapter. This evidence shows that, despite significant advances in knowledge about pain and about therapeutic agents to manage pain, inadequate management is a significant challenge that leads to unnecessary suffering.

The literature review (Chapter 2) includes an analysis of strategies that have been recommended to address theory-practice gaps in pain management in several health disciplines. These strategies include education of health professionals and the development of institutional policies that address pain assessment and management. However, due to increasing evidence that pain continues to be poorly managed in some health settings, attempts have been made to change practice through accreditation processes where a licence to provide a health service is contingent on the agency meeting a range of agreed standards – including standards relating to pain management. However, no such accreditation systems apply to Australian EMS, which generally have state-based monopolies over the provision of emergency ambulance services as either government agencies or quasi-autonomous non-government organisations.

As an example of health agency accreditation involving the establishment of pain management standards, the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) – the agency responsible for evaluation and accreditation of health care organisations and programs in the United States – has responded to the evidence of inadequate analgesia by publishing pain management standards that affirm that every patient has a right to have his or her pain assessed and treated.[11] While the achievement of these standards of care are a prerequisite for the

accreditation of health care facilities in the US, there is criticism regarding the effect these standards have had on pain management practice.[12] In addition, the Joint Commission has no authority over EMS in the US, as legislative responsibility for the ambulance sector rests with the US National Highway Traffic Safety Administration. Notwithstanding the lack of regulation of standards of care in the US EMS setting, the National Association of EMS Physicians Standards and Clinical Practices Committee has developed a position paper that recommends that pain is assessed and documented in all patients treated and transported by paramedics.[13] However, these standards are not mandated by any central accreditation process, and there is currently no published data describing clinical performance benchmarks for paramedic pain management in the US.

In Australia, the CAA has identified quality of pain relief as a surrogate measure of compassion and caring, and has recently recommended that EMS develop and adopt clinical performance indicators that include reduction in pain.[14] However, this is not a binding recommendation and national data relating to the adoption of pain management performance indicators by Australian EMS is not currently available in the public domain.

The Metropolitan Ambulance Service (MAS) in Melbourne (currently Ambulance Victoria (AV) following a merger with Rural Ambulance Victoria (RAV) in 2008 but known as MAS when this research commenced) is one of the only Australian ambulance services to have publically reported pain management data based on defined performance benchmarks for the reduction of cardiac and trauma related pain. In 2005–2006, MAS reported in the organisation's annual report that paramedics had achieved a mean decrease of cardiac pain of 3.6 points on a 1-10 scale, and a reduction of traumatic pain by 2.8 points.[15] These exceeded the benchmark reduction of a mean of at least 2.5 points for both cardiac and traumatic pain in a performance management agreement between the State Government and MAS.[16] It should be noted that the reporting of a mean reduction of pain score is not synonymous with pain relief, as a patient with an initial complaint with severe pain scored as 10 may still report moderate to severe pain after a three point reduction. This illustrates a limitation in reporting pain management outcomes as a mean pain score.

The following year MAS reported that the benchmark reduction of pain score in cardiac cases, but that a new benchmark of a 3-point reduction in pain score for traumatic pain had not been met. The mean reduction in pain was reported to be 2.9.[17] In the 2007-08 annual report clinical performance in the area of pain reduction was not reported.[18] While this evidence represents a significant attempt to highlight pain relief as an important clinical outcome of paramedic care, at the commencement of this study (2003) a literature search (described in Chapter 2) failed to locate evidence describing the frequency or nature of pain among patients treated by paramedics, or evidence of the efficacy of pain management practice within other Australian EMS.

Pain Relief as a Clinical Imperative

Pain may be considered an innocuous diagnostic marker of injury or disease that will resolve once the underlying pathology is treated. However, this way of thinking ignores increasing evidence that prolonged pain is associated with physiological changes that are associated with significant morbidity. It is known that acute pain may progress to chronic pain,[19]and that chronic pain has psychosocial and economic consequences due to impaired mobility, loss of productivity and depression.[20] It is estimated that pain is the third most costly health problem in Australia with an annual cost to the community estimated to be $34 billion.[21] This has led to a recommendation by the National Pain Strategy – representing health professionals, consumers and funding agencies – to establish the recognition and management of pain as a national health priority.[22]

Inadequate pain management during hospitalisation has been linked to increased odds of chronic pain,[23] and there is evidence that poor post-surgical pain management is associated with impaired immune response the promotion of tumour growth through inhibition of natural killer (NK) cell activity.[24] While this evidence exists for post surgical pain, there is limited evidence reviewing the consequences of poor management of acute pain that may eventually resolve without intervention. There is however, increasing evidence that poorly controlled acute pain may lead to changes in pain tolerance and predispose some patients to chronic pain syndromes. One study that shows an association between acute pain and subsequent hypersensitivity to later episodes of procedural pain involves a study of infant males

(n=87) circumcised with or without analgesia, and their pain response to vaccination at the four and six month points post circumcision showed that the no analgesia group had significantly higher behavioural pain responses.[25] Other evidence that high levels of pain from injury early in life is associated with hypersensitivity to pain in later life comes from a study of children (aged 9-16 years) who had suffered moderate to severe burn injury during infancy (6-24 months). The authors found alterations in thermal pain sensitivity in the severely burned children and conclude that early pain from trauma "can induce global, long-term alterations in sensory and pain processing."[26]

Despite the rapid increase in knowledge of the physiology of pain and of the means of relieving pain that has occurred over the last few decades, it took a 1973 study by Marks and Sachar – now frequently cited as a seminal work – to highlight a high incidence of poorly controlled pain in medical and surgical cases in a hospital setting. [27] Marks and Sachar were psychiatrists frequently called to investigate cases of suspected "drug seeking" or other forms of aberrant behaviour in hospitalised patients reporting pain. Instead of confirming a diagnosis of drug addiction, the authors found that patients were seeking analgesics to control pain that was unrelieved by conservative and often sub therapeutic doses of analgesics or inadequate dosing regimes. The observed reluctance by medical and nursing staff to prescribe or administer analgesics was influenced by concerns about the patient's motives for seeking analgesics, and by unrealistic beliefs that opioids prescribed for pain lead to drug addiction. Other reasons for the reluctance to use clinically effective doses of opioids arose from poor knowledge of therapeutic dose, incidence of side effects and duration of effect, as well as peer criticism of practice.

The evidence that pain is often inadequately managed has subsequently been confirmed by numerous studies since the work of Marks and Sachar was published. In 1989 Wilson and Pendleton revealed low rates of analgesia for patients presenting with pain at an Emergency Department (ED). Of those patients who did receive analgesia in the ED, 69% waited more than 1 hour following arrival at the ED.[28] In 2006, a multi-centre study of ED pain management in the US found little improvement since 1989, with only 61% of patients with pain administered analgesia in the ED, and a median wait for those who did receive analgesia of 90 minutes. The authors conclude that "much remains to be done in this area".[29] An audit of pain

management in Australian emergency departments published in 2008 also found a low incidence of analgesia in specific medical and traumatic conditions, and a median wait time of 62 minutes to analgesia.[30] Another Australian ED study of morphine administration in the ED found a median time from triage to morphine administration of 79 minutes, but also found that time to administration was associated with time of day and patient volume in the ED, so that the median time to administration for patients arriving in the afternoon was 127 minutes compared with those arriving late at night, who experienced a median delay of 47 minutes.[31] However, the study did not appear to control for the effect that prehospital administration of analgesics may have on time to morphine administration in the ED.

The causes for these findings are likely to be multifactorial, and include deficiencies in medical and nursing education, unreasonable fears of analgesic side effects that include addiction, and cultural, social and organisational barriers. In addition, despite research linking unrelieved pain with adverse consequences, there is a lack of high level evidence of "harmful" effects of acute pain, and this may be one explanation for low levels of analgesic use reported in ED settings, particularly if pain is simply considered a normal and inevitable consequence of tissue injury that is typically self-limiting.

The interest generated by the poor state of pain management in medicine led to the foundation in 1973 of the International Association for the Study of Pain, the subsequent development of pain management as a medical specialisation, and the establishment of the principle of pain relief as a basic human right[32]. In Australia the College of Anaesthetists has a Faculty of Pain Medicine, multidisciplinary pain clinics have been established in the larger public hospitals, and evidence-based pain management guidelines have been published that include guidelines for the management of acute pain.[19]

A Definition of Pain

Given that the central focus of this thesis is the paramedic's role in the assessment and management of pain, it is important that this term is defined.

While a definition of pain helps clinicians agree on the identification and classification of this symptom, the complex nature of this phenomenon is shaped by

individual differences in perception and expression, which conspire to complicate this aim. This is best represented by a letter to colleagues regarding the definition of pain compiled by Henry Beecher, Anaesthetist-in-Chief at the Harvard Medical School in the US from the 1940s through the 1960s: "If you ever get a good psychologist to tell you what pain is, please let me know. I haven't had any luck".[33] At the time Beecher had noted significant variations in pain expression among soldiers wounded in combat when compared with pain among his postoperative patients at Massachusetts General Hospital. This was attributed to differences in context, expectations of cure, and the consequence of the pain, which in battle may result in evacuation from the battleground.

The problems of describing and defining what is an intensely personal experience to other observers is also exemplified by Virginia Woolf who, when writing in "On being ill", exclaims "let a sufferer try to describe a pain in his head to a doctor and language at once runs dry".[34]

Despite the challenges in achieving consensus on a description of an intangible entity such as pain, in 1979 the International Association for the Study of Pain Subcommittee on Taxonomy published a set of definitions of pain terms. This group defined pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage".[35] This definition recognises the emotional as well as the physical components of pain, while also affirming that pain may not be associated with obvious tissue injury or pathology.

This multidimensional definition may be contrasted with the description of pain recorded by Rene Descartes, the 17th century French physicist and philosopher, who perceived pain as a simple mechanical transmission of "fast moving particles of fire" along a specific pathway from the site of the stimulus to the brain.[36] More advanced understandings of the neuroanatomy and physiology of pain occurred in the twentieth century, with developments in knowledge of pain, and its various causes and management, with this knowledge increasing rapidly towards the end of that century. Although the current definition of pain has remained unchanged since first published, recent work has demonstrated the importance of the patient's interpretation of the

pain and the influence that the context and social structures such as culture and prior pain experience may have on both the perception and expression of pain.[37]

The Evolution of Analgesia

The word analgesia means the absence of pain or the inability to perceive pain. However, this term is also commonly used to refer to interventions designed to relief pain without necessarily achieving a pain-free state.

Although pain is commonly associated with deliberate and accidental injury, pain may also be iatrogenic; caused through surgery and procedures such as the reduction of dislocations, injections and suturing of wounds. In this respect pain may be seen as an inevitable consequence of some medical interventions. However, the humanitarian obligation to reduce and relieve pain and suffering has lead to significant advances in the prevention and management of pain, particularly since the mid 1800s, when drugs that enabled anaesthesia were first used during surgery. These included nitrous oxide, ether and chloroform. The first demonstration of anaesthesia performed by William Morton in 1846 at the Massachusetts General Hospital in Boston, and while anaesthesia was initially criticised by the medical profession, it gained popularity after the physician John Snow administered chloroform to Queen Victoria during the birth of her first child in 1853.[38] Some of the resistance to the use of analgesia in this setting is believed to have been based on religious views that suffering brought an individual closer to God,[2] and that pain during childbirth was God's plan - "In sorrow thou shalt bring forth children".[39]

Despite significant advances since the mid 19th century in the management of pain arising from surgical procedures, relief from pain has not been universally available to all people. During a journey to Africa in the first part of the 20th century Albert Schweitzer – physician and humanitarian – lamented the lack of modern medical care for the African people, and through his observations wrote that "pain is a more terrible lord of mankind than even death itself".[40] Since then the relative absence of effective forms of analgesia for the majority of the population in some countries – particularly African nations – continues to be documented.[41]

Evidence-practice Gaps in Australian Health Settings

In 2003, the National Institute of Clinical Studies (NICS) – a Federally funded division of the National Health and Medical Research Council – published the a report that identified several health priorities relating to demonstrated gaps between best current evidence and clinical practice. One of these areas was the management of acute and cancer related pain in hospitalised patients.[42] Several additional studies and reports followed that focused on translating evidence into practice. A subsequent report that examined the outcome of initiatives that aimed to address practice gaps found that, despite the recent development of evidence based practice guidelines, "there is little evidence to tell us whether the resulting improvements in knowledge and attitudes have led to improvements in clinical practice".[43] While this report noted improvements in pain assessment and documentation, this data provided limited information about the pain management outcomes. Barriers to the improvement of pain management practice were described as having a system, clinical, and patient focus. For example, system barriers involve institutional commitment to changing practice, whereas clinical barriers include the clinician's knowledge of contemporary standards of care. Patient barriers include fear of drug side effects such as sedation or addiction, and personal beliefs regarding the nature and significance of pain.

While the NICS reports do not describe evidence-practice gaps in the community emergency health setting relating to pain management, in 2008 the results of a three round Delphi study were published that involved the identification and ranking of research priorities in the field of prehospital care. Experts from clinical, management and research areas within the field were involved in the development of the areas of research priorities, and in the clinical domain the need for research into prehospital pain management was identified as a research priority.[44]

What is Known About the State of Paramedic Pain Management Practice in Australia?

In order to understand the prevalence of pain among patients cared for by paramedics, and to evaluate the quality of care, clinical performance benchmarks must be established and published. The publication of patient outcomes is sometimes associated with licensing or accreditation standards for health care institutions. In the Australian state of Victoria all public hospitals must be accredited, a requirement

introduced by the state government on 1 July 2000. Accreditation is achieved through independent organisations such as the Australian Council on Healthcare Standards. This organisation has developed a range of standards for health care services, which includes standards for pain management. In February 2007 the Victorian Quality Council developed an acute pain management toolkit that was distributed to all Victorian health care agencies in an attempt to improve pain management and to benchmark pain management practice across the state.[45]

Australian EMS or ambulance services are not subject to the same accreditation standards, and while some outcomes data such as the results of a patient satisfaction data is published through the Council of Ambulance Authorities annual report,[14] the satisfaction survey does not ask respondents about specific aspects of care. The results of this national survey reveals that 98% of patients were "satisfied or very satisfied" with the quality of paramedic care and treatment.[46] While these results could be interpreted as a high level of satisfaction with all aspects of care – including pain management – the data should be interpreted with caution as the survey does not specifically address pain relief. In addition, patient expectations of pain relief are not described and hence satisfaction may be high if patients do not expect pain relief. Finally, patient satisfaction has been shown to be a poor surrogate for pain reduction as other factors may influence satisfaction.[47 48]

While the education of novice practitioners should prepare them to deal with health emergencies that include the management of severe pain, there is scant reference to pain management in much of the paramedic education literature. This is however, a finding common to some other health disciplines,[49] and as a means of addressing this deficit the International Association for the Study of Pain has developed a multidiscipline university level curriculum for teaching health students about pain and pain management.[50]

The importance of relieving pain and the consequences of poorly managed pain have been accepted across most health disciplines, and evidence based practice guidelines are now informing pain management practice. However, there is still little evidence relating to the prevalence of pain or the efficacy of paramedic initiated pain management interventions in Australia. This thesis aims to contribute to the evidence relating to paramedic pain management practice.

Rationale for the Study

Evidence of outcomes is needed to affirm the effectiveness of clinical procedures and health care systems. Data must be compared with contemporary evidence relating to standards of care so that disparities may be identified and corrective interventions implemented to achieve appropriate clinical outcomes. Evidence from several sources identified in the following chapter indicates that pain management is suboptimal across many health settings, particularly within the medical and nursing domains. However, little is known about the prevalence or nature of pain experienced by individuals cared for by paramedics.

One of the factors that initiated this thesis was a study undertaken by the author that aimed to use a visual analogue scale (VAS) to measure the adequacy of paramedic pain management in a major Australian city (Sydney). At the time the study was undertaken, paramedics did not routinely use a pain scale to measure and document pain severity. This study found that when the VAS was used by paramedics to measure pain, a modest reduction in pain was recorded between the first and final assessment by paramedics (mean reduction 18.2 mm on a 0-100 mm scale). However, 51% of patients did not receive analgesia (either morphine sulphate or methoxyflurane) despite the no analgesia group recording a mean initial pain score of 54.5 mm.[51] An attitudinal survey administered to paramedics involved with this study was undertaken to investigate barriers to the use of pain scales such as the VAS. The responses included several comments questioned the validity of the VAS, highlighted concerns that patients may overstate or exaggerate their pain, and suggested that paramedic judgements regarding the patients' level of pain may be more appropriate than values derived from a pain scale. This paper is included as Appendix A.

This thesis aims to extend the investigation of paramedic pain management practice, but also aims to explore attitudes, beliefs and values that may influence paramedic practice in the area of pain assessment and management.

Research Questions

This project aims to investigate pain management practice in an Australian EMS in order to establish the current status of practice and to compare this with

contemporary standards of care. This applied clinical research will use a descriptive cross-sectional design involving a retrospective analysis of patient care records to identify the incidence of pain reported by patients, the extent and nature of analgesic interventions performed by paramedics, and the outcome of care in relation to pain reduction in the prehospital phase of care. The thesis comprises a quantitative study of current paramedic practice, followed by a qualitative study of paramedics' attitudes relating to pain and their assessment and management of pain.

The objectives of the first stage of the thesis are to analyse patient care records generated by paramedics to identify and record:

- incidence of pain among patients treated and transported by paramedics;
- estimated duration of pain prior to paramedic care;
- classification of the pain, in terms of trauma, cardiac, or other origin;
- methods of assessing pain severity and the frequency of the recording of pain severity scores;
- changes in pain severity score before and after treatment by paramedics;
- analgesics used; and
- incidence and nature of any side effects of analgesic administration.

Ethics approval for this first stage of the study was granted by the Monash University Standing Committee on Ethics in Research Involving Humans – *"2004/754 - Epidemiology of pain in patients transported by ambulance paramedics"* (Appendix B).

The qualitative component of the study aimed to elicit, analyse and report paramedics' and student paramedics' attitudes, beliefs and knowledge regarding pain measurement and pain management in order to identify potential barriers to effective pain management practice.

The specific research aims of this qualitative study were to:

- identify factors influencing or inhibiting paramedic pain management practice, such as individual, organisational, educational and demographic factors that may affect clinical judgements and decisions in cases involving patients reporting pain
- predict the likely impact of these factors on pain management practice; and
- recommend strategies that may reduce any barriers to effective pain management identified by this study.

Ethics approval for this qualitative component of the study was granted by the Monash University Standing Committee on Ethics in Research Involving Humans – *"CF07/0449 - 2007/0139: Paramedic attitudes and beliefs regarding pain assessment and pain management"* (Appendix C).

Personal Reflections

As a practicing paramedic and paramedic educator it is important to disclose my first-hand experience of helping patients in pain and in observing the actions and interactions of paramedics when dealing with patients experiencing or reporting pain. This connection between clinical practice and the study of pain provides a unique insight to this research, but also presents significant challenges in dealing with my own beliefs about the topic. The potential for bias is a real threat to the objectivity of the study, but is openly acknowledged and countered through my awareness of the potential influence of my personal beliefs and values. In undertaking this study I have been careful in monitoring the influence that my personal beliefs may have on my analysis and interpretation of the findings, and have consciously reflected on the objectivity of my thoughts at all stages of this process. In addition, my supervisors have been helpful in encouraging these reflections and in helping me to check for the potential for bias. The focus groups were facilitated by Professor Paul Komesaroff, who guided the discussions while enabling me to generate additional questions based on the direction of the discussions. The analysis of the focus group transcripts was also a challenge, as the Grounded Theory method used to enable theories to emerge from the data had the potential to be influenced by my personal opinions and prior experiences as a paramedic. Again, the conscious separation of my beliefs from those emerging from the transcripts was central to the development of theories that are elaborated in the qualitative research section of this thesis.

The reasons for embarking on this journey must be acknowledged as arising from my experiences as a paramedic. Early in my career I was often frustrated at my inability to effectively manage cases of severe pain. I discovered that some cases of pain associated with severe trauma or with disease sometimes proved to be resistant to relief using the only available agents; initially trichloroethylene but later nitrous oxide. Some of this lack of effect may have been due to administration technique; these drugs were self-administered by the patient and it was often difficult to encourage patients to submit to the unpleasant odour of trichloroethylene or the potentially claustrophobic face mask of the nitrous oxide apparatus when the patient was distressed by severe pain. In addition, the elderly or those with communication difficulties sometimes found it difficult to understand instructions regarding the use of the devices used to deliver the drug.

When morphine was introduced to paramedic practice, the information provided to paramedics regarding the adverse effects of this drug may have made many nervous of serious consequences that included respiratory depression. This fear of the drug as well as the fear of chastisement by hospital staff for giving excessive amounts of the drug may have led to suboptimal doses of in some cases. An additional fear involved a perceived risk to paramedic safety as some believed that individuals addicted to opioids may rob ambulances or assault paramedics in a quest for morphine to feed a drug habit. When familiarity of the action and safety profile of the drug developed over time, and it was realised that security of the drug was not the problem it was thought to be, a remaining fear was that some patients might be untruthful in reporting pain in order to obtain the drug for personal benefit.

This fear that some patients may have other motives in reporting pain is evident from my discussions with students in my role as an educator, where beliefs and concerns about patient motivations for seeking pain relief and its provision are evident even early in their early paramedic training. Therefore my experience as a career paramedic, an educator, and a researcher have all contributed to the development, analysis and interpretation of the study data.

Thesis Structure

Some of this data arising from this research enabled the development of papers that were submitted to journals and published following peer review. These papers have been included in this thesis as appendices, and the results will be referred to support conclusions in relevant chapters of this thesis.

The following chapter (Chapter 2) presents a more detailed review of the literature pertaining to paramedic pain practice, but also examines practice in medical and nursing settings where no evidence exists in the prehospital setting. This chapter sets the scene for subsequent analysis and description of pain and pain management in the paramedic practice setting. This is presented in Chapter 3.The literature review enabled the development of a paper that summarises the state of paramedic pain management practice. This was published in the American Journal of Nursing and is included as Appendix D.[52]

Chapter 3 presents a retrospective analysis of patient care records involving paramedic care in cases where pain is documented. This research enabled the publication of three papers that describe specific outcomes of the data analysis. These papers are included as Appendicis E and F.[53 54]

The qualitative section of this study is presented through an introduction to the methodology (Chapter 4), followed by an analysis and discussion of the results (Chapters 5 and 6). Two published papers that arose from the analysis of the qualitative data are presented as Appendices G and H.[55 56] The thesis concludes (Chapter 7) by linking the research findings with discussion of future directions in the study of pain, and strategies that may achieve equitable and effective standards of care for patients with pain cared for by paramedics.

Chapter Summary

In summary, relief from pain is considered a basic human right. The early management of acute pain may limit the progression of chronic pain syndromes, with chronic pain representing a disability associated with significant emotional and financial consequences. Clinical practice guidelines and effective analgesics have the potential to alleviate pain associated with a broad range of causes for patients across the lifespan. However, despite the existence of evidence-based guidelines the

management of pain in some health settings has been found to be suboptimal. Whether this situation also applies to paramedic practice is not well known. As such, this thesis will explore and analyse the current state of pain among patients treated by paramedics in the Australian city of Melbourne. The quantitative study of patient care records will inform the qualitative investigation of paramedics' attitudes and beliefs regarding pain assessment and pain management.

This research will provide a quantification of pain management provided by paramedics in Melbourne, and will include a qualitative investigation of paramedics' beliefs about the provision of pain relief. The outcomes of this study will identify whether the provision of pain relief is suboptimal in paramedic practice, which is currently unknown. This data should provide a new body of knowledge to inform paramedic practice in the area of pain management and to identify potential areas of further research.

List of References

1. Nixon HL. Accepting the risks of pain and injury in sport: mediated cultural influences on playing hurt. Sociology of Sport Journal 1993; 10(2):183-96.

2. Glucklich A. Sacred pain: hurting the body for the sake of the soul. New York: Oxford University Press, 2001.

3. Fosnocht DE, Heaps ND, Swanson ER. Patient expectations for pain relief in the ED. Am J Emerg Med 2004; 22(4):286-8.

4. Australian College of Ambulance Professionals. What is a paramedic? [Web Page]. 2010; Available at http://www.acap.org.au/paramedics/what-is-a-paramedic/. (Accessed 15 June 2010).

5. Department of Health (UK). Taking healthcare to the patient: transforming NHS ambulance services. London: COI Communications for the Department of Health, 2005.

6. Council of Ambulance Authorities. 2007-08 annual report. Flinders Park, South Australia: Council of Ambulance Authorities, 2008.

7. Callaham M. Quantifying the scanty science of prehospital emergency care. Ann Emerg Med 1997; 30(6):785-90.

8. Mather LE. The clinical effects of morphine pharmacology. Reg Anesth 1995; 20(4):263-82.

9. Poisons and Therapeutic Goods Regulation 2008 (NSW). 2008-392. 2008.

10. Ambulance Victoria. Clinical practice guidelines for MICA and ambulance paramedics. Melbourne, Victoria: Ambulance Victoria, 2009.

11. Joint Commission on Accreditation of Healthcare Organizations. Improving the quality of pain management through measurement and action. Oakbrook Terrace, IL: Joint Commission Resources, 2003.

12. Burgess FW. Pain scores: are the numbers adding up to quality patient care and improved pain control? Pain Med 2006; 7(5):371-2.

13. Alonso-Serra HM, Wesley K. Position paper: prehospital pain management. Prehosp Emerg Care 2003; 7(4):482-8.

14. Council of Ambulance Authorities. Clinical performance indicators. Indicator area 5: Trauma pain relief. Flinders Park, South Australia: Council of Ambulance Authorities, 2001.

15. Metropolitan Ambulance Service. Metropolitan Ambulance Service 2005-2006 annual report. Doncaster, VIC: MAS, 2006.

16. Department of Human Services. 2006-07 Statement of Priorities: Agreement between Minister for Health and the Metropolitan Ambulance Victoria. Melbourne: Victorian Government Department of Human Services, 2006.

17. Metropolitan Ambulance Service. Metropolitan Ambulance Service 2006-2007 annual report. Doncaster, VIC: MAS, 2007.

18. Metropolitan Ambulance Service. Metropolitan Ambulance Service 2007-2008 annual report. Doncaster, VIC: MAS, 2008.

19. Macintyre PE, Schug SA, Scott DA, Visser EJ, Walker SM Working Group of the Australian and New Zealand College of Anaesthetists and Faculty of Pain Medicine. Acute pain management: scientific evidence. 3rd edn. Melbourne: Australian and New Zealand College of Anaesthetists and Faculty of Pain Medicine, 2010.

20. McNeill JA, Sherwood GD, Starck PL. The hidden error of mismanaged pain: a systems approach. J Pain Symptom Manage 2004; 28(1):47-58.

21. MBF Foundation. The high price of pain: the economic impact of persistent pain in Australia. Australia: Report conducted by Access Economics in collaboration with the University of Sydney Pain Management Research Institute, 2007.

22. National Pain Summit. National pain strategy: pain management for all Australians. Melbourne: Australian and New Zealand College of Anaesthetists Faculty of Pain Medicine, Australian Pain Society, Chronic Pain Australia in collaboration with MBF Foundation and the University of Sydney Pain Management Research Institute, 2010.

23. Desbiens NA, Wu AW, Alzola C. *et al*. Pain during hospitalization is associated with continued pain six months later in survivors of serious illness. Am J Med 1997; 102:269-76.

24. Page GG. Acute pain and immune impairment. Pain: Clinical Updates 2005; XIII(1):1-4.

25. Taddio A, Katz J, Ilersich AL, Koren G. Effect of neonatal circumcision on pain response during subsequent routine vaccination. Lancet 1997; 349(9052):599-603.

26. Wollgarten-Hadamek I, Hohmeister J, Demirakca S, Zohsel K, Flor H, Hermann C. Do burn injuries during infancy affect pain and sensory sensitivity in later childhood? Pain 2009; 141(1-2):165-72.

27. Marks RM, Sachar EJ. Undertreatment of medical inpatients with narcotic analgesics. Ann Intern Med 1973; 78(2):173-81.

28. Wilson JE, Pendleton JM. Oligoanalgesia in the emergency department. Am J Emerg Med 1989; 7(6):620-3.

29. Todd KH, Crandall C, Choiniere M *et al*. Pain in the emergency department: a multicenter study. Acad Emerg Med 2006; 13(5_suppl_1):S88-a, 89.

30. Yeoh MJ, Huckson S. Audit of pain management in Australian emergency departments. Emerg Med Australas 2008; 20(s1):A35-A34.

31. Forero R, Mohsin M, McCarthy S *et al*. Prevalence of morphine use and time to initial analgesia in an Australian emergency department. Emerg Med Australas 2008; 20(2):136-43.

32. Cousins MJ. Relief of acute pain: a basic human right? Med J Aust 2000; 172:3-4.

33. Beecher HK. The measurement of pain. Pharmacological Reviews 1957; 9(1):59-209.

34. Woolf V. On being ill. First published as an individual volume in 1930 by The Hogarth Press. 2nd edition. Ashfield MA: Paris Press, 2002.

35. Merskey H, Albe-Fessard DG, Bonica JJ *et al*. Pain terms: a list with definitions and notes on usage. Pain 1979; 6:249-52.

36. Benini A, DeLeo JA. René Descartes' physiology of pain. Spine 1999; 24(20):2115-19.

37. Craig KD. The social communication model of pain. Canadian Psychology 2009; 50(1):22-32.

38. Caton D. What a blessing she had chloroform: the medical and social response to the pain of childbirth from 1800 to the present. New Haven, Conn: Yale University Press, 1999.

39. The Holy Bible. King James Version: Genesis 3.16. Grand Rapids (MI): Zondervan Publishing House, 1995.

40. Schweitzer A. On the edge of the primeval forest: experiences and observations of a doctor in equatorial Africa (translated from German by CT Campion). London: A & C Black, 1922.

41. Lohman D, Schleifer R, Amon JJ. Access to pain treatment as a human right. BMC Medicine 2010; 8(8):doi:10.1186/1741-7015-8-8.

42. National Institute of Clinical Studies. Evidence-practice gaps report, Volume 1. Melbourne: NICS, 2003.

43. National Institute of Clinical Studies. Evidence-Practice Gaps Report Volume 1: A review of developments: 2004-2007. Canberra: National Health and Medical Research Council, 2008.

44. Snooks H, Evans A, Wells B *et al*. What are the highest priorities for research in pre-hospital care? Results of a review and Delphi consultation exercise. J Emerg Prim Health Care 2008; 6(4):Article Number: 990319.

45. Victorian Quality Council. Acute pain management: measurement toolkit. Melbourne: Rural and Regional Health and Aged Care Services Division, Victorian Government Department of Human Services, 2007.

46. Bogomolova S. Ehrenberg-Bass Institute, University of South Australia. Council of Ambulance Authorities national patient satisfaction survey results 2007. Adelaide, South Australia: Council of Ambulance Authorities, 2007.

47. Afilalo M, Tselios C. Pain relief versus patient satisfaction. Ann Emerg Med 1996; 27(4):436-8.

48. Carlson J, Youngblood R, Dalton JA, Blau W, Lindley C. Is patient satisfaction a legitimate outcome of pain management? J Pain Symptom Manage 2003; 25(3):264-75.

49. British Pain Society. Survey of undergraduate pain curricula for healthcare professionals in the United Kingdom. London: The Pain Education Special Interest Group of the British Pain Society, 2009.

50. Charlton JE ed. Core curriculum for professional education in pain. 3rd edition. Seattle: IASP Press, 2005.

51. Lord BA, Parsell B. Measurement of pain in the prehospital setting using a visual analogue scale. Prehospital Disaster Med 2003; 18(4):353-8.

52. Lord B. The paramedic's role in pain management. Am J Nurs 2004; 104(11):50-3.

53. Lord B, Cui J, Kelly AM. The impact of patient sex on paramedic pain management in the prehospital setting. Am J Emerg Med 2009; 27(5):525-9.

54. Lord B, Cui J, Woollard M. Ambulance call triage outcomes for patients reporting pain: a retrospective cross sectional analysis of pain score versus triage level. Emerg Med J 2009; 26:123-7.

55. Lord B, Woollard M. The reliability of vital signs in estimating pain severity among adult patients treated by paramedics. Emerg Med J 2010; doi:10.1136/emj.2009.079384.

56. Lord B. Paramedic assessment of pain in the cognitively impaired adult patient. BMC Emerg Med 2009; 9(20):doi:10.1186/1471-227X-9-20.

Chapter 2: Literature Review

Introduction

This chapter provides a more detailed examination of the phenomenon of pain, which explains some of the challenges faced by health professionals who must interpret the individual's very personal and variable experience of pain to inform clinical judgements regarding the management of pain. In addition, contemporary pain management practice will be explored in the disciplines of medicine, nursing and paramedic practice, and the factors associated with documented theory-practice gaps will be elaborated and linked to the subsequent chapters of this thesis.

The Complex Nature of Pain

The individual nature of pain perception and the varied responses to pain can make the study of pain a complex and challenging task. Unless the presence of pain is explicitly communicated by the patient, the presence and nature of pain can only be inferred from observing tissue injury or behavioural cues associated with pain. Unlike other physiological variables that can be recorded by health care providers with high levels of inter-rater agreement, the subjective nature of pain may complicate the clinical assessment of this important complaint.

An individual's response to pain is mediated by the type and degree of stimulation of afferent nerves responsible for the transmission of pain, and also by psychological, environmental, cultural and social factors.[1] Nociceptors are specialised nerve endings that are activated by mechanical, chemical or thermal *noxious* stimulus, hence the name nociceptor. Once the threshold for activation is achieved, an action potential is generated that is eventually processed by the central nervous system and perceived as the sensation of pain. However, physiological processes responsible for pain transduction and perception are more complex that the simple mechanical model proposed by Descartes' in the 17th century.[2] An expansion of knowledge regarding the physiology of pain occurred in 1965 when medical researchers Melzac and Wall published in the journal *Science* a theory of pain known as the "gate-control theory".[3] This model sought to explain factors that modulate pain perception by proposing that modulation of afferent input by inhibitory descending pathways and by peripheral

afferent nerves that can act as a "gate" to inhibit pain at the spinal cord level. This theory helped to explain the highly variable relationship between injury and pain, as the perception of pain was influenced by factors that extended beyond that of simple stimulation of sensory afferents. This finding was followed by a significant growth in pain-related research which helped to explain how damage to pain pathways could lead to pain in the absence of obvious tissue injury. As such, pain can exist in the absence of obvious nociception, and the absence of obvious pain-related pathology is a feature of some types of chronic pain.[4]

Since this study, the lack of a reliable correlation between the degree of nociception and the pain experienced and expressed by an individual has been confirmed.[5] In addition, the emotional influence of pain is considerable. Indeed, individuals with high levels of empathy have been shown to vicariously experience pain when observing painful injuries or procedures in others,[6] suggesting that the emotional domain plays an important role in pain perception.

The resulting unique and variable interpretation of pain and the associated behavioural responses to pain causes dilemmas if the health professional assessing an individual expects a "standard" response to pain based on observed injury or other aspects of the patient history or presentation. An expectation of a reproducible correlation between injury or pathology and the individual's report of pain may be associated with knowledge of normal values and ranges for other physiological variables that can be more easily and objectively measured. If blood pressure, body mass index, peak expiratory flow rate and other measures are commonly reported against standard normal values, some degree of dissonance may be experienced by health care providers who expect the same level of objectivity when assessing pain. The difficulty associated with the assessment of pain is recognised in the literature as a barrier to effective analgesia.

Pain Relief as a Basic Human Right

Although pain is an expected consequence of illness and injury, the early and effective management of pain is now seen as a fundamental human right.[7, 8] This position has been supported by evidence that patients in some health settings are not experiencing adequate pain relief.[9] Evidence of inadequate care has highlighted the

importance of pain management as an essential component of patient care, and has led to the establishment of specialist pain management units within some hospitals. Pain management is now a medical specialisation through the Australian and New Zealand College of Anaesthetists Faculty of Pain Management,[10] with the College producing a statement on patients' rights to pain management[11] and an evidence-based guide to acute pain management.[12]

In order to evaluate evidence relating to pain management in the paramedic practice setting a structured literature review will now be undertaken to establish the current level of knowledge relating to pain in this setting.

Objectives for this Review

This literature review aims to identify studies relating to prehospital pain measurement and/or pain management that have been published since 1966 in order to describe and understand the current status of pain management in the prehospital setting. The specific aims are to identify prehospital-specific literature that addresses the following themes:

- Epidemiology of pain;
- Pain management in the prehospital setting;
- Assessment and measurement of pain;
- Evidence of inadequate analgesia;
- Barriers to effective analgesia; and
- Pain management education.

These issues will be contrasted with related findings arising from other health care settings and disciplines.

The review will summarise the major agreements and disagreements evident in the literature, and will identify gaps in the existing database regarding paramedic pain management practice.

Criteria for Inclusion and Search Strategies

English language published reports relating to prehospital pain management, pain measurement or analgesics in the prehospital setting were included. Searches of databases included Index Medicus, CINAHL, APAIS-Health, Australasian Medical Index, Cochrane Database of Systematic reviews, Database of Abstracts of Reviews of Effectiveness (DARE), Cochrane Controlled Trials Register (CCTR), Meditext, and the Australian Rural and Remote Health (RURAL) database.

The terms prehospital, pre-hospital, ambulance$, air ambulance$, emergency medical technician$, paramedic, emergency medical service$ were searched by Medical Subject Heading (MESH heading) or keyword. The '$' sign denotes a truncated search, which searches for all possible endings of the search term. The results were combined with the following grouped terms: analgesi$, pain, pain management, pain measurement, morphine$, methoxyflurane, nitrous oxide, fentanyl.

Analysis and Discussion

At the time this search was conducted (2003) the search strategy and filters identified 67 eligible articles. Many of these did not report research outcomes involving experimental studies, but were narratives that addressed some aspect of pain management in the prehospital setting.

Articles that reported research findings tended to employ observational designs such as case-control, using retrospective data to report outcomes such as the frequency of paramedic-administered nalbuphine against cases where the drug was not given but may have been indicated.[13]

Two prospective, randomized, double-blinded trials were identified; one that investigated the effect of acupuncture on pain, anxiety and patient satisfaction in cases of trauma,[14] and one that compared the efficacy of tramadol against morphine.[15]

Epidemiology of Pain in the Prehospital Setting

Only one study was found that investigated the epidemiology of pain in the prehospital setting.[16] This study used a retrospective cross-sectional probability sample of emergency department visits in the United States of America during 1999 to identify the proportion of patients arriving by ambulance where pain was recorded as a complaint. Of these patients, information about pain was unknown or missing in 52% of cases. Where pain was documented, 20% had moderate to severe pain, and 14% had mild pain. It should be noted that the data was obtained from hospital medical records rather than ambulance report forms and this subsequently affects the reliability of the data. The authors admit that the reported data are likely to be conservative, given that narcotic analgesics were administered to 13% of patients where no presenting level of pain was documented. Further epidemiological studies are warranted to discover the incidence and nature of pain in the prehospital setting.

Although data regarding the incidence of pain in patients treated and transported by ambulance is sparse, the prevalence of pain in patients presenting to the emergency department has been confirmed by several studies.[17] [18] In a 2002 study involving 1,665 visits to the Emergency Department (ED) of an urban teaching hospital in the US, Cordell and colleagues identified 61.2% of cases where the word pain or related terms such as discomfort were documented on the patient care record. Patient-reported ratings of severity were not reported. In this study pain was described as the chief complaint in 52.2% of cases presenting to this ED.[19] Unfortunately, the retrospective methodology used in this study may have understated the true incidence of pain.

Pain Management in the Prehospital Setting

This literature search found that evidence relating to pain management in the prehospital setting is scant. In a paper published in 1996 that described pain research methods in the prehospital setting, the author identifies only six peer-reviewed papers during the period 1980 to 1996 that relate to "optimal analgesic interventions or experimental designs during the prehospital phase of emergency care".[20] Some of these cited reports were descriptive; none of the six studies cited were controlled.

Analgesia in the prehospital setting has received little attention prior to 1970, when Baskett and Withnell first described the use by a United Kingdom ambulance service of a nitrous oxide/oxygen mix marketed as Entonox.[21] Although the Ambulance Service of New South Wales and other Australian ambulance services introduced trichloroethylene (Trilene) as an inhalational analgesic prior to this study, ambulance officers in the United Kingdom did not have access to any agent for the relief of a patient's pain until at least 1970. This belief is supported by Baskett's claim that, through the use of Entonox, "for the first time, ambulance personnel can do something specific to relieve pain".[21]

Trichloroethylene was introduced by the Ambulance Service of New South Wales in the mid 1950s, and was used until 1981, when it was phased out in favour of Entonox. First synthesised in 1894, trichloroethylene was identified as a narcotic agent in 1911. Although best known as a solvent and metal degreaser, this agent gained popularity in Great Britain in the 1940s as an inexpensive analgesic and anaesthetic, particularly in the area of obstetrics.[22] No published studies have been identified that describe the use of trichloroethylene in the prehospital setting.

The unavailability of analgesic agents in other ambulance systems is highlighted by a Canadian study published in 1981 that described the use of nitrous oxide/oxygen.[23] McKinnon confirms the importance of prehospital pain relief as a fundamental aspect of care, and claims that "until recently this goal seemed out of reach". This author reported "worth while" pain relief in 93% of patients. This was calculated by adding the percentage of patients who rated pain relief as "marked" (45%) and "partial" (48%) after administration of the nitrous oxide/oxygen mix. However, use of a recognised pain scale or pain severity scoring system to obtain these results was not evident. Instead, patients and "ambulance attendants" used a questionnaire to rate pain relief in response to nitrous oxide/oxygen administration.

These findings led McKinnon to recommend a 50:50 nitrous oxide/oxygen mix as a safe and effective analgesic for use by ambulance services. The author's endorsement of this analgesic was supported by citing a study conducted in 1964 that concluded that nitrous oxide is a superior pain killer when compared with morphine.

Baskett's seminal publication was soon followed by several other studies investigating and reporting the use of nitrous oxide in the field.[24-29] However, the

methodology used often involved unblinded, non-controlled trials, which produce results that are prone to confounding and bias. As Callaham observes, a positive outcome "is an expected and predictable outcome in an uncontrolled scientific study, regardless of the true efficacy of the therapy."[30]

A study by Stewart *et al* involving 1201 patients administered a 50:50 mixture of nitrous oxide and oxygen reported that an "acceptable level of sedation/analgesia appeared to be reached in almost all conditions.[24] However, no pain relief was observed in 9.6% of cases, and in 61.3% the pain relief was observed to be partial. Although a series of verbal descriptors were used to rate pain, the terms used (VERY SEVERE; groans, writhes, screams) imply that these were behaviours observed by the paramedic in order to rate the pain rather than reported by the patient. This is supported by a concession by the authors that the reported 90% rate of partial or complete pain relief represented "anecdotal reporting". If vocalisation is used to rate pain, it is unsurprising that pain scores were reduced during gas administration as the method of administration – the gas only flows while the delivery mask is tightly sealed against the patient's face – reduces the patient's ability to groan, scream or vocalise. Stewart *et al* also reported a 20.6% incidence of side-effects that were associated with the use of nitrous oxide. These included "nausea or vomiting (5.7%), dizziness or light headedness (10.3%), excitement (3.7%), and numbness (0.3%)."[24] However, the study design makes it impossible to attribute these effects to the analgesic intervention.

More reliable methods of rating pain severity using patient self-report were available at the time of this study, and the use of validated tools may have produced stronger evidence of efficacy. Unfortunately the approach to scoring pain used by Stewart *et al* was also adopted in a later study by Johnson and Atherton,[31] who justified their choice of methodology on the basis of its use by Stewart and colleagues. Johnson and Atherton admit that the pain severity was determined by the treating paramedic. This scoring system resulted in three categories of outcome following nitrous oxide administration; no pain relief (15%), partial (77%), or complete pain relief (6%).

Although nitrous oxide/oxygen mixtures have a considerable history of safe use in the obstetric setting, the use of this analgesic in prehospital care was still being investigated in clinical trials in the US as late as 1991.[31]

While all ambulance services in the UK were reportedly using Entonox by 1993, its effectiveness was beginning to be questioned, with Chambers and Guly identifying a need for better prehospital analgesia.[32]

Apart from questions about its effectiveness as an analgesic in cases of severe pain, and difficulties in administration due to technical and communication difficulties, other problems associated with the use of nitrous oxide involve exposure of paramedics to potentially high atmospheric levels of the gas. In 1983, Stewart *et al* describe the findings of a study that detected concentrations of nitrous oxide in the ambulance of over 1200 parts per million (ppm).[24] The Australian standard for occupational exposure to nitrous oxide is, in contrast, a time-weighted average maximum exposure of 25 ppm over an eight-hour working day. The maximum short term exposure (no more than 30 minutes per day) is 75 ppm.[33]

This concern regarding environmental exposure to high levels of nitrous oxide was first identified in a 1980 study that found concentrations of nitrous oxide in the patient treatment area of the ambulance of "650-1,700 ppm, with top concentrations up to 7,500 ppm".[34] In 1990, the National Association of Emergency Medical Services Physicians released a position paper addressing the use of nitrous oxide/oxygen mixtures in prehospital care. This position paper reinforced the need to use scavenging systems and adequate ventilation while nitrous oxide is used within the ambulance.[35] However, difficulties in maintaining environmental exposure standards of nitrous oxide led to the decision by the Ambulance Service of New South Wales to withdraw this agent from use in 2001.[36]

Morphine has long been recognised as the standard against which other analgesics are measured. However, its introduction in the prehospital or EMS setting has, until recently, faced several barriers. While one barrier has involved pragmatic legislative issues relating to the prescription and security of opioids, some resistance was based on fallacious claims that "the relatively long action of the drug may hinder accurate diagnosis on arrival at hospital by masking pain".[21] The same authors also claim that opioids such as morphine and pethidine act as "potent cardiovascular and respiratory depressants" when given in doses required to achieve adequate analgesia.[21]

The fear that opioids may mask symptoms and make diagnosis more difficult has been refuted by evidence that demonstrates that the relief of pain may enhance the

diagnostic process.[37] Yet this unfounded concern has resulted in physicians refusing paramedics authority to administer morphine in cases where this intervention appears to be warranted.[38]

While recognising the important role of opiates in the management of pain, Baskett claims that unreliability of drug absorption and excretion is "accentuated in the accident and emergency situation." Furthermore, the author also cites "unfortunate and increasing addiction problems" to conclude that "it is obvious that the opiates are impossible to consider as a satisfactory analgesic in these conditions".[39] Whilst this has subsequently proved to be untrue, these fears may continue to constrain the use of opioids for pain management in the prehospital setting.

Nalbuphine, a synthetic opioid with agonist-antagonist properties, appeared to be an ideal drug to address concerns regarding respiratory depression and legislative restrictions, and was the subject of several studies of its use in the prehospital setting.[13 40-44] This drug produces analgesia by acting as a κ opioid receptor agonist, while antagonising μ receptors. The latter effect helps to explain the drug's relative lack of respiratory depression and euphoria, as activation of μ receptors by opioids such as morphine is associated with respiratory depression.

The first prehospital study of nalbuphine was published by Stene and colleagues in 1988.[42] This paper, one of the six studies cited by Yealy,[20] lists study objectives that are broadly stated as being the investigation of side effects of nalbuphine, and the drug's impact on patient evaluation of pain relief when the drug was administered to patients with pain associated with "orthopedic injuries, burns, multiple trauma, or intraabdominal conditions".[42] The authors claim that paramedics assessed the patient's pain severity using a visual analogue scale (VAS), which involves the patient marking a point on a 100 millimetre line at a point between two descriptors – no pain, and worst pain imaginable that represents their current level of pain severity. However, data associated with this form of pain score was not reported. Instead, response to nalbuphine administration was described using a categorical rating method where relief was listed as "none", "a little", "a lot" and "complete". Using this system the authors reported that forty-one patients (89%) reported pain relief, and five patients (11%) reported no pain relief. Two of the "no relief" group were

reported to be addicted to opioids, and as such it was believed that they did not benefit from nalbuphine due to the drug's antagonist properties.

Nalbuphine administration by paramedics was the focus of a study in England published in 1994.[40] Although paramedics in this setting could use Entonox (50:50 nitrous oxide/ oxygen mixture) to relieve a patient's pain, the authors identify several limitations of this inhalational analgesic that may lead to sub-optimal pain relief. As such, paramedics were trained to administer nalbuphine for suspected myocardial infarction, isolated limb fractures and burns. Pain severity was recorded using a visual analogue scale immediately prior to giving the nalbuphine, and again at the hospital of destination. The study enrolled 116 patients, and was able to demonstrate a mean reduction of 5.0 (mean initial score 8.0, mean final score 3.0).

Although the visual analogue scale produces continuous data on a scale from 0 to 100, the authors noted that many of the scores were recorded as an integer. In explanation, the authors' hypothesis for this finding was that, due to time constraints, patients simply pointed to an area on the un-marked 100 mm line and the paramedics estimated the position using the closest integer. Proper use of this scale involves the patient marking a point on the 100 mm line that best represents their pain severity. The position of the mark is typically measured with a ruler to the closest millimetre. In this study the resulting data is ordinal, and is subject to observer bias. Nevertheless, a mean reduction of pain to 3.0, if correct, would normally be associated with a clinically significant reduction in pain if this corresponded to a score of 30mm. The minimal clinically significant change in VAS has been found to be 13mm.[45]

The authors conclude that nalbuphine is an effective analgesic for the conditions described in the report, and that paramedics can safely administer the drug to patients in pain. This drug subsequently became a common paramedic-administered opioid throughout UK ambulance services.[40]

Acceptance of this drug proved to be less enthusiastic among emergency physicians. In a series of case reports, Houlihan *et al* describe instances were excessive amounts of morphine were needed to achieve pain relief in patients given nalbuphine in the field. The antagonist action of this drug on μ opioid receptors was proposed as the cause of the ineffectiveness of morphine at normal therapeutic doses, given that

morphine is a μ agonist.[46] This publication generated a further report that confirmed the initial authors' findings.[47]

Given these concerns, attention turned to other types of analgesia that may be safely used in the prehospital setting. By 1992 Bruns and colleagues had published the first report of morphine sulphate (MS) administered by paramedics in the San Francisco area.[48] This prospective observational study sought to investigate the safety of prehospital use of morphine in an urban emergency medical services system. The authors found a low rate of complications and concluded that "paramedics functioning within a system of base hospital medical direction can safely administer MS." Although no other evidence of paramedic administration of morphine can be identified in the peer-reviewed literature at this time, other ambulance services moved to approve paramedic-administered morphine. In some cases, such as the Ambulance Service of New South Wales and Victorian ambulance services, paramedics did not require direct medical contact for approval to administer this drug, but instead used clinical protocols to inform their management of pain.

Although the use of morphine by paramedics was beginning to be considered in other countries, the adverse affects of the drug and risks of overdose were also being considered. While discussing the safety profile of nalbuphine, Chambers and Guly[40] cite the Bruns *et al* study[48] of paramedic administered morphine that purportedly found that "three of 89 cases required naloxone". Investigation of this claim found that Bruns *et al* studied 84 patients (rather than 89 reported by Chambers and Guly), who received morphine after paramedic assessment determined that patient had ischaemic chest pain and/or pulmonary oedema. There were three documented cases of "respiratory depression". One of these patients was given naloxone (an antidote to morphine) as the initial paramedic diagnosis of pulmonary oedema was incorrect – the diagnosis made in the emergency department was "aspiration pneumonia". The other two patients with respiratory depression were not given naloxone, and the authors report that it is uncertain whether morphine contributed to the respiratory depression, particularly when in each case a relatively low dose of 2 milligrams of morphine was administered.[48]

Misreporting of the type encountered in the Chambers and Guly study has the potential to sustain or amplify concerns regarding the incidence of respiratory

depression associated with opioid administration. The effective incidence of 3.4% attributed to Bruns *et al* is fallacious and based on misinterpretation of the data. Furthermore, Bruns *et al* relate several limitations in their study and state that the "true rate of risk from the drug itself cannot be established from this study, since complications from the disease process or from other drug effects cannot be separated".[48]

Some published work on the topic of prehospital analgesia only serves to confuse the reader and possibly contributes to the perpetuation of inaccurate beliefs about the role of opioids in the pain management process. In an article by Hatlestad, the author discusses the use of anxiolytics and analgesics in managing pain, but confuses procedural sedation with sedation as an adverse effect of opioids.[49] The author cites a study by Miner *et al* to support the claim that sedatives and opioids increase the risk of hypoventilation. While this assertion is supported by the literature, the study cited in support of this contention is an abstract that described the use of end-tidal carbon dioxide monitoring to assess respiratory suppression during procedural sedation, which does not specifically address this topic.

Other drugs that have been used to relieve pain in a paramedic practice setting include methoxyflurane, a volatile analgesic and anaesthetic that was widely used in anaesthesia during the 1960s to 70s.[50] Although evidence of renal toxicity lead to discontinuation of its use in some countries, it remains a popular analgesic agent in some Australian ambulance services. The Ambulance Service of New South Wales introduced this drug when Entonox was withdrawn from use in 2001 due to concerns regarding unacceptable expose levels within ambulances. Unfortunately, the occupational health implications of high methoxyflurane concentrations in ambulances have also raised concerns regarding the appropriateness of the use of inhalational analgesics where adequate ventilation is difficult. These issues have resulted in withholding analgesia in some cases where paramedics hold concerns regarding personal exposure to these agents.[36]

At the time this review was undertaken there were several papers published that address the use of methoxyflurane in the emergency department or prehospital setting. However, all are case studies or uncontrolled observational studies.[51-53]

Assessment and Measurement of Pain

One of the objectives of this literature review is to identify contemporary approaches to pain assessment and explore methods used to measure pain in the prehospital setting. Validation of the efficacy of pain management practice requires the assessment of the patient's pain before and after analgesic interventions; yet the literature suggests that formal assessment of pain severity, quality and other characteristics is not commonly performed or documented.

The importance of obtaining a patient self-report of pain severity is well documented, given the frequent underestimation of pain when the pain is assessed by the health professional instead of the patient.[54-59] In a study that sought to correlate patient self-report of pain with an assessment of severity made by the emergency medical service (EMS) team consisting of a physician and two ambulance technicians, the study found that the EMS crew tended to "significantly underestimate their patients' pain severity."[60] When the patients rated their pain as severe there tended to be a greater degree of underestimation of pain severity by the EMS crew.

A lack of documented pain assessment is highlighted in a report that studied the pain recording practices of nurses and physicians.[61] Although the presence of pain was noted on 94% of patient records generated in the emergency department, a validated pain scale was used in just 23% of cases. When analgesic therapy was implemented, the occurrence of pain following therapy was recorded in 39% of cases but the frequency of pain scale use was 19%.

A study involving nurses in a major teaching hospital revealed that while 76% of nurses claimed that they "frequently" or "always" used a patient self-assessment tool to rate pain, only 23% of the patient charts on the wards where these nurses worked showed evidence of pain scores using a patient self-assessment tool. In order to improve the formal documentation of pain severity and response to therapy the authors recommend that the patient chart incorporate a section that enables the recording of pain scores.[62]

While investigating the use of traction splinting for femoral shaft fractures involving children, the researchers discovered that while many of these patients received analgesia, a reliable and validated pain scale "was not used in any of the study

patients making interpretation of analgesia difficult".[63] Several pain scales have been successfully developed to overcome the difficulties in assessing pain in children.[64-66] Although lack of familiarity with paediatric pain scales may be expected in some settings, the fact that this study occurred within a specialist paediatric hospital makes this finding even more remarkable.

Each of the State ambulance services in Australia incorporates a section on the patient report form for the documentation of a pain severity score, although the Ambulance Service of New South Wales only added the facility for scoring pain severity to the patient report form in 2004. Pain severity is usually recorded using the Verbal Numeric Rating Scale (VNRS), which requires the paramedic to ask the patient to describe the severity of their pain by stating a number zero to ten. The patient is generally instructed that zero represents no pain and 10 the worst pain imaginable before being asked to state a number that best represents their current level of pain severity. This scale is also known as the Numeric Rating Scale (NRS) and the scale has been recommended for paramedic use.[67]

Although a valid and reliable method of scoring pain severity is necessary to evaluate trends in the patient's condition and response to analgesic interventions, a study of paramedic-administered analgesia involving seven ambulance services in the United Kingdom found that there was no provision on the patient report form for pain scores. The authors recommend that "means must be made available to permit assessment of the efficacy of pre-hospital analgesia, which must be included on the patient report form to allow automatic and consistent statistical analysis of this important aspect of clinical effectiveness and patient care".[68]

Problems associated with the assessment of pain identified by Chambers and Guly,[40] and less explicitly by Stene *et al*,[42] are of critical importance. Unless a valid, reliable and practical method of pain severity assessment is regularly employed by paramedics, trends in the patient's level of pain and changes in pain severity associated with analgesic interventions cannot be properly evaluated or described.

In a study investigating EMS research priorities previously cited (EMSOP IV),[67] the investigators focus on the "pain" dimension of discomfort, specifically examining pain measurement and the use of pain scales in the prehospital setting. While recognising the importance of patient self-reports of pain, the authors were only able

to cite two published studies that evaluated different pain measurement scales in the prehospital setting. Although multidimensional pain scales such as the McGill Pain Questionnaire[69] measure pain quality, severity and interference with function, such scales may not practical in the prehospital setting due to the time required to complete the assessment. Maio *et al* subsequently sought to identify pain scales that were practical to use in the prehospital setting, and which had also been validated in other health care settings.

After reviewing the literature on the use of pain scales, Maio *et al* recommend either the Adjective Response Scale (ARS), or the Numeric Response Scale (NRS) for use in the prehospital setting. The former involves the use of descriptions of pain severity such as "none", "slight", "moderate", "severe" or "agonising", with the patient asked to select the term that best describes their pain.[67] In contrast, the NRS requires the patient to rate their pain between 0 and 10, with 0 representing no pain, and 10 the worst pain imaginable. The NRS scale can also be presented as a scale from 0 to 100, which may increase the sensitivity of the scale. Although evidence has validated the use of these scales in the ED setting,[70, 71] little research exists that examines the use of these pain scales in the prehospital setting.

While the lack of recognised pain score methods has been noted in some studies, Chambers and Guly reported difficulties regarding the use of a visual analogue scale to measure pain severity in the prehospital setting: "Both [ambulance] staff and patients had trouble using the scaling system and less than 30% of ambulance arrivals [at the emergency department] had complete information".[32] A detailed analysis of these problems was not provided.

The two studies cited by Maio *et al* that involved the evaluation of pain scales in the prehospital setting both involved physicians working on ambulances in France. The first study[72] aimed to evaluate acute pain in the prehospital setting. The authors enrolled 255 patients aged 10 or greater and used a 5-point verbal rating scale and visual analogue scale to score pain at the beginning and end of medical management in the field. The researchers found that 65% of patients reporting significant pain (defined as a VAS $\geq$ 30 mm) received analgesia. Significantly, only 49% of patients reported good pain relief at the end of their medical care. Both types of pain scale were reported to be easy to use and convenient for assessing pain intensity in the

prehospital setting. However, it was found that only 60% of patients were able to use the VAS.

In a follow-up study, Ricard-Hibon and colleagues[73] sought to evaluate the effect of a pain management quality control program on the level of pain reported by patients treated by physicians staffing ambulances in a French EMS system. Pain severity was measured at the commencement of prehospital treatment and at hospital of destination. Pain was assessed using a 5-point verbal rating scale and VAS. The incidence of patient requests for analgesia was also recorded. Additionally, patients were asked to judge the pain relief achieved at the end of the prehospital phase of care.

The first stage of this study involved the measurement of outcomes of the variables listed above. Two hundred and seventy one patients were eligible for inclusion – patients were excluded if less than 10 years of age, had an altered level of consciousness that prevented the use of self-report of pain, or presented with "psychiatric disease or had major cardiorespiratory failure necessitating ventilation and anaesthesia".[73] Of the 255 patients able to report their pain, 61 had clinically significant pain (defined as VAS > 3 or VAS > 30 mm). Yet 36% of these patients were not given analgesia. When later questioned about the significant number of patients who failed to receive analgesia, the physicians cited other treatment priorities and the fact that many patients did not ask for analgesia as reasons affecting this outcome. Furthermore, "physicians were not accustomed to using pain scales and the belief in these scales was limited, so that analgesics were given in accordance with the physician's subjective evaluation rather than pain scale evaluation".[73] This lack of faith in the utility of pain scales and the veracity of self-reporting of pain severity has been reported in other health disciplines. As such this belief also has the potential to affect pain management practice by paramedics if they are found to hold similar beliefs.

At the conclusion of the first stage of the Ricard-Hibon study, physicians involved in the study participated in training sessions that aimed to improve their knowledge of contemporary practice in analgesia and pain measurement. Furthermore, pain protocols were developed to support clinical decision-making and analgesic practice. Following these interventions the study was repeated. There was a statistically

significant improvement in pain scores recorded in the second stage of this study. Sixty seven percent of patients reported adequate pain relief (in contrast with 49% in the first stage). Although the authors claim that the training program and pain protocol produced an improvement in pain relief in this study, almost one third of patients reporting "clinically significant pain" still failed to describe their pain relief as satisfactory. Perhaps this is due to the reported mean dose of intravenous morphine sulphate of 7.2 mg (range 1 to 23 mg), which may represent a conservative and potentially sub-therapeutic does of this drug. The authors also cite four cases where the protocol dose of morphine was not given, although the actual protocol is not cited in this study.[73]

Although the authors cite the increased sensitivity of the VAS as a reason for using this tool for this study, they also highlight potential problems in its use by some patients. Only 87% of patients were reported to be able to self-report pain severity using a VAS in the second stage of this study. Reasons given were language difficulties and cognitive impairment, particularly among some elderly patients.[73]

One disadvantage of pain scales such as the VAS and the NRS is the finite upper limit of the scale. Patients may report an initial score of 10 using a NRS, or indicate their pain to be at the "worst pain imaginable" margin of the VAS. However, if their pain subsequently worsens, these scales do not accommodate this change. While the patient may verbalise this adequately, the inability to capture this as a data point that exceeds the scale's upper limit produces some difficulties in data analysis.

The Adjective Rating Scale (ARS) typically uses five descriptions of pain severity, such as "none", "slight", "moderate", "severe" or "agonising". A numeric score can be assigned to each and the results analysed using non-parametrical methods. While this scale is easy to use, its limitations include a reduced sensitivity to small change in score, and the difficulty in using it when patients have difficulty understanding the terms used, either due to language problems or cognitive impairment. In these cases the scales developed specifically for paediatric patients or for patients with cognitive impairment[74] may be more suitable.

Evidence of Inadequate Analgesia

Studies have demonstrated that pain management is a vital, yet sometimes neglected or inadequately managed, component of the patient care process. Much of the evidence that confirms this belief arises from the study of analgesic use in the hospital emergency department, postoperative, and palliative care settings.[9] The following section will explore and analyse evidence of inadequate analgesia in the prehospital or EMS setting that was identified by the literature search. However, as a small number of studies directly relating to paramedic practice were found, the search was extended to include evidence from the Emergency Department setting. This is a logical extension as many patients treated by paramedics will be transferred to the ED for ongoing care. In addition, the nature of the health emergencies encountered in the ED are similar to cases paramedics encounter in the community.[75,76]

Evidence from the Prehospital or EMS Setting

Early evidence of concerns about the availability of adequate analgesia in EMS can be found in a report by Baskett and Withnell, who in 1970 state that "it is still nearly as unpleasant for a patient to be taken to hospital with a fractured femur or acute urinary retention as it was 30 years ago".[21] However, 30 years later it appears that little has changed, with White *et al* reporting that in 1,073 patients with suspected extremity fractures, just 18 patients (1.8%) received paramedic-initiated analgesia in a setting where morphine and nitrous oxide were available to these patients.[77]

A study conducted just two years later involved a retrospective study of 124 patients with a hospital diagnosis of hip or lower-extremity fracture transported by ambulance paramedics. Although 113 (91.1%) received analgesia in the emergency department, only 22 (18.3%) received prehospital analgesia. Patients given prehospital analgesia received this "almost 2.0 hours sooner that in the ED (mean 28.4 +/- 36 min vs. 146 +/- 74 min after EMS scene arrival, $p < 0.001$)".[78]

Further evidence of inadequate analgesia in the prehospital setting arises from a study of paramedic-initiated analgesia for isolated extremity fractures in a US EMS system. Only 11% of patients reporting pain were found to have received analgesia. Following an education program the incidence of analgesic use rose to 31%.[79] The

authors noted that this represented a significant improvement in analgesic use. Nevertheless this still leaves 69% of patients with untreated pain.

A retrospective study of cases of burns and/or amputations transported by EMS agencies in a region of California during 1996 identified patients who received morphine sulphate. Although the paramedics employed by these agencies were able to administer morphine, just 11% of burns patients and 17% of patients suffering amputation received morphine. The authors conclude morphine is underutilised in these cases.[80] In cases such as these the correlation between the nature of the injury and expected level of pain could be expected to assist the paramedic's clinical decision process regarding the administration of analgesia. If this is not the case then it may be that less obvious origins of pain – for example abdominal pain – may result in an even lower incidence of analgesia. However, this assumption needs to be tested by appropriate research methods.

Despite the availability of effective analgesics, the studies cited suggest that paramedics underutilise these agents. This is confirmed by a study of nalbuphine administration by paramedics in the United Kingdom that measured the frequency of nalbuphine administration against the frequency of administration in the emergency department. Of patients transported by paramedics who required parenteral analgesia in the emergency department, just 41% received prehospital nalbuphine analgesia.[43]

As there was reportedly no parenteral analgesia administered by paramedics in the study setting prior to 1992, this result was viewed positively. Of note were the narrow indications for the drugs use; paramedics were not able to administer nalbuphine for many non-traumatic conditions. This limitation on use may be responsible for the significant percentage of patients who received analgesia in the emergency department, rather than in the prehospital setting.

As reported previously, paramedic-administered opioid analgesia is a relatively new initiative. By 1993, only five (of 65) ambulance services in the UK were using analgesia other than Entonox. Analgesics used by these services were nalbuphine (n=3), diclofenac (n=1), and diamorphine (n=1).[32] While legislative restrictions account for some of these findings, the reluctance of ambulance services medical advisors to support paramedic-administered opioids was noted as a barrier to appropriate administration by the study authors.

Evidence from Emergency Department Studies

One of the early studies into pain management in the ED found that 69% of patients reporting pain waited more than 1 hour while 42% waited more than 2 hours before analgesia was administered. Furthermore, 56% of patients with pain did not receive any analgesia while in the ED.[9]

In a study of emergency department analgesia for fracture pain, 91% of patients were found to have no analgesia administered before referral to the fracture clinic. Following the development and dissemination of an analgesic protocol this number was reduced to 69%. While the reduction is significant, there appears to be potential for further improvements in the number of patients receiving analgesia.[81]

Despite moves to address the problems identified in these and subsequent studies, pain management still fails to meet current benchmarks in some settings. As recently as 2003, an emergency department study of analgesic use for extremity or clavicular fractures found that just 64% of patients received an analgesic, with 42% of these receiving a narcotic analgesic (n=2,828). Patients with moderate or severe pain were more likely to receive an analgesic (73%). Those aged 0 to 3 and those aged 70 or more were less likely to receive analgesia (54%, 58%).[82]

Further confirmation of inadequate analgesia involves a study of patients attending an emergency department (ED) at a Paris university hospital. The authors found that 78% of patients (*n*=726) complained of pain on arrival at the emergency department. Pain severity was assessed using either a 0-10 numeric rating scale (NRS) or a verbal pain intensity scale (VPIS). The VPIS required the patient to classify their pain as "low", "moderate", "intense" or "extremely intense". Pain was categorised as "intense" in 54% of cases. Three hundred and eighty four patients were reported to have reported their pain severity during the initial assessment in the emergency department, and at discharge. Insufficient pain relief was reported by 77% of these patients.[83] This study also found that patients who were unaccompanied were more likely to report unrelieved pain (47% vs. 57%, $P<0.002$). Conclusions may be that lack of an advocate for the relief of their pain or that fear of inadequate social support influenced the patients' perception of pain in these cases.

The "risk markers" that identified inadequate pain relief were found to be "moderate or low pain intensity, no intervention in the ED before medical examination, and no use of medication before arrival".[83] A limitation of this study is the inability to identify the type of medication administered to patients prior to arrival at the ED, or whether this was self-administered or provided by other health care providers. Although the authors make comment about the role of the Service d'Aide Medicale Urgente (SAMU) ambulance service in delivering patients to the ED or admitting directly to intensive care unit, no data identifies the SAMU in the provision of patient analgesia prior to arrival at the ED.

The influence that prehospital analgesia has on subsequent treatment in the ED is also identified as an important factor affecting pain management in a study undertaken by Vassiliadis *et al*[84] involving patients with femoral neck fractures arriving by ambulance at the ED of a major teaching hospital in the western Sydney region. This retrospective study examined the pain management of 128 patients transported to the ED by the Ambulance Service of New South Wales, where the admission diagnosis was fractured neck of femur (NOF). Forty nine percent of patients transported by ambulance did not receive analgesia, with the authors concluding that paramedics are "unwilling or unable to provide analgesia for patients with fractured NOF".[84] While this finding is significant, an equally important finding was that patients who did receive analgesia from paramedics were assigned a higher (more time critical) triage category on arrival at the ED, and were more promptly given pain relief in the ED. The median time to ED analgesia was 1 h 35 min in the prehospital analgesia group, and 3 h 38 min in the group that did not receive prehospital analgesia. While this finding appears to be consistent with that of Tcherny-Lessenot *et al*,[83] the study by Vassiliadis *et al*[84] did not attempt to assess unrelieved pain at discharge. Nevertheless, prehospital pain relief has been shown to have an important influence on pain management in the ED setting.

Interestingly, the Vassiliadis *et al* study was unable to assess patient self-report of pain severity, as pain scales were not used by paramedics or by ED staff. Instead, the authors relied on patient notes to grade the pain as "none, mild, moderate or severe". This creates potential errors in identifying the true extent and severity of pain in the study population. Underreporting of pain is more likely to occur in elderly patients (the median age of patients in the study was 82) and those with cognitive

impairment.[37] Vassiliadis and colleagues found that thirty-two percent of patients had a Glasgow Coma Score (GCS) of less than 15. However, while the authors state that the GCS "had no influence on whether or not analgesia was prescribed in the prehospital or ED setting", the true incidence of pain in this study is unknown.[84]

Although provision of analgesia was also apparently unaffected by whether or not the patient told the paramedic that they had pain, in a retrospective study such as this the difficulties in verifying this are obvious. Patients in pain may not have revealed their pain unless asked.

Barriers to Effective Analgesia

While knowledge of pain physiology and analgesic pharmacology has increased in recent years, there is substantial evidence that advances in pain management practice have not kept pace. In highlighting the societal and economic implications of inadequate pain management, particularly chronic pain, Cousins maintains that "there is a huge gap between knowledge and practice, and this gap is, in fact, widening as the knowledge increases almost exponentially."[85]

While there has been significant work done to implement evidence-based pain management practice in Australian emergency departments,[12 86 87] there has been little comparable work on closing theory-practice gaps in EMS settings.

Emergency Medical Services (EMS) have tended to lag behind other disciplines in developing a discipline-specific evidence base to guide practice. However, the awareness of this issue is increasing due to work by agencies such as the United States National Highway Traffic Safety Administration (NHTSA). Given that aspects of prehospital care have come under scrutiny due to lack of evidence of the efficacy of some paramedic interventions, the NHTSA recommended that conditions and diseases encountered in the prehospital setting be prioritised to enable the development of studies that measure the outcomes of prehospital care for these high-priority conditions. An additional recommendation was that measures for outcome and risk adjustment be developed. This project was subsequently established as the Emergency Medical Services Outcomes Project (EMSOP).[88]

The EMSOP researchers ranked the frequency of 27 categories of medical, trauma and other conditions after analysing patient report forms submitted by EMS in several states and counties in the United States. Expert opinion was then used to re-rank each of the 27 conditions on the basis of the potential effect that EMS interventions may have on these conditions. For each, the importance and potential impact of EMS intervention on outcome in several categories – death, disease, disability, discomfort, dissatisfaction, and destitution - was calculated. This process identified "discomfort", which includes pain, as a priority condition for prehospital outcomes-based research. This is significant given that "almost no work has evaluated the effect of EMS care on non-mortality outcome measures."[88]

In a further critique of evidence relating to emergency EMS interventions in the prehospital setting, Callaham finds a paucity of evidence arising from controlled studies, such as randomised controlled trials (RCTs). The author further questions the focus on "life saving" interventions, given that the "majority of EMS patients have far more chronic, complex problems that are not amenable to a simple quick fix in the field."[30] If this assessment is accurate, researchers need to turn their attention to conditions where paramedics are able to demonstrate a significant contribution to a broader range of patient outcomes. Callahan emphasises the importance of ensuring that relief of patients' pain and distress is a primary goal, and suggests that effective pain management should perhaps be "the major focus of EMS."[30]

While research into pain management practice in EMS is currently limited, there is evidence of research in other health disciplines that explores barriers to pain relief. Inadequate knowledge regarding contemporary pain management practice, phobias about opioid addiction, and overconfidence in nurses' judgement about patients' pain levels are cited as reasons for poor pain management practice in a study by Lander, involving 63 nurses working in medical, surgical and paediatric settings.[89] This study found that most nurses surveyed incorrectly believed that addiction was very likely to occur in cases of short-term opioid administration. Just as concerning, only 64.4% believed that patients accurately report their pain. Instead, nurses believed that their clinical judgement provided a more reliable estimate of patients' pain than self-reporting. Length of nursing experience was not associated with any variable in this study, suggesting that fallacies developed as a novice were resistant to change following extensive clinical experience.

Solomon's review of the literature concerning the correlation between the patients' and health professionals' rating of pain discovered evidence that health professionals tend to underestimate pain.[58] While it could be expected that more experienced clinicians would demonstrate greater acuity and accuracy in pain assessment that correlates more strongly with the patient's self-report of pain, paradoxically this is not the case; the greater the clinical experience the greater the degree of underestimation of pain severity.

The theory that a habitual discounting of pain by health professionals acts as a protective psychological barrier or inoculation against frequent exposure to pain has also been espoused by Choiniere *et al*,[91] who found that nurses underestimated pain severity reported by burns patients. This presumably adaptive way that physicians and other health professionals conceptualise the patients' pain than makes it easier to "ignore their patients' expectations of pain relief".[90] If this behaviour can be generalised in its application to other health settings then it is possible that paramedics are also adopting this behaviour in their assessment of pain in the prehospital setting.

Knowledge about the physiology of pain and of contemporary approaches to pain management may also affect the quality of patient care. In a study involving nurses in several clinical units within a large teaching hospital in the US aimed to identify knowledge, attitudes and clinical practice in the area of pain management, the authors discovered significant knowledge deficits, particularly in the difference between acute and chronic pain, non-pharmacological analgesic interventions, and the physiology of pain. Barriers to pain management identified by nurses were cited as the patients' reluctance to report pain, and the patients' unwillingness to accept opioids for pain relief.[62] These findings represent beliefs reported by the nursing respondents in this study: the actual incidence of patients withholding information about their pain is not reported. If the actual incidence can be confirmed, a reticence to report pain represents a communication barrier that may be addressed by strategies that aim to overcome this barrier. However, what is not explored is the nurses' role in adopting a questioning technique that encourages the patient to reveal the true extent of their pain.

The belief that patients commonly refuse analgesia is also not supported by data showing the actual incidence. For example, one study identified 2 patients (from a total study number of 128) that refused analgesia.[84] If patient refusal of analgesics is an issue, consideration must be given to whether refusal is related to a perception that opioids such as morphine are drugs of abuse that carry the potential for addiction. Although society may have a negative perception of heroin as a dangerous drug of abuse, this drug is available for clinical use in the UK in the form of diamorphine. If patients realises that diamorphine was heroin, the negative societal perception may influence the patient's willingness to consent to administration of this drug.

Although Clarke *et al*[62] analysed the correlation between the intensity of personal pain experienced by nurses and their use of self-assessment tools for evaluating the patients' pain, no correlation was discovered. The decision to investigate this possible association was influenced by the work Holm and colleagues[92] cited by Clarke, who discovered that the nurses' personal experience of pain significantly influenced their assessment of a patient's pain.

Ferrell and colleagues identified general under treatment of pain and the acceptance of the patient's self-reports of pain as the two most commonly reported ethical issues that respondents believed they lacked the ability to manage. Comments from respondents indicated a "tendency for practitioners, both family and specialists, to pass their own judgement on the patient's pain, and worse, to label some patients with reasonable and justified reasons for having pain as 'addicts'."[93]

In the prehospital setting, paramedics generally have access to effective analgesic agents, and their clinical management of a patient's pain is usually aided by practice guidelines whose scope should ensure that patients achieve good levels of pain relief, particularly in cases of acute pain. The limited evidence however, suggests that pain management in the prehospital setting is constrained by issues that have been found to inhibit effective analgesia in other health settings. Clinical practice guidelines inform pain management, however the effectiveness of pain management relies of the clinical decision making abilities of the paramedic. While studies have investigated the need to develop clinical decision making skills to improve pain management practice,[94-96] several other barriers need to be addressed. Solomon relates the importance of identifying the barriers before designing and implementing

corrective action; "It is important to distinguish between error associated with inaccurate assessment and error associated with biased assessments."[58] The latter is expanded in the next section.

Attitudes of Health Professionals

Findings from several studies have identified health carer attitudes as a barrier to effective pain management.[62 97-102] These findings have identified similar attitudes among occupational and physical therapists, nurses, and physicians working in a range of clinical settings.

In a large study involving over 500 nurses, Brunier *et al* found that very few nurses strongly believed that patients ought to achieve a pain-free state. Concerns regarding potential for addiction and respiratory depression were identified; however, the perceived incidence was very much greater than the actual incidence reported in the literature. Twenty seven percent of respondents did not agree that the patients' self-report of pain could be believed, and 44% "falsely agreed with the statement that the estimation of pain by a physician or nurse is more valid than the patient's self-report."[103] These authors highlight the finding that over 20 years of research and recommendations regarding pain management has not eliminated significant gaps in the assessment, documentation, treatment and evaluation of pain.

As in other areas of paramedic practice, there is very little published evidence investigating the attitudes of paramedics in relation to pain management. One such study was focus of an investigation by Jones and Machen.[104] The authors cite only one other study that investigates the paramedics' perceptions of pain relief.[68] However, the cited paper reveals that the investigators captured knowledge relating to analgesic practice – such as indications for use of analgesics, and advantages or disadvantages associated with their use – but did not aim to examine or report paramedics' attitudes relating to pain management. As such, the Jones and Machen study represents the only published study to date that investigates paramedics' attitudes and beliefs regarding analgesic practice. Still, this study has some significant faults in the interpretation of the data.

Jones and Machen aimed to "explore paramedics' perceptions of the evaluation of patients in pain and the factors which influence their pain management decisions."[104]

They did this by recruiting six paramedics from a UK ambulance service and used semi-structured interviews to capture their attitudes. The authors claim that the paramedics recruited for this study were "knowledgeable, reflective and, most importantly, willing to talk about their experiences."[104] This sample is both small in number and unrepresentative of the study population. Furthermore, the fact that the principle researcher was a colleague of the participants creates the potential for further bias.

The researchers describe the themes that are explored through the use of nine open-ended questions. These ask the participants to describe factors that influence the patient's experience of pain, the integrity of the self-report of pain provided by the patient, methods employed by paramedics to recognise pain and assess severity, and the types of injury that typically indicated a need for analgesia. Respondents were also asked about factors that may influence their decision to provide or withhold analgesia, and were invited to discuss non-pharmacologic options for analgesia. Content analysis was the qualitative methodology employed to analyse the data arising from the interviews.

The authors describe beliefs regarding the patient's perception of pain, with respondents indicating a belief that older patients perceive pain differently to younger people, and that different cultures express pain in different ways. The explanation for the former belief was that the elderly have been desensitised to pain due to more encounters with pain during their lifespan, and the fact that the elderly are more likely to experience pain given the increased frequency of painful pathologies associated with aging. While the latter is established, evidence relating to differences in pain perception with increasing age are inconclusive.[105]

Cultural differences can affect the expression of pain. However, clear differences are confounded by differing pain experiences, as well as socio-economic and educational variables, which prevent clear correlations between race and pain expression or perception. Furthermore, the diversity of research settings and methods used to seek answers to questions about ethnicity and pain have made it difficult to identify to conclusive answers.[106]

While patients have differing ways of expressing pain, at least one respondent in the Jones and Machen study sought to rationalise a perceived difference in cultural expression of pain as a type of attention seeking behaviour.

When analysing responses regarding the paramedics' methods of evaluating pain, Jones and Machen reportedly found that paramedics used the patients' behaviour as a reliable indication of pain. While behaviour cues are valid when assessing pre-verbal children and the cognitively impaired, the use of behaviour of patients in pain can be affected by the personal interpretation of the observer. This is evident in the narrative offered by one paramedic:

> *"People who are in a lot of pain try to help you as much as they can, as opposed to just wailing on the floor. People who are genuinely in pain, if you ask them to talk they'll talk because they want to get rid of the pain."*[104]

The implication arising from this statement is that patients who suppress their expression of pain are more "genuine", and are therefore more likely to receive appropriate care. Furthermore, the statement indicates that overt expressions of pain are seen as signs of malingering. However, the authors did not explore this theme further, or highlight the incongruity of this belief. Paramedics tacitly identified stoicism in the face of pain as a positive trait, and used this as a benchmark for patients to aspire to. Patients who failed to meet the paramedics' benchmark for appropriate behaviour associated with pain may have been viewed as being undeserved of analgesia. If those who chose to bear their pain quietly are seen as the normal standard of behaviour in response to pain, there is a risk that patients with more overt behavioural responses to pain may be disbelieved.

Although respondents indicated that they scored pain using a 1-10 numeric rating scale, there was evidence paramedics questioned the scale's validity and reliability. This is evident in comments expressed by study participants that "most people always answer 10 as they want to be treated as soon as possible." Doubts about the integrity of the patient's self-report are reinforced by comments suggesting that paramedics believe patients are not honest about their true level of pain severity. As such, the respondents tended to place emphasis on their own observations of apparent injury, non-verbal behaviour, and clinical findings such as signs of enhanced

autonomic nervous system activity as a means of confirming the presence and severity of pain.

This study presents evidence that paramedics' attitudes are inconsistent with contemporary pain management practice. However, as their pain management practice was not evaluated, no conclusions can be drawn about the impact on clinical practice. However, if the paramedic's assessment of the patient's account of their pain is inconsistent with their other clinical findings, then the patient may not receive adequate, or any, analgesia. This finding is confirmed by the statement obtained from one of the paramedics, where they indicate that in order to administer an analgesic, "I have to believe they are in moderate to severe pain so if I don't think, even, they can scream as loud as they like, if I don't believe it's genuine pain I won't give them a drug."[104] Paramedics were also reticent to treat chronic pain and conditions such as back and abdominal pain where the source of the pain was not easily observed.

The authors appear to support contemporary pain measurement practice that validates the importance of patient self-report of pain severity as a reliable indicator of pain intensity by citing a paper that criticised paramedic interpretation of the patients' pain. Yet there is also tacit support for the value of paramedic experience, judgement and intuition in assessing pain and validating the patient's self-report.

Perhaps the most remarkable outcome of this study is the authors' failure to acknowledge the extent of the disparity of opinions expressed. Attitudes reported in this paper are inconsistent with contemporary practice. Instead, the authors conclude that "small deficits in knowledge have been uncovered and areas highlighted where additional training would be of benefit."[104] Recognition of the dysfunctional nature of the attitudes elicited by this study may have been more likely if the author was not a member of the study milieu, as this relationship may have inhibited the publication of negative comments relating to peers.

Some of the attitudes identified in this study are consistent with those identified in studies of nurse attitudes. However, the potential impact on practice is likely to be greater in the paramedic setting as the paramedic is responsible for the decision to initiate analgesia. In contrast, while pain management practice can be affected by the prevailing attitudes of nursing staff, the initial decision to prescribe the analgesics remains the responsibility of the physician.

Physicians and other health professionals have a moral obligation to relieve a patient's pain. Yet evidence suggests that this duty to uphold and apply the principles of beneficence is regularly ignored, a claim which is supported by evidence that "caregivers routinely, often deliberately, under-medicate patients in pain".[107] The health professional's prevailing attitudes must account for some of these findings. Yet while the literature frequently provides evidence of health carer attitudes that are inconsistent with contemporary pain management standards,[108] there are few published theories to explain these findings.

Pain Management Education

Although the relief of suffering is a fundamental role of a physician, the historical separation between mind and body proposed by Descartes in order to satisfy the churches' rights to the spiritual domain has left physicians with responsibility for just the physical person. As Cassell points out, "in that religious age, 'person,' synonymous with 'mind,' was necessarily off-limits to science".[109] The fact that suffering (and pain) can occur in the absence of any physical manifestation tends to associate pain with the mind, and this may have contributed to a lack of emphasis on the concept of suffering in medical education programs, and an interrelated failure to address the management of pain. However, this does not adequately explain why a lack of compassion is associated with some pain management practice.

Ruddick supports the view that medical training inculcates a "peculiar concept of pain" (as a useful symptom for exploring disease) that inhibits the effective management of a patient's pain and suffering.[90] However this author also views an apparently callous and insensible approach to pain management as a protective mechanism designed to shield physicians from the pain they frequently encounter and cause. This view of pain eventually replaces their prior lay – and possibly patients' – perception of pain.

In an editorial published in 1987 by prominent pain specialists Melzack and Liebeskind, the authors decry the needless pain, suffering and decreased quality of life resulting from inadequate analgesia. Particular attention is given to the very young and elderly, who tend to be most at risk of inadequate analgesia.[110] These

authors believe that the "answer to this enormous world health problem lies in education".

While education may assist in addressing this problem, the effectiveness of educational interventions in changing pain practice have been questioned.[111] For education to be effective, a rigorous analysis of the nature of the knowledge deficit is mandated. Desired learning outcomes span knowledge, skills and attitudes. Differing approaches to instructional design are employed to achieve each type of learning outcome, yet the precise type of educational gap is not often identified in educational programs that aim to improve the clinicians' ability to manage pain. Lack of attention to the analysis, design, development and evaluation of such educational programs may be the reason for apparent failures to change clinical practice.

Research conducted by Francke and colleagues discovered that the introduction of an education program that aimed to improve pain assessment and pain management practice among nurses at five Dutch hospitals did not increase the incidence of activities related to obtaining a patient's pain history. Although not statistically significant, the use of questioning techniques by nurses to evaluate the patient's pain, and the use of pain rating scales, actually declined following the education program.[112] The lack of direct questioning by nurses to identify the nature of the patient's pain has parallels with the Clarke *et al* study,[62] where the nurses believed that patients were reluctant to reveal their pain status. The authors of the Dutch study relate assumptions about the lack of change in practice despite a concerted educational strategy. Specifically, they believe that "nurses' limited openness to new approaches, a lack of support from physicians and nurse supervisors, and that program items were not translated into ward policy" were potential barriers to practice reform. When nurse participants were interviewed about the lack of practice change, they admitted that only practice changes considered to be "very important" were likely to influence their daily practice routines.[112]

This finding highlights the importance of the problem analysis and design stage of an education program that aims to reduce gaps in knowledge relating to pain management. While the apparent problem may be a deficit in knowledge – for example knowledge of pain scoring tools and the importance of patient self-reporting of pain – change in practice may not occur if the carer's beliefs and values are not

addressed by educational strategies. Furthermore, carers may hold appropriate beliefs regarding the assessment of pain, and have available suitable tools for pain measurement, yet fail to engage in this practice if their peers do not share their views. Change in pain measurement practice in an EMS setting is also unlikely to occur unless the employer values and supports change, sets performance benchmarks and regularly audits compliance with these benchmarks.

Conclusion

Although the literature regarding pain management in the prehospital setting is scant when compared with research efforts within other health disciplines, the extant data provides some evidence that factors affecting health professionals' judgements and practice in caring for patients with pain may also apply to the paramedic practice setting.

There is widespread agreement within the literature that, despite concerted efforts to raise the profile of pain management, promulgate clinical practice guidelines, and to improve the education of health professionals, effective pain relief is still elusive in a significant number of health settings. There are however, disagreements regarding reasons for this knowledge/practice gap. While some advocate increased emphasis on education and policy, others have demonstrated that attitudes may be resistant to educational strategies designed to achieve change.

Given the availability of effective analgesics and techniques for administration that can alleviate pain or achieve pain-free states in the majority of patients, it is difficult to defend inadequate analgesia when health professionals have a duty of care to ensure that they effectively manage patients' pain and suffering.

In examining the paramedic literature, it is evident that significant gaps exist in the current knowledge base. These gaps are particularly apparent in the areas of the epidemiology of pain, and in the identification of attitudes, beliefs and values held by paramedics in relation to pain management. As such this thesis aims to address these gaps by describing the status of pain management in a major Australian urban setting. This research will also identify the nature and cause of barriers that may influence the effectiveness of pain management practice in the prehospital setting.

The following chapter presents the methods and results of an epidemiological study of pain management in Victoria, which is followed by a qualitative investigation of paramedics' attitudes to pain management in the prehospital setting.

List of References

1. Craig KD. The social communication model of pain. Canadian Psychology 2009; 50(1):22-32.

2. Benini A, DeLeo JA. René Descartes' physiology of pain. Spine 1999; 24(20):2115-19.

3. Melzack R, Wall PD. Pain mechanisms: a new theory. Science 1965; 150:971-9.

4. Devor M. Response of nerves to injury in relation to neuropathic pain. In: McMahon SB, Koltzenburg M, editors. Wall and Melzack's textbook of pain. 5th edition. Philadelphia: Elsevier Churchill Livingstone, 2006: 905-28.

5. Labus JS, Keefe FJ, Jensen MP. Self-reports of pain intensity and direct observations of pain behaviour: when are they correlated? Pain 2003; 102:109-24.

6. Osborn J, Derbyshire SW. Pain sensation evoked by observing injury in others. Pain 2010; 148(2):268-74.

7. Cousins MJ, Brennan F, Carr DB. Pain relief: a universal human right. Pain 2004; 112(1-2):1-4.

8. Lohman D, Schleifer R, Amon JJ. Access to pain treatment as a human right . BMC Medicine 2010; 8(8):doi:10.1186/1741-7015-8-8.

9. Wilson JE, Pendleton JM. Oligoanalgesia in the emergency department. Am J Emerg Med 1989; 7(6):620-3.

10. Australian and New Zealand College of Anaesthetists. Guidelines on acute pain management. Professional Document PS41 [Web Page]. October 2000; Available at http://www.anzca.edu.au/publications/profdocs/profstandards/PS41_2000.htm. (Accessed 20 December 2002).

11. Australian and New Zealand College of Anaesthetists. Statement on patients' rights to pain management and associated responsibilities: Professional Standard No. 45. Australian and New Zealand College of Anaesthetists, 2008.

12. Macintyre PE, Schug SA, Scott DA, Visser EJ, Walker SM. Working Group of the Australian and New Zealand College of Anaesthetists and Faculty of Pain Medicine. Acute pain management: scientific evidence. 3rd edition. Melbourne: Australian and New Zealand College of Anaesthetists and Faculty of Pain Medicine, 2010.

13. Gray A, Johnson G, Goodacre S. Paramedic use of nalbuphine in major injury. Eur J Emerg Med 1997; 4(3):136-9.

14. Kober A, Scheck T, Greher M *et al*. Prehospital analgesia with acupressure in victims of minor trauma: a prospective, randomized, double-blinded trial. Anesth Analg 2002; 95(3):723-7.

15. Vergnion M, Degesves S, Garcet L, Magotteaux V. Tramadol, an alternative to morphine for treating posttraumatic pain in the prehospital situation. Anesth Analg 2001; 92(6):1543-6.

16. McLean SA, Maio RF, Domeier RM. The epidemiology of pain in the prehospital setting. Prehosp Emerg Care 2002; 6(4):402-5.

17. Johnston CC, Gagnon AJ, Fullerton L, Common C, Ladores M, Forlini S. One-week survey of pain intensity on admission to and discharge from the emergency department: a pilot study. J Emerg Med 1998; 16(3):377-82.

18. Tanabe P. Pain management practices in the emergency department Chicago, Illinois: University of Illinois at Chicago, 1996.

19. Cordell WH, Keene KK, Giles BK, Jones JB, Jones JH, Brizendine EJ. The high prevalence of pain in emergency medical care. Am J Emerg Med 2002; 20(3):165-9.

20. Yealy DM. Prehospital pain research. Ann Emerg Med 1996; 27(4):471-3.

21. Baskett PJ, Withnell A. Use of Entonox in the ambulance service. BMJ 1970; 2(700):41-3.

22. Waters EM, Gerstner HB, Huff JE. Trichloroethylene: an overview. J Toxicol Environ Health 1977; 2:671-707.

23. McKinnon KD. Prehospital analgesia with nitrous oxide/oxygen. Can Med Assoc J 1981; 125(8):836-40.

24. Stewart RD, Paris PM, Stoy WA, Cannon G. Patient-controlled inhalational analgesia in prehospital care: a study of side-effects and feasibility. Crit Care Med 1983; 11(11):851-5.

25. Donen N, Tweed WA, White D, Guttormson B, Enns J. Pre-hospital analgesia with Entonox. Can Anaesth Soc J 1982; 29(3):275-9.

26. Ferrell BR, Novy D, Sullivan MD *et al*. Ethical dilemmas in pain management. J Pain 2001; 2(3):171-80.

27. Thal ER, Montgomery SJ, Atkins JM, Roberts BG. Self-administered analgesia with nitrous oxide. Adjunctive aid for emergency medical care systems. JAMA 1979; 242(22):2418-9.

28. Symes D. First at the scene: the relief of pain at an accident. Entonox has proved to be a valuable and relatively safe analgesic. Nursing Times 1979; 75(28):1173.

29. Wright CJ, McDowall DG, Wilson J, Hain WR, Furness R, Daykin JH. Pre-mixed nitrous oxide-oxygen analgesia in the ambulance service. Anaesthesia 1972; 27(4):459-60.

30. Callaham M. Quantifying the scanty science of prehospital emergency care. Ann Emerg Med 1997; 30(6):785-90.

31. Johnson JC, Atherton GL. Effectiveness of nitrous oxide in a rural EMS system. J Emerg Med 1991; 9(1-2):45-53.

32. Chambers JA, Guly HR. The need for better pre-hospital analgesia. Arch Emerg Med 1993; 10(3):187-92.

33. National Occupational Health & Safety Commission. Exposure standards: nitrous oxide [Web Page]. nd; Available at

www.nohsc.gov.au/OHSInformation/Databases/ExposureStandards/. (Accessed 12 October 2003).

34. Ancker K, Halldin M, Gothe CJ. Nitrous-oxide analgesia during ambulance transportation. Airborne levels of nitrous oxide. Acta Anaesthesiol Scand 1980; 24(6):497-500.

35. Anonymous. Use of nitrous oxide:oxygen mixtures in prehospital emergency care. National Association of Emergency Medical Services Physicians. Prehospital Disaster Med 1990; 5(3):273-4.

36. Bradbury N. Ambulances left without pain relief [Web Page]. 27 February 2001; Available at www.labor.net.au/news/812.html. (Accessed 1 June 2003).

37. National Health and Medical Research Council (NHMRC). Acute pain management: scientific evidence. Canberra: Commonwealth of Australia, 1999.

38. Gabbay DS, Dickinson ET. Refusal of base station physicians to authorize narcotic analgesia. Prehosp Emerg Care 2001; 5(3):293-5.

39. Baskett PJ. The use of entonox in the ambulance service. Proceedings of the Royal Society of Medicine 1972; 65(1):7-8.

40. Chambers JA, Guly HR. Prehospital intravenous nalbuphine administered by paramedics. Resuscitation 1994; 27(2):153-8.

41. Wollard M, Jones T, Pitt K, Vetter N. Hitting them where it hurts? Low dose nalbuphine therapy. Emerg Med J 2002; 19:565-70.

42. Stene JK, Stofberg L, MacDonald G, Myers RA, Ramzy A, Burns B. Nalbuphine analgesia in the prehospital setting. Am J Emerg Med 1988; 6(6):634-9.

43. Hyland-McGuire P, Guly HR. Effects on patient care of introducing prehospital intravenous nalbuphine hydrochloride. J Accid Emerg Med 1998; 15(2):99-101.

44. Johnson GS, Guly HR. The effect of pre-hospital administration of intravenous nalbuphine on on-scene times. J Accid Emerg Med 1995; 12(1):20-2.

45. Gallagher EJ, Liebman M, Bijur PE. Prospective validation of clinically important changes in pain severity measured on a visual analog scale. Ann Emerg Med 2001; 38(6):633-8.

46. Houlihan KP, Mitchell RG, Flapan AD, Steedman DJ. Excessive morphine requirements after pre-hospital nalbuphine analgesia. J Accid Emerg Med 1999; 16(1):29-31.

47. Robinson N, Burrows N. Excessive morphine requirements after pre-hospital nalbuphine analgesia.[comment]. J Accid Emerg Med 1999; 16(5):392.

48. Bruns BM, Dieckmann R, Shagoury C, Dingerson A, Swartzell C. Safety of pre-hospital therapy with morphine sulphate. Am J Emerg Med 1992; 10(1):53-7.

49. Hatlestad D. Pain management in the field. Emerg Med Serv 2001; 30(10):64-70.

50. Komesaroff D. Pre-hospital pain relief: Penthrane or Entonox? Aust J Emergency Care 1995; 2(2):28-9.

51. Thomas W. Methoxyflurane, can it be used in the emergency department? Aust Emerg Nurs J 1997; 1(3):13-5.

52. Komesaroff D. The "Penthrox Inhaler":a new simple device for oxygen therapy with or without pain relief. "Spark of Life" International Conference. Australian Resuscitation Council, 1993.

53. Hodgkinson K. The use of Penthrane for patients with severe back pain transported by non-emergency ambulance services. Response 1997; 18-9.

54. Kelly AM, Powell CV, Williams A. Parent visual analogue scale ratings of children's pain do not reliably reflect pain reported by child. Pediatr Emerg Care 2002; 18(3):159-62.

55. Guru V, Dubinsky I. The patient vs. caregiver perception of acute pain in the emergency department. J Emerg Med 2000; 18(1):7-12.

56. Zalon ML. Nurses' assessment of postoperative patients' pain. Pain 1993; 54(3):329-34.

57. Teske K, Daut RL, Cleeland CS. Relationship between nurses' observations and patients' self-reports of pain. Pain 1983; 16(3):289-96.

58. Solomon P. Congruence between health professionals' and patients' pain ratings: a review of the literature. Scand J Caring Sci 2001; 15(2):174-80.

59. McCaffery M, Ferrell BR, Pasero C. Nurses' personal opinions about patients' pain and their effect on recording assessments and titration of opioid doses. Pain Mgmt Nurs 2000; 1(3):79-87.

60. Luger TJ, Lederer W, Gassner M, Lockinger A, Ulmer H, Lorenz IH. Acute pain is underassessed in out-of-hospital emergencies. Acad Emerg Med 2003; 10(6):627-32.

61. Eder SC, Sloan EP, Todd K. Documentation of ED patient pain by nurses and physicians. Am J Emerg Med 2003; 21(4):253-7.

62. Clarke EB, French B, Bilodeau ML, Capasso VC, Edwards A, Empoliti J. Pain management knowledge, attitudes and clinical practice: the impact of nurses' characteristics and education. J Pain Symptom Manage 1996; 11(1):18-31.

63. Chu SL, Browne GJ, Lam LT. Traction splinting of femoral shaft fractures in a paediatric emergency department: time is of the essence? Emerg Med (Fremantle) 2003; 15(5/6):447-52.

64. Ramelet A, Rees NW, McDonald S, Bulsara MK, Huijer Abu-saad H. Clinical validation of the Multidimensional Assessment of Pain Scale. Pediatr Anesth 2007; 17(12):1156-65.

65. Merkel SI, Voepel-Lewis T, Shayevitz JR, Malviya S. The FLACC: a behavioral scale for scoring postoperative pain in young children. Pediatr Nurs 1997; 23(3):293-7.

66. Wong D, Baker C. Pain in children: comparison of assessment scales. Pediatr Nurs 1988; 14(1):9-17.

67. Maio RF, Garrison HG, Spaite DW *et al*. Emergency Medical Services Outcomes Project (EMSOP) IV: pain measurement in out-of-hospital outcomes research. Ann Emerg Med 2002; 40(2):172-9.

68. Clarke TNS, Ennis BP, Joicey P, Meehan C. Paramedic administered analgesia - an appraisal of current practice. Prehospital Immediate Care 1998; 2:123-7.

69. Chapman CR, Syrjala KL. Measurement of pain. Loeser J.D., Ed. Bonica's management of pain. 3rd edition. Philadelphia: Lippincott Williams & Wilkins, 2001: 310-28.

70. Berthier F, Potel G, Leconte P, Touze MD, Baron D. Comparative study of methods of measuring acute pain intensity in an ED. Am J Emerg Med 1998; 16(2):132-6.

71. Bijur PE, Latimer CT, Gallagher EJ. Validation of a verbally administered numerical rating scale of acute pain for use in the emergency department. Acad Emerg Med 2003; 10(4):390-2.

72. Ricard-Hibon A, Leroy N, Magne M. Evaluation of acute pain in prehospital medicine. Ann Fr Anesth Reanim 1997; 16(8):945-9.

73. Ricard-Hibon A, Chollet C, Saada S, Loridant B, Marty JA. A quality control program for acute pain management in out-of-hospital critical care medicine. Ann Emerg Med 1999; 34(6):738-44.

74. Abbey J, Piller N, De Bellis A *et al*. The Abbey pain scale: a 1-minute numerical indicator for people with end-stage dementia. Int J Palliat Nurs 2004; 10(1):6-13.

75. Pargeon KL, Hailey BJ. Barriers to effective cancer pain management: a review of the literature. J Pain Symptom Manage 1999; 18:358-68.

76. Oden R. Acute postoperative pain: incidence, severity and etiology of inadequate treatment. Anesthesiol Clin North Am 1989; 7:1-5.

77. White LJ, Cooper JD, Chambers RM, Gradisek RE. Prehospital use of analgesia for suspected extremity fractures. Prehosp Emerg Care 2000; 4(3):205-8.

78. McEachin CC, McDermott JT, Swor R. Few emergency medical services patients with lower-extremity fracture receive prehospital analgesia. Prehosp Emerg Care 2002; 6(4):406-10.

79. Lovesky D, Bird S, Restuccia M, Mangolds G, Dickson EW. Effect of a paramedic pain management training program on pre-hospital analgesic use. Acad Emerg Med 2003; 10(5): 450.

80. Kozac RJ, Chapman C, Hart MM. Utilization of pain medication in the out-of-hospital setting. Prehosp Emerg Care 1997; 1(3):180.

81. Goodacre SW, Roden RK. A protocol to improve analgesia use in the accident and emergency department. J Accid Emerg Med 1996; 13:177-9.

82. Brown JC, Klein EJ, Lewis CW, Johnston BD, Cummings P. Emergency department analgesia for fracture pain. Ann Emerg Med 2003; 42(2):197-205.

83. Tcherny-Lessenot S, Karwowski-Soulié F, Lamarche-Vadel A, Ginsburg C, Brunet F, Vidal-Trecan G. Management and relief of pain in an emergency department from the adult patients' perspective. J Pain Symptom Manage 2003; 25(6):539-46.

84. Vassiliadis J, Hitos K, Hill CT. Factors influencing prehospital and emergency department analgesia administration to patients with femoral neck fractures. Emerg Med (Fremantle) 2002; 14(3):261-6.

85. Cousins MJ. Pain: the past, present and future of anesthesiology? Anesthesiology 1999; 91(2):538-51.

86. National Institute of Clinical Studies. Evidence-practice gaps report, Volume 1. Melbourne: NICS, 2003.

87. National Institute of Clinical Studies. Evidence-Practice Gaps Report Volume 1: A review of developments: 2004-2007. Canberra: National Health and Medical Research Council, 2008.

88. Maio RF, Garrison HG, Spaite DW *et al*. Emergency medical services outcomes project I (EMSOP I): prioritizing conditions for outcomes research. Ann Emerg Med 1999; 33(4):423-32.

89. Lander J. Fallacies and phobias about addiction and pain. Br J Addict 1990; 85(6):803-9.

90. Ruddick W. Do doctors undertreat pain? Bioethics 1997; 11(3-4):246-55.

91. Choiniere M, Melzack R, Girard N, Rondeau J, Paquin MJ. Comparisons between patients' and nurses' assessment of pain and medication efficacy in severe burn injuries. Pain 1990; 40(2):143-52.

92. Holm K, Cohen F, Dudas S, Medema PG, Allen BL. Effect of personal pain experience on pain assessment. J Nurs Scholarship 1989; 21(2):72-5.

93. Ferrell BR, Novy D, Sullivan MD *et al*. Ethical dilemmas in pain management. J Pain 2001; 2(3):171-80.

94. Hamers JPH, van den Hout MA, Halfens RJG, Abu-Saad HH, Heijltjes AEG. Differences in pain assessment and decisions regarding the administration of analgesics between novices, intermediates and experts in pediatric nursing. Int J Nurs Stud 1997; 34(5):325-34.

95. Lander J. Clinical judgements in pain management. Pain 1990; 42(1):15-22.

96. Lander J. Strategies to improve clinical judgements about pain. Percept Mot Skills 1997; 84(2):573-4.

97. Levin ML, Berry JI, Leiter J. Management of pain in terminally ill patients: physician reports of knowledge, attitudes, and behavior. J Pain Symptom Manage 1998; 15(1):27-40.

98. Brown ST, Bowman JM, Eason FR. Assessment of nurses' attitudes and knowledge regarding pain management. J Contin Educ Nurs 1999; 30(3):132-9.

99. McMillan SC, Tittle M, Hagan S, Laughlin J, Tabler RE. Knowledge and attitudes of nurses in veterans hospitals about pain management in patients with cancer. Oncol Nurs Forum 2000; 27(9).

100. de Rond MEJ, de Wit R, van Dam FSAM, van Campen B, den Hartog YM, Klievink RMA. A pain monitoring program for nurses: effects on nurses' pain knowledge and attitude. J Pain Symptom Manage 2000; 19(6):457-67.

101. Rochman DL, Herbert P. Occupational and physical therapists' knowledge and attitudes regarding pain: a survey. American Pain Society Bulletin 2000; 10(1).

102. Lebovits AH, Florence I, Bathina R, Hunko V, Fox MT, Bramble CY. Pain knowledge and attitudes of healthcare providers: practice characteristic differences. Clin J Pain 1997; 13(3):237-43.

103. Brunier G, Carson G, Harrison DE. What do nurses know and believe about patients with pain? Results of a hospital survey. J Pain Symptom Manage 1995; 10(6):436-45.

104. Jones GE, Machen I. Pre-hospital pain management: the paramedics' perspective. Acc Emerg Nurs 2003; 11:166-72.

105. Harkins SW. Aging and pain. Loeser J.D., Ed. Bonica's management of pain. 3rd edition. Philadelphia: Lippincott Williams & Wilkins, 2001: 813-23.

106. LeResche L. Gender, cultural, and environmental aspects of pain. Loeser J.D., Ed. Bonica's management of pain. 3rd edition. Philadelphia: Lippincott Williams & Wilkins, 2001: 191-5.

107. Post LF, Blustein J, Gordon E, Dubler NN. Pain: ethics, culture, and informed consent to relief. In: Weinberg M., Editor. Medical ethics: applying theories and principles to the patient encounter. New York: Prometheus Books, 2001: 209-29.

108. Australian and New Zealand College of Anaesthetists and Faculty of Pain Medicine. Acute pain management: scientific evidence. 2nd edition. Melbourne: ANZCA, 2005.

109. Cassel EJ. The nature of suffering and the goals of medicine. Weinberg M., Ed. Medical ethics: applying theories and principles to the patient encounter. New York: Prometheus Books, 2001: 230-40.

110. Liebeskind JC, Melzac R. The International Pain Foundation: meeting a need for education in pain management. Pain 1987; 30:1-2.

111. Max MB. Improving outcomes of analgesic treatment: is education enough? Ann Intern Med 1990; 113(11):885-9.

112. Francke AL, Luiken JB, de Schepper AME, Abu-Saad HH, Gryponck M. Effects of a continuing education program on nurses' pain assessment practices. J Pain Symptom Manage 1997; 13(2):90-7.

Chapter 3: The Nature and Management of Pain in Paramedic Practice

Chapter Introduction

This chapter aims to describe the nature and incidence of pain among patients treated by paramedics in Melbourne, Australia. Analysis of the data obtained from patient care records generated by paramedics who care for people with pain will provide the first detailed description of pain in this environment. Paramedic management of cases involving pain will be analysed in order to describe analgesic interventions and changes in pain severity following analgesia. Significant differences in treatment will be investigated and described. Disparities in care will be investigated by undertaking a qualitative study of paramedics' attitudes and beliefs regarding the assessment and management to determine the influence that personal, environmental and organisational factors may have on pain management practice, which is presented in Chapter 5. This knowledge aims to inform paramedic practice as well as the design of education and continuing professional development programs to ensure that practice is consistent with evidence relating to contemporary standards of care.

Study Introduction

Even though pain is presumed to be a common complaint in paramedic practice, the literature review preceding this chapter found that little is known about the epidemiology of pain in patients cared for by paramedics. Furthermore, although the literature review found significant evidence of inadequate pain management across several health settings, there is limited evidence regarding the efficacy of paramedic management of pain in the prehospital setting.

In order to develop an understanding of the incidence and nature of pain in a paramedic practice setting and to describe pain management practice in this setting, this chapter uses a retrospective cohort study to describe the epidemiology and management of pain by paramedics employed by a major ambulance service in Australia. The primary research question underpinning the design of this study was:

In patients transported by emergency ambulance, what is the incidence of pain, the reported cause if known, location of the pain as reported by the patient, and duration of pain from reported onset to assessment by a paramedic?

Secondary research questions were:

- What are the types of pain severity scales employed by paramedics to assess pain, and their frequency of use?
- What is the frequency of analgesic use for cases involving pain, the type and dose of analgesic, response to therapy, and adverse effects reported by paramedics?
- Does gender, age, type of pain or duration of pain influence analgesic administration?

Following the analysis of paramedic focus group discussions presented in Chapter 5, a post hoc analysis of pain data was undertaken to answer research questions that arose from the qualitative study of paramedic attitudes and beliefs regarding pain. This included the question "what is the correlation between initial pain severity score and the patient's recorded pulse rate, respiratory rate and blood pressure", as this topic was identified as a theme associated with the assessment of pain. The result of this analysis is included as Appendix G.

Methodology

Study Design

The study was a retrospective cohort study of patients transported to hospital by emergency ambulance for the 7-day period 16-22 August 2005 by paramedics employed by the Metropolitan Ambulance Service in the Australian state of Victoria. At the time the data was collected the organisation was known as the Metropolitan Ambulance Service (MAS). However, on 1 July 2008 this organisation and the Rural Ambulance Service (RAV) were merged to become Ambulance Victoria (AV). In this chapter the service will be referred to by the name at the time of the data collection: MAS.

Setting

The study setting was an ambulance service in a major urban centre (Melbourne, Australia) where at the time of this study MAS provided emergency ambulance response to a population of approximately 3.9 million people. In 2005 when this data was collected the service responded to approximately 253,000 emergency calls and transported 202,143 patients.[1] All calls to the emergency telephone number in this country (000) that are classified as needing emergency assistance receive an advanced life support (ALS) response, with a Mobile Intensive Care Ambulance (MICA) also responded when the call triage process identifies a need for an extended scope of care. At the time of this study, paramedics employed by MAS were able to administer inhaled methoxyflurane (Penthrane) or intravenous morphine (MS) to manage pain according to organisational clinical practice guidelines. Non-urgent cases or routine patient transfers may be referred to non-emergency transport agencies if the patient meets low acuity criteria, and these cases were not included in this study.[2]

Population

All adult patients (age greater than 15 years of age) with a Glasgow Coma Score (GCS) greater than 12 who reside in the MAS area of operation.

Procedure

This convenience contiguous sample of Patient Care Records (PCRs) was selected using an arbitrary commencement date in 2005. All PCRs generated during the study period were hand searched to identify cases that included any of the following:

- documented reports of pain, a pain severity score or a description of pain in the history section of the PCR, or use of words associated with pain such as ache, headache, burning, or tearing sensations;
- records of injuries that may be associated with pain;
- provision of analgesia by paramedics; or
- a record of pain assessment including the report of pain severity.

Cases were included in this study if all the following were present:

- the patient care record included a report of pain or words associated with pain, or record of pain severity score or assessment, or evidence of analgesic administration;
- the patient was transferred to hospital or other health care agency care;
- the patient's age was 15 years or greater;
- the GCS was greater than 12.

Cases involving the use of the analgesics methoxyflurane or morphine were included even if pain was not explicitly described on the PCR.

Original paper-based PCRs were de-identified by MAS, which included removal of name, address, phone numbers, location, destination, crew details and team number, prior to being provided for review. The data to be de-identified was determined by the agency providing the records, and included data that may have enabled the identification of the treating paramedics.

Cases were excluded if the patient's age was less than 15 (patients aged less than 15 are defined as a paediatric patient in this setting), or the Glasgow coma score was less than 13, as children or patients with cognitive impairment may require different approaches to pain assessment.

For cases meeting inclusion criteria, PCR data were extracted by explicit review methodology, with each case assigned a unique identifier. Data extraction involved a script that was used by the author and two research assistants to apply exclusion criteria and to transcribe data from eligible cases. Data included patient demographics, provision of analgesia by paramedics and type of analgesia provided as well as the cause, duration, region of pain and pain severity recorded by the treating paramedic, adverse effects of analgesia administration, and call triage category. The complete list of fields that were applied to the data collection are shown in Table 3-1.

Each case that met inclusion criteria was assigned a unique identifier. Pain region was coded according to the description of pain provided by the paramedic in the history or treatment sections of the PCR. The location of reported pain may have also been marked on a body figure in both anterior and posterior anatomical positions on

the PCR. Where no description of the anatomical location of the pain was provided, the position was coded if the record of the patient's complaint allowed this. For example, a complaint of migraine was coded as "region=head" even though there may not have been any other reference to anatomical location. A copy of the PCR is included as Appendix I.

Origin of the pain was determined by analysis of the paramedic's description of the history and assessment of the patient recorded on the PCR, which enabled a separation of cardiac, trauma, and other causes of pain. For example, any reference to chest pain that was treated according to the cardiac chest pain clinical practice guidelines[3] used by paramedics in this study was coded as cardiac, as was pain that was associated with a paramedic notation of a cardiac problem as the principle cause of the presentation in the treatment, initial assessment or final assessment sections of the PCR. Pain was coded as trauma if there was a description of injury that was associated with pain. Where the information provided by the paramedic did not enable the coding of pain as either cardiac or traumatic the pain was coded as "other". This category included pain that may have had a medical origin, such as migraine or renal colic. However, the information available on the PCR did not enable a more specific classification of cause of pain.

Duration of pain was coded according to paramedic notations of the onset and or duration of pain. For example, a notation of "pt has had L sided chest pain for 5/7" was coded as pain duration = ">24 hours to 7 days" as the notation 5/7 refers to a duration of 5 days. In other cases the time of onset was clearly reported by the paramedic, for example, "… @ 2200 hrs sudden onset of RUQ abdo pain". The duration of pain was estimated by comparing the notation of onset with the time the paramedic arrived on scene, which in this case was 0045 hours. As such the duration of pain in this case was coded as "< 6 hours". If the pain had been intermittent but the time of initial onset was noted by the paramedic the duration was coded as time of onset to time of paramedic assessment. Where the duration of the pain episode was unclear or was not stated this variable was coded as "unknown".

Any notation of drug or alcohol use made by the paramedic was coded as a dichotomous True or False. Comments made by the paramedic in reference to drug

or alcohol use were transcribed to the comments section in the database which was linked to the StudyID.

Paramedic assessment of pain severity in this setting is most commonly recorded using the verbal numeric rating scale (VNRS), which uses a number from 0 to 10 to rate pain with 0 being no pain and 10 the worst pain imaginable. This tool has been validated in the emergency department for the assessment of acute pain,[4 5] and is recommended for use in the prehospital setting.[6] Assessment of pain and the recording of severity, a component of the clinical examination undertaken by paramedics in this setting with the ambulance service, requiring a pain score to be recorded for all cases involving pain. As such, where no report of pain is elicited during the patient assessment process a score of zero (0) should normally be recorded in the relevant vital sign section of the PCR. However, where a notation of pain was made by the paramedic but no pain score was recorded and no other form of pain assessment was recorded the initial VNRS was treated as missing data. Other methods of assessing pain severity – such as the use of adjectives to describe severity – were also recorded.

Evidence of patient self-medication for pain prior to arrival of the paramedic was noted in the comments section of each record.

Adverse effects associated with analgesic drug administration were noted in the comments section. The types of adverse effects that were included in this study are described in Table 3-1.

Data were manually transcribed from the PCR to an ACCESS database (Access, Microsoft Corporation, Redmond, WA, USA). Data transcribed by research assistants was tested for inter-rater agreement. Following data entry the author sequentially sampled 1:20 of the PCRs involving pain (89/1766) and transcribed the data into a second database while blinded to the initial results. Agreement between the two datasets was estimated by the kappa statistic.[7] Analysis of the type of analgesic and dose administered in each case produced a kappa value of 1.0, representing perfect agreement. Patient gender ($\kappa = 0.96$), initial pain score recorded as a score between 0-10 ($\kappa = 0.97$), and final pain score ($\kappa = 0.93$) all showed high levels of inter-rater agreement. Estimates of the duration of pain had 91% agreement

($\kappa = 0.77$) and inter-rater agreement on cause of pain recorded as a nominal variable returned a kappa of 0.75

A kappa value between 0.61 and 0.80 represents a good level of agreement, and values > 0.80 represent very good agreement.[8]

Analysis

Descriptive statistics, univariate and multivariate logistic regression methods were used to test the association between response and explanatory variables. Odds ratios and their associated 95% confidence intervals were calculated accordingly. All statistical tests were considered to be significant at the 0.05 level. Stata version 9 (Stata Corporation, College Station, TX, USA) was used to perform the statistical analysis.

The baseline characteristics for patients with pain were reported as means, standard deviations and proportions. Data that were not normally distributed were compared using non-parametric tests.

Ethics Approval

The study was approved by the Monash University Standing Committee on Ethics in Research Involving Humans (protocol number 2004/754) and by the Metropolitan Ambulance Service Research Committee (Appendix B).

Table 3-1: Data fields extracted from the PCR

Patient age and gender

Pain region
Head (coded as "head" if the pain descriptors include headache, migraine and pain from eye, face, scalp or teeth)
Cervical
Thoracic (includes anterior chest, thoracic spine and scapular regions)
Abdominal
Lower back (includes flank, lumbar spine, sacrum, and coccyx)
Pelvic (includes genital and anal regions)
Upper limbs (includes shoulder and clavicle)
Lower limbs (includes hip)

Cause of pain
Cardiac (where the paramedic notes their judgement that the pain has a cardiac origin)
Trauma (includes burns, musculoskeletal, soft tissue injury and pain from envenomation and poisoning)
Other (pain that could not be classified as cardiac or trauma, and including pain from medical conditions such as abdominal pain, cancer, migraine, dental pain, post-surgical pain. Cases were also coded to this category where insufficient information was provided to enable classification of the cause of pain)

Duration of pain
< 6 hours
6-24 hours
>24 hours to 7 days
> 7 days and < 3 months
> 3 months

Alcohol or drug use
Any reference to alcohol use, intoxication, use of the notation ETOH to indicate alcohol use, reference to recreational drug use such as marijuana, ecstasy, methamphetamines, GHB, heroin. Reference to methadone or participation in a drug rehabilitation program.

Pain severity score
Type of assessment – Verbal Numeric Rating Scale (0-10), Adjective rating (agonising, severe, moderate, mild, none), or other. Two pain severity scores (VNRS) or adjective responses were collected where recorded by the paramedic representing the initial and final scores recorded.

Self medication
Any report of the patient use of self-medication for pain including the name of the drug and dose if recorded.

Paramedic administered analgesia by type and dose (Morphine and/or methoxyflurane)

Adverse effects
The following events were classified as adverse effects if they occurred in association with morphine or methoxyflurane administration:

- Any nausea or vomiting. Nausea and vomiting prior to drug administration was also recorded to enable the identification of those patients who developed nausea and/or vomiting after drug administration where these symptoms were not reported prior to administration.
- Hypotension – fall of systolic blood pressure to < 100 mmHg.
- Bradycardia – fall of pulse rate to <60.
- Hypoventilation – fall of respiratory rate to <12 or where breathing assistance was provided.
- Glasgow Coma Score – fall of GCS to <13.

Response code (generated by the dispatch centre and communicated to the responding crew to indicate urgency of response).
1 = "time critical"
2 = "acute, non-time critical"
3 = "non acute"

The response code is a number from 1-3 that is assigned to the case by the ambulance dispatcher. This code is calculated from a matrix that links an alpha-numeric value generated by a computer-based triage algorithm that supports the call taking process with a response code determined by the ambulance service. The code is recorded by the paramedic on the PCR and this was transcribed as part of the data collection process to enable an analysis of the association between call triage priority level and pain severity.

Outcomes of Interest

Primary outcomes of interest were the incidence of pain, frequency and type of assessment of pain severity, pain management interventions and the effect that gender, age, duration of pain, pain severity, type of pain and response code had on pain management interventions.

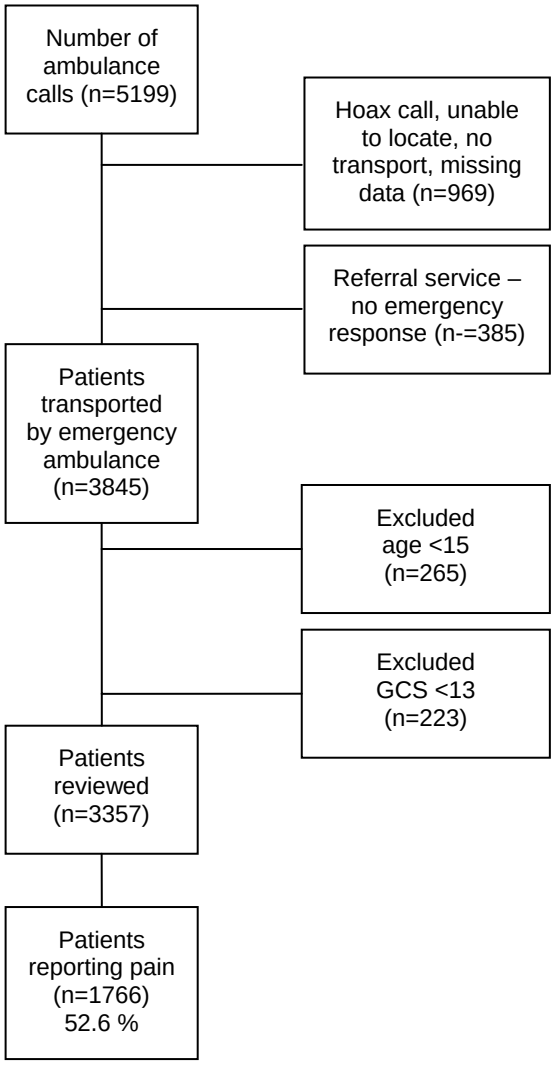
Results

During the study period 3357 patients met the inclusion criteria (Figure 3-1). The difference between the number of ambulance calls during the study period (5199) and the number transported (3845) can be explained by cases where the crew were unable to locate the patient, hoax calls, calls cancelled by the caller prior to arrival, cases where the patient was assessed but refused transport, or where no emergency care or transport were required. The latter includes as an example a third party caller reporting a motor vehicle accident where no persons are found to be injured following ambulance attendance.

Ambulance calls that were not part of the 3845 transported in this study include 385 calls triaged as low priority cases that were referred to another health service. A Call Referral Service was introduced by MAS in 2003 to manage low acuity 'no priority symptoms' cases that do not need an emergency ambulance response. Callers with no priority symptoms (as determined by the telephone triage Medical Priority Dispatch System)[9] may be provided over the phone self-care advice or referral to an alternate healthcare provider, including locum medical services, mental health practitioners, nurses and outreach workers.[1] Approximately 5% of emergency calls to the Metropolitan Ambulance Service are classified as low priority and these do not

generate an ambulance response but are instead referred to alternate service providers.[10]

Figure 3-1: Flow chart showing cases and excluded data



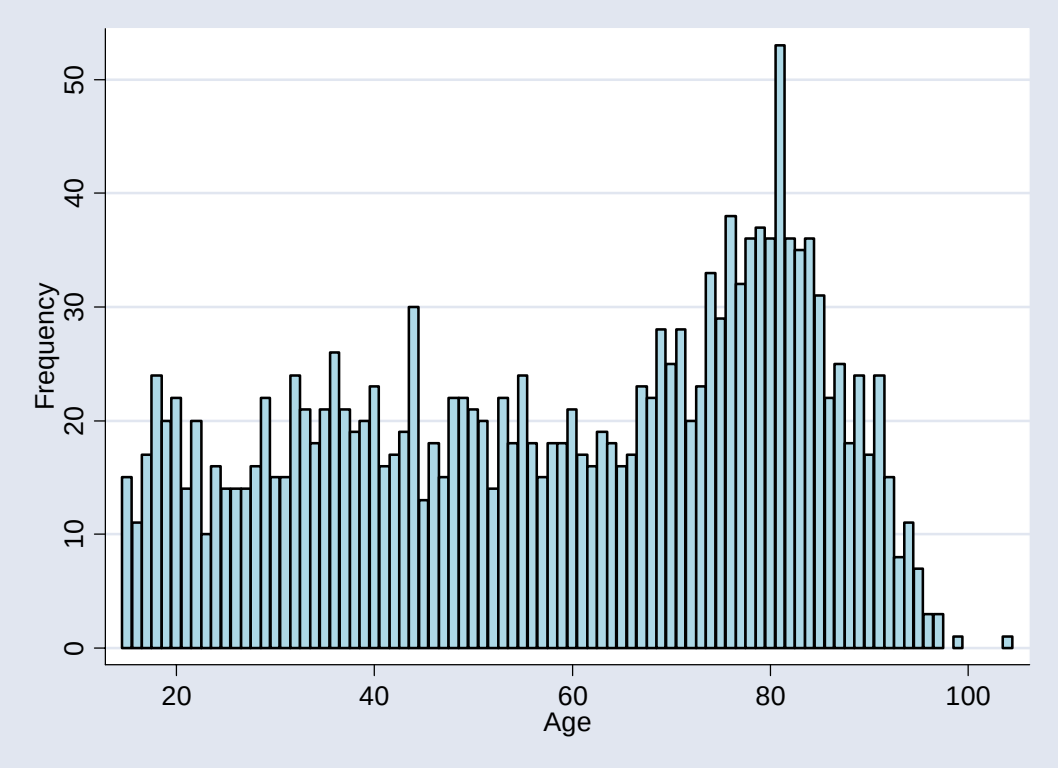
Incidence of Pain

Of the 3357 patients that met inclusion criteria, 1766 had a documented complaint of pain (52.6%).

Age Distribution and Gender

Evidence of age was available in 1736 cases (98.3%). The mean age was 58 years (SD 22.8), median age was 61 (interquartile range 39-79). Fifty-two percent were female. Age distribution for this cohort is shown in Figure 3-2.

Figure 3-2: Age distribution (n=1736)



Cause of Pain

The most frequently coded cause of pain was "other" (56.9%), followed by trauma (32.1%). Table 3-2 shows the classification of the presumed cause of pain:

Table 3-2: Classification of pain by cause

Pain cause	n (%)
Trauma	567 (32.11)
Cardiac	194 (10.99)
Other	1,005 (56.91)
Total	1,766 (100)

Cause of Pain by Age Category

The association between age and cause of pain was analysed after converting age from continuous to categorical data. The age categories used were as follows (Table 3-3)

Table 3-3: Age categories

Age category	Age range
1	<= 40
2	> 40 to <= 60
3	> 60 to <= 80
4	> 80

The results are shown in Table 3-4:

Table 3-4: Cause of pain by age category

	Age category					
	<=40	**>40 to <=60**	**>60 to <=80**	**>80**	**Missing**	**Total**
Pain Cause						
Trauma	206 (36.33%)	118 (20.81%)	104 (18.34%)	132 (23.28%)	7 (1.23%)	567 (100%)
Cardiac	14 (7.22%)	35 (18.04%)	101 (52.06%)	41 (21.13%)	3 (1.55%)	194 (100%)
Other	252 (25.07%)	228 (22.69%)	308 (30.65%)	197 (19.60%)	20 (1.99%)	1,005 (100%)
Total	472 (26.73%)	381 (21.57%)	513 (29.05%)	370 (20.95%)	30 (1.70%)	1,766 (100%)

A χ^2 test for difference in the proportions identified significant differences between cause of pain and age category ($p<0.0001$). Pain from trauma was most frequently documented in the <40 age category. While the incidence of pain associated with trauma decreased from age 40 to age 80, the frequency increased in the >80 age category. Pain of a cardiac origin was most common in the >60 to 80 age category.

Cause of Pain by Gender

When cause of pain is compared by gender, significant differences exist (p=0.046), with females more likely to have traumatic pain but less likely to have cardiac pain than males (Table 3-5):

Table 3-5: Pain cause by gender

	Gender			
	Male (%)	**Female (%)**	**Missing (%)**	**Total (%)**
Pain Cause				
Trauma	257 (45.33)	298 (52.56)	12 (2.12)	567 (100)
Cardiac	107 (55.15)	81 (41.75)	6 (3.09)	194 (100)
Other	457 (45.47)	532 (52.94)	16 (1.59)	1,005 (100)
Total	821 (46.49)	911 (51.59)	34 (1.93)	1,766 (100)

Location of Pain

The location of the pain was coded based on notations of location provided by the paramedic in the history and examination section of the PCR or by markings on the anatomical diagram on the PCR that represented pain in one or more body regions. The most common location for pain was the thoracic region (41.3% of cases), followed by the abdominal region (24% of cases). The frequency of pain by body region is illustrated in Table 3-6. It should be noted that the frequency exceeds the total number of cases as some cases have pain coded to more than one body region.

Table 3-6: Location of pain

Location of pain	**n (%)**
Head	236 (13.4)
Cervical	152 (8.6)
Thorax	729 (41.3)
Abdomen	425 (24.0)
Pelvis	205 (11.6)
Upper limb	247 (14.0)
Lower limb	280 (15.8)
Lower back	205 (11.6)

Duration of Pain

Pain of less than 6 hours duration was the most frequent category (68.8% of cases), see Table 3-7.

Table 3-7: Estimated duration of pain

Duration	n (%)
<6 hours	1,215 (68.84)
6-24 hours	228 (12.92)
>24 hours to <1 week	222 (12.58)
1 week to 3 months	43 (2.44)
>3 months	14 (0.79)
Unknown	44 (2.49)
Total	**1,766 (100)**

Pain Assessment and Pain Severity Scoring

The frequency of pain severity scale use by type of scale is shown in Table 3-8. Of the 1,766 cases included in this study the majority of cases (95%, n=1673) included some form of pain severity rating on the PCR. The most common (76.9%) was a verbal numeric rating scale (VNRS). This scale involves asking the patient to rate their pain severity by providing a number between 0 for "no pain" to 10 for "worst pain imaginable". An adjective rating that included terms such as "mild", "moderate" or "severe" was used to record pain severity in 11.1% of cases, and "other" methods accounted for the remaining percentage. Other methods included the use of adjectives related by the patient such as "big", and by symbols used by paramedics to record pain severity, such as addition marks (+ + +) or ticks (✓✓✓).

Table 3-8: Frequency of pain severity scale use by type of scale

Pain Scale	n (%)
Adjective rating	185 (11.06)
VNRS (0-10)	1,286 (76.87)
Other	202 (12.07)
Total	1.673 (100)

Frequency of Pain Scoring by Cause of Pain, Gender, Age, Alcohol or Drug Use and Duration of Pain

The frequency of pain by cause of pain is shown in Table 3-9. This data includes cases where pain severity is not recorded but where there was a notation of pain on the PCR resulted in the inclusion of the record.

The cause of pain is associated with significant variations in the frequency of pain severity scoring. When all forms of pain severity scoring are included in a χ^2 analysis of pain scoring by cause of pain, there is a significant difference between categories ($p = 0.045$), with pain of cardiac origin showing a higher frequency of pain severity recording than pain from trauma or other causes.

Table 3-9: Frequency of pain scoring by cause

	Pain score recorded		
	No (%)	**Yes (%)**	**Total**
Pain Cause			
Trauma	32 (5.64)	535 (94.36)	567 (100)
Cardiac	3 (1.55)	191 (98.45)	194 (100)
Other	59 (5.87)	946 (94.13)	1,005 (100)
Total	94 (5.32)	1,672 (94.68)	1,766 (100)

No significant difference in the frequency of pain severity scoring was found for gender ($p = 0.11$), age category ($p = 0.16$), alcohol or drug use ($p = 0.84$) or duration of pain ($p = 0.66$).

Pain Severity Scoring using the VNRS

No attempt was made to convert adjective ratings or other forms of non-numerical pain category rating to a numerical format. Pain severity scores using the VNRS were assigned to the following categories (Table 3-10):

Table 3-10: Pain score categories

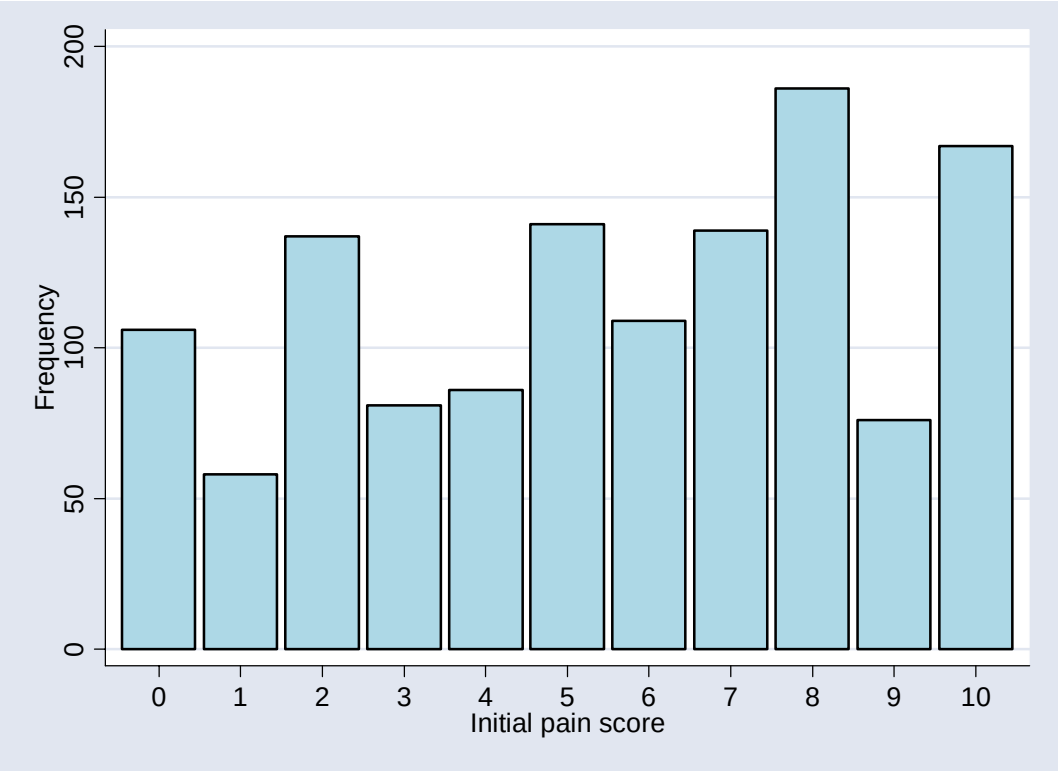
Pain Category	
0	No pain, VNRS = 0
1	Mild pain, VNRS 1 to 3
2	Moderate pain, VNRS 4 to 7
3	Severe pain, VNRS 8 to 10

These pain severity categories were based on work by Fosnocht *et al*, who used a prospective, multi-centre cohort study of pain severity in patients presenting to an emergency department (n=639) to assign pain scores using a 0-10 verbal numerical rating scale (VNRS) to categories of mild, moderate or severe based on interference with function.[11]

For reports of pain severity scored by using the verbal numeric rating scale (VNRS) the median initial pain score was 6 (IQR 3-8), and the median final score was 3 (IQR 1-5).

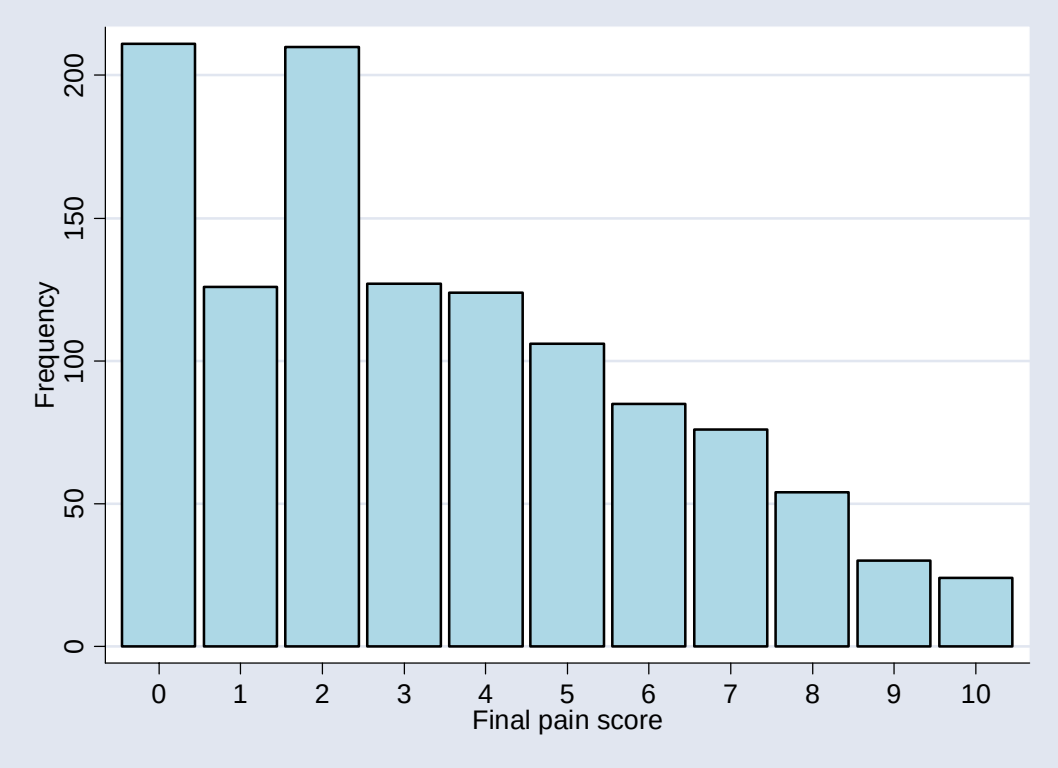
The initial VNRS pain score distribution is shown in Figure 3-3 as a percentage for each of the 11 points on the scale. Cases that include an initial score of 0 (no pain) are included in the data set as the PCR for these cases include a score >0 at a later assessment point.

Figure 3-3: Distribution of initial VNRS pain score (n=1286)



The final VNRS pain score represents the last recorded score on the PCR. The distribution of the final score where the initial pain score was greater than 0 is shown in Figure 3-4:

Figure 3-4: Distribution of final VNRS pain score in cases where the initial score is >0 (n= 1,173)



Initial VNRS by Gender

This showed a significant difference (p=0.047), with females more likely to have severe pain (VNRS>7) at the initial paramedic assessment, see Table 3-11.

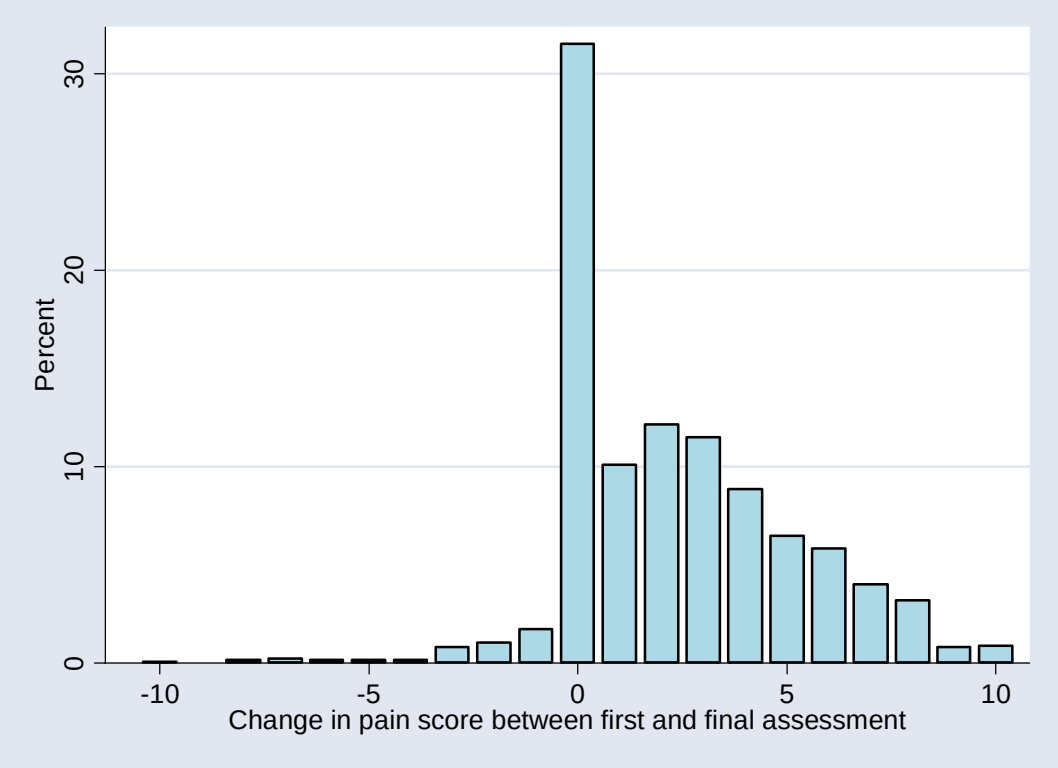
Table 3-11: Comparison of initial VNRS by gender

	Gender (%)		
	Male	**Female**	**Total**
Initial pain category			
No pain	48.51	51.49	100
VNRS 1 to 3	51.84	48.16	100
VNRS 4 to 7	52.58	47.42	100
VNRS 8 to 10	43.74	56.26	100
Total	49.13	50.87	100

Change in Pain Score between First and Final VNRS Scores

Figure 3-5 illustrates the distribution of change in VNRS between the first and final pain score. This is calculated by subtracting the final pain score from the first pain score.

Figure 3-5: Change in pain score as a percentage – all patients (difference between first and final pain scores, n=1218)



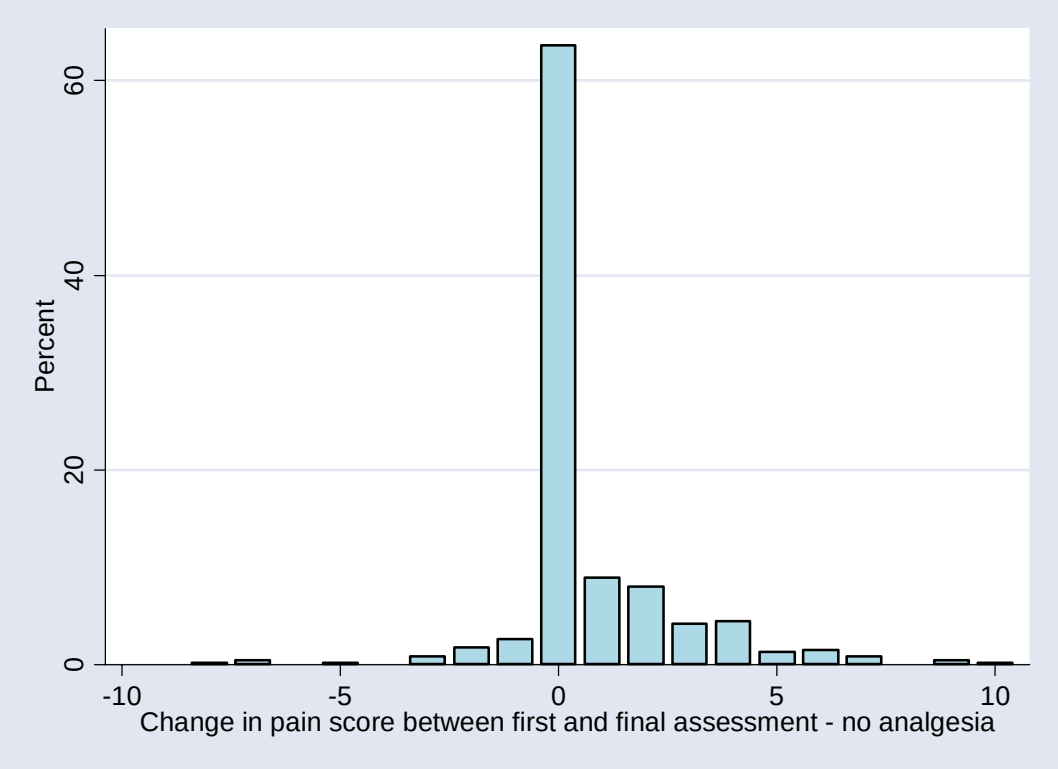
Positive numbers in this figure represent a reduction in pain severity, so that a value of 10 indicates an initial VNRS score of 10/10 and a final score of 0/10. Negative values represent an increase in pain severity between the first and final VNRS scores. For example, an initial pain severity score of 4/10 and a final score or 6/10 would be plotted as a -2 value on this graph, representing an increase in pain severity during paramedic care.

Of those cases where both a first and final VNRS was recorded, a large proportion of patients (384/1218, 31.5%) had no change in pain score from initial score to final score as recorded on the PCR. While Figure 3-5 shows a trend to an overall reduction of pain severity during the period of care by the paramedic, in some cases an increase in pain was noted.

Of the 409 patients recorded as having severe pain (VNRS >7) at the first point of assessment, 108 (26%) continued to have severe pain at the final point of assessment.

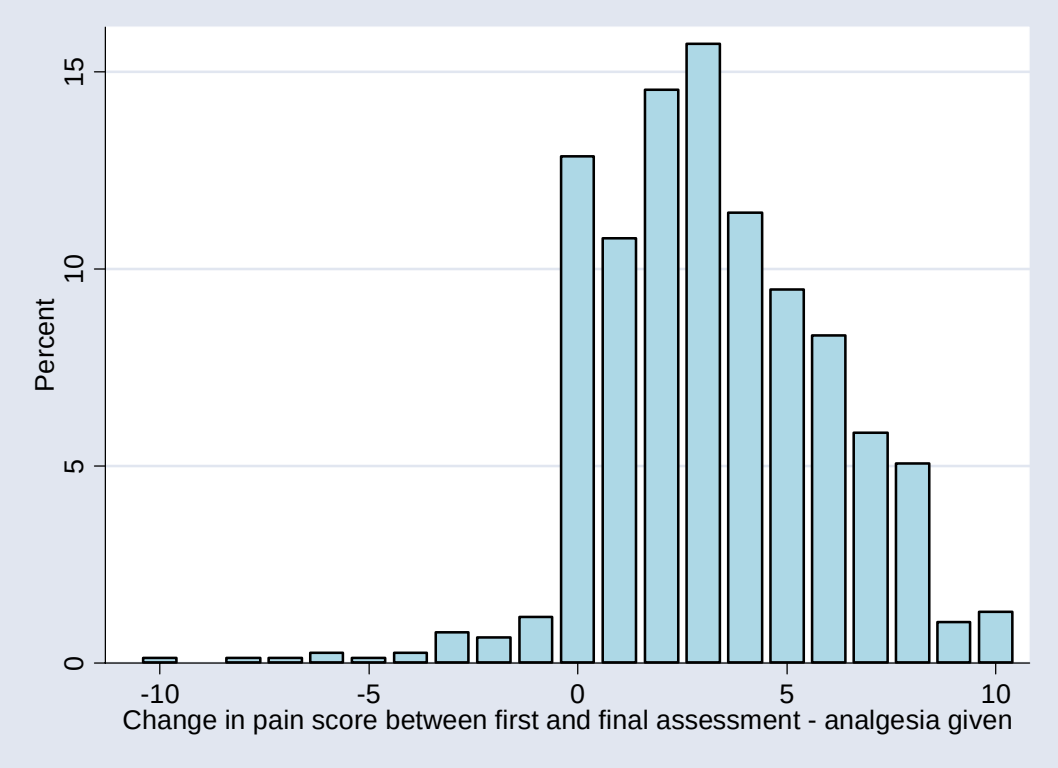
When the change in pain severity score is further analysed by separating patients who did not receive analgesia (Figure 3-6) from those who did (Figure 3-7), the following results are seen:

Figure 3-6: Change in VNRS pain score as a percentage – no analgesia group (n=448)



Some patients showed a reduction in pain score without administration of analgesics. However, 63.6% (285/448) of those who did not receive analgesia had no change in pain severity.

Figure 3-7: Change in VNRS pain score as a percentage – analgesia group (n=770)



There is a trend towards reduction in pain severity with administration of analgesia, although 12.9% (99/770) who did receive analgesia had no change in pain severity.

Reduction in Initial VNRS Score to Final Score of 2/10 or Less

Reduction of final pain score to 2/10 or less is a clinical goal described by the clinical practice guidelines informing paramedic pain management practice at the time this study was undertaken.[12] Of those patients who had both a first and final VNRS recorded and whose initial VNRS pain score was >2,450 (43.5%) had a final VNRS score of 2/10 or less.

Table 3-12 illustrates the number of cases where the final pain score was <=2 by type of pain:

Table 3-12: Reduction of final pain score to 2 or less

	Reduction in pain score to 2/10 or less		
	No (%)	**Yes (%)**	**Total**
Pain Cause			
Trauma	186 (58.49)	132 (41.51)	318
Cardiac	39 (28.47)	98 (71.53)	137
Other	360 (62.07)	220 (37.93)	580
Total	585 (56.52)	450 (43.48)	1,035

There were significant differences between cause of pain and reduction of final pain score to 2/10 or less. Patients with cardiac pain were more likely to have their final pain score reduced to 2/10 or less (71.5%) than those with pain due to trauma (41.5%), or pain from other causes (37.9%), $p < 0.001$.

When the cases involving a final pain score of 2/10 or less are compared with the initial pain score, it is clear that as the severity of the initial pain score increases, the chance of having a final pain score of 2 or less diminishes, so that only 18.7% of patients with an initial pain score of 10/10 achieved a final pain score of 2/10 or less (Table 3-13):

Table 3-13: Comparison of initial VNRS score (Pain 1) with achievement of final VNRS of <=2

	Reduction in final pain score to 2/10 or less		
	No (%)	**Yes (%)**	**Total**
Initial Pain Score			
2	0 (0.00)	125 (100.00)	125
3	29 (42.03)	40 (57.97)	69
4	36 (46.75)	41 (53.25)	77
5	64 (50.79)	62 (49.21)	126
6	62 (62.00)	38 (38.00)	100
7	85 (64.89)	46 (35.11)	131
8	121 (69.14)	54 (30.86)	175
9	58 (80.56)	14 (19.44)	72
10	130 (81.25)	30 (18.75)	160
Total	585 (56.52)	450 (43.48)	1,035

When comparing reduction in final pain score to the location of the pain, location was not associated with a statistically significant reduction of final pain score to 2/10 or less, with the exception of thoracic pain, which was associated with a higher

likelihood of achieving this benchmark ($p < 0.001$), and abdominal pain, where patients were less likely to have their final pain score reduced to 2/10 or less ($p < 0.001$).

Age category was associated with significant differences in the frequency of VNRS score reductions to 2/10 or less ($p < 0.001$), with an increasing trend to meeting this pain reduction goal as age increased (Table 3-14):

Table 3-14: Frequency of final pain score less than or equal to 2/10 by age category

	Reduction in final pain score to 2/10 or less		
	No (%)	**Yes (%)**	**Total**
Age Category			
<=40	215 (66.56)	108 (33.44)	323
>40 to <=60	154 (62.10)	94 (37.90)	248
>60 to <=80	128 (46.89)	145 (53.11)	273
>80	79 (45.14)	96 (54.86)	175
Total	576 (56.53)	443 (43.47)	1,019

Pain Severity and Response Code

In this study setting the Medical Priority Dispatch System (MPDS) (Priority Dispatch Corp. Salt Lake City, UT),[9] is used to triage and prioritise the response to telephone calls made to the emergency number (000) that are redirected to the ambulance call taking and dispatch centre. The call taker uses scripted questions to interrogate the caller in order to generate a complaint-based code and response priority, known as a response determinant, which is then matched to one of three locally determined response codes that determine urgency of response and the capabilities of the responding crew (ALS, MICA or both).

There were 1,246 cases where both an initial pain score using the VNRS and a response code were recorded. Of these cases 716/1246 (57.5%) were associated with a code 1 ("time critical") response. After adjusting for gender, age, cause of pain and duration of pain a multivariate logistic regression analysis found no significant change in the odds of a patient in pain receiving a time critical response compared with patients who had no pain, regardless of their initial pain score (VNRS 1 to 3 OR = 1.11, 95% CI = 0.7 to 1.8; VNRS 4 to 7 OR = 1.12, 95% CI = 0.7 to 1.8; VNRS 8 to 10 OR = 0.84, 95% CI = 0.5 to 1.4).

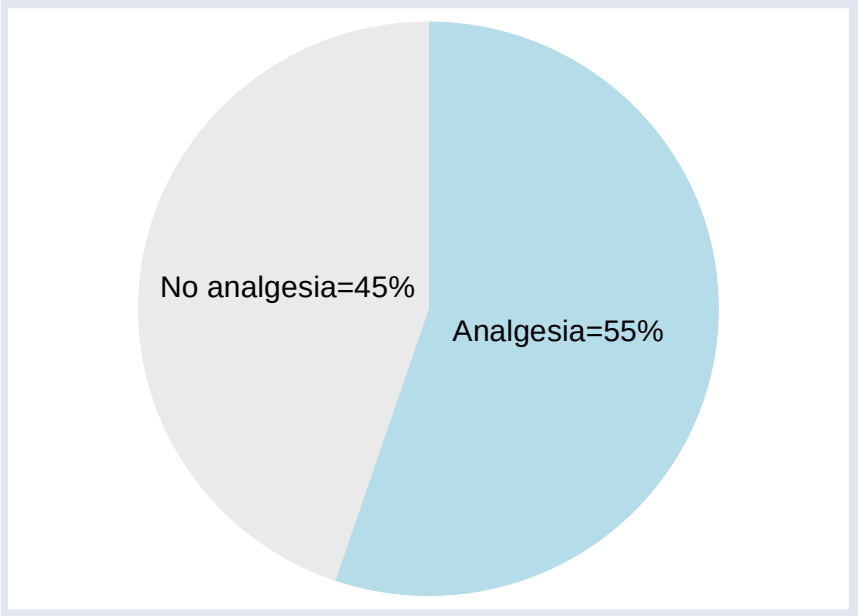
The relationship between response code and pain severity is elaborated further in a published research paper based on this data that is included as Appendix F.[13]

Analgesic Use

Although other pharmacological agents such as and glyceryl trinitrate for ischaemic chest pain or midazolam may be used in the management of pain, these drugs have not been included in this analysis as they are not classified as analgesics.[14]

The frequency of analgesic administration in cases where pain was documented is shown in Figure 3-8:

Figure 3-8: Percentage of analgesic administration in cases where pain was documented



Of the 1,766 patients reporting pain 263 (15%; 95% CI 13 to 17%) received morphine, 605 (34%; 95% CI 32-37%) received methoxyflurane, and 104 (6%; 95% CI 5-7%) received both.

Refused Analgesia

Paramedics recorded that 192 (10.9%; 95% CI 9-13%) patients declined analgesia when it was offered. When cases involving refusal of analgesia were removed from the analysis, 622 of 1574 (39.5%) of cases where pain was documented did not involve administration of either morphine or methoxyflurane.

Although there was no significant gender difference in the proportion of refusal (female=10.9%, male=10.7%; p = 0.92), there were significant differences in refusal rates when comparing the cause of pain. While 80 (14.1%) patients with pain arising from trauma refused analgesia, only 5 (2.6%) patients with a cause of pain classified as cardiac were recorded as having refused analgesia ($p < 0.001$).

When refusal of analgesia was analysed by body region associated with pain only the cervical region was found to be associated with a significantly high rate of refusal ($p< 0.001$).

Refusal of analgesia by initial VNRS severity category is shown in (Table 3-15):

Table 3-15: Patients refusing pain relief by pain severity category

	Refused pain relief		
	No (%)	**Yes (%)**	**Total**
VNRS category			
0	98 (92.45)	8 (7.55)	106
1 to 3	239 (86.59)	37 (13.41)	276
4 to 7	395 (83.16)	80 (16.84)	475
8 to 10	405 (94.41)	24 (5.59)	429
Total	1,137 (88.41)	149 (11.59)	1,286

There were significant differences between pain score categories and rate of analgesic refusal ($p < 0.001$). Patients with severe pain (VNRS 8-10) were less likely to refuse analgesia than those with lower levels of pain

Age ($p = 0.15$), gender ($p = 0.92$), documented drug or alcohol use ($p = 0.09$) and duration of pain ($p = 0.63$) were not associated with significant differences in the rate of refusal.

Analgesic Administration by Pain Cause

The administration of morphine and/or methoxyflurane by cause of pain is shown in Table 3-16 and Table 3-17:

Table 3-16: Morphine administration by cause of pain

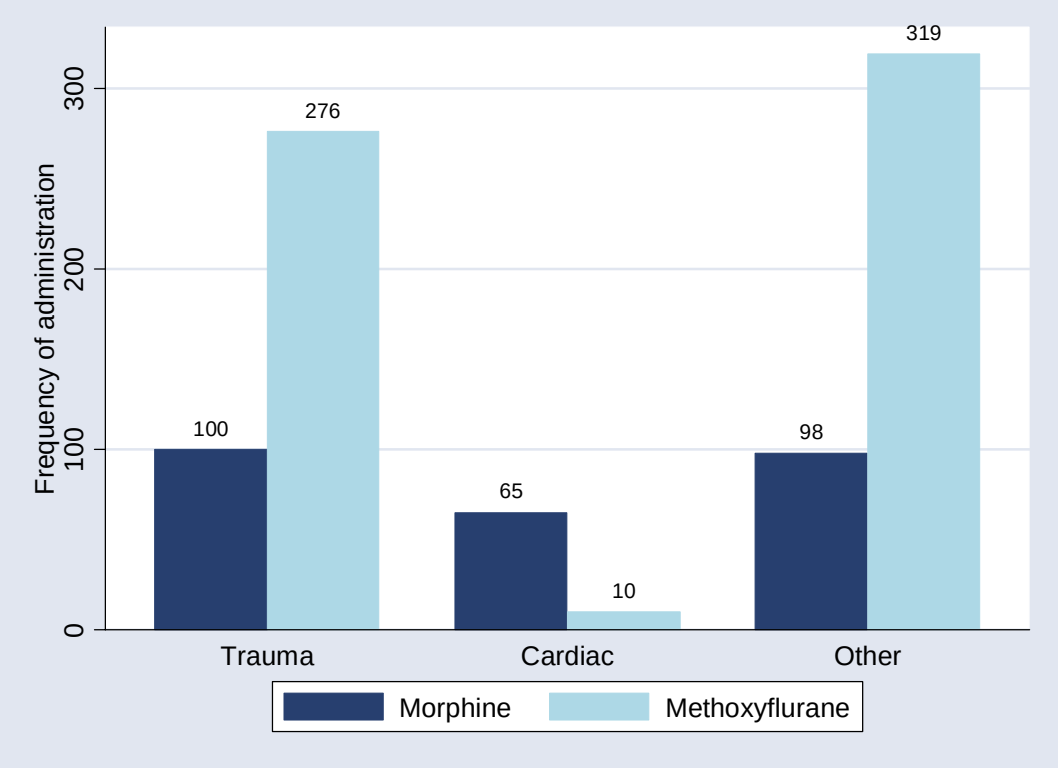
	Morphine administered		
	No (%)	**Yes (%)**	**Total**
Pain Cause			
Trauma	467 (82.36)	100 (17.64)	567
Cardiac	129 (66.49)	65 (33.51)	194
Other	907 (90.25)	98 (9.75)	1,005
Total	1,503 (85.11)	263 (14.89)	1,766

Table 3-17: Methoxyflurane administration by cause of pain

	Methoxyflurane administered		
	No (%)	**Yes (%)**	**Total**
Pain Cause			
Trauma	291 (51.32)	276 (48.68)	567
Cardiac	184 (94.85)	10 (5.15)	194
Other	686 (68.26)	319 (31.74)	1,005
Total	1,161 (65.74)	605 (34.26)	1,766

When comparing analgesic administration with cause of pain it was shown that 65/194 (33.5%) patients with cardiac pain received morphine and 10/194 (5.1%) received methoxyflurane, with 2/194 receiving both drugs. For patients with pain due to trauma, 100/567 (17.6%) received morphine, 276/567 (48.7%) received methoxyflurane, and 68/567 (12%) received both. When pain was classified as "other" morphine was administered in 98/1005 (9.7%) of cases, and methoxyflurane was administered in 319/1005 (31.7%) of cases. The frequency of administration by pain cause is shown in Figure 3-9.

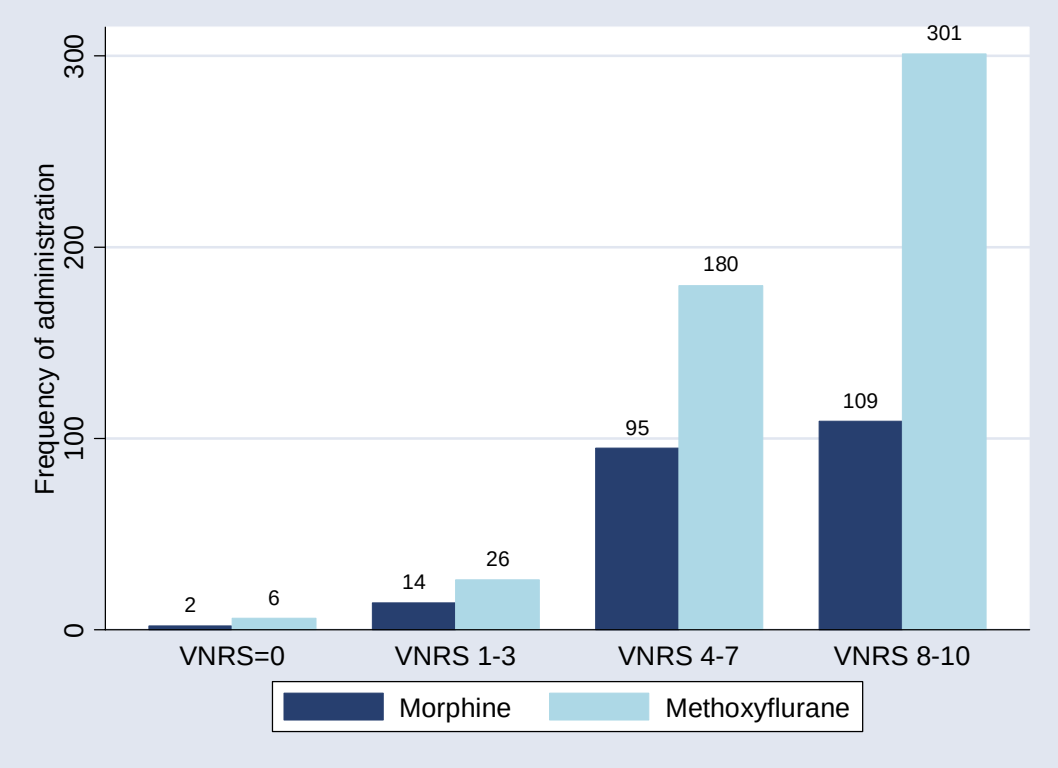
Figure 3-9: Frequency of morphine and methoxyflurane administration by pain cause (n=868)



Analgesic Administration and Pain Severity

There were significant differences ($p < 0.001$) between categories of pain severity (recorded using the VNRS) and analgesic administration, with the frequency of analgesia administration increasing as pain severity increased Figure 3-10:

Figure 3-10: Frequency of morphine and methoxyflurane administration by initial pain category



Methoxyflurane was more frequently administered than morphine, even in cases involving severe (VNRS 8-10) pain. Administration of analgesia when VNRS=0 may be explained by analgesia administration following an increase in pain severity after the point of first assessment.

Logistic regression analysis (Table 3-18) found that for those cases that included a VNRS pain severity score, patients with cardiac pain were more likely to receive analgesia than those with trauma related pain (OR 4.14; 95% CI, 2.37 to 7.23; p<0.001), after adjusting for age, gender, initial pain score, cause of pain and duration of pain. Those aged 41 to 60 years were more likely to receive analgesia than those aged 15 to 40 years (OR 1.59; 95% CI, 1.06 to 2.37; p=0.024).

Table 3-18: Logistic regression of factors associated with analgesia administration

Variable	Odds ratio	95% CI	p-value
Age category (years)			
15-40	1.0		
> 40 to <= 60	1.59	1.06-2.37	0.024
> 60 to <= 80	1.27	0.86-1.87	0.225
> 80	1.10	0.72-1.69	0.651
Gender			
Male	1.0		
Female	0.86	0.64-1.15	0.304
Pain cause			
Trauma	1.0		
Cardiac	4.14	2.37-7.23	< 0.001
Initial pain score			
VNRS = 0	1.0		
VNRS 1-3	1.68	0.91-3.10	0.097
VNRS 4-7	10.73	5.95-19.35	< 0.001
VNRS 8-10	42.93	22.62-81.48	< 0.001
Pain duration			
< 6 Hours	1.0		
6-24 hours	0.80	0.52-1.23	0.310
> 24 hours to < 1 Week	0.60	0.38-0.94	0.026
1 week to 3 Months	0.34	0.14-0.83	0.018
> 3 Months	0.48	0.11-2.12	0.331

Analgesic Administration by Pain Region

Patients with pain in the head region received the lowest rate of analgesia (29.7% of cases), followed by cervical pain (37.5% of cases) and abdominal pain (50.1% of cases).

Analgesic Administration Associated with Drug or Alcohol Use

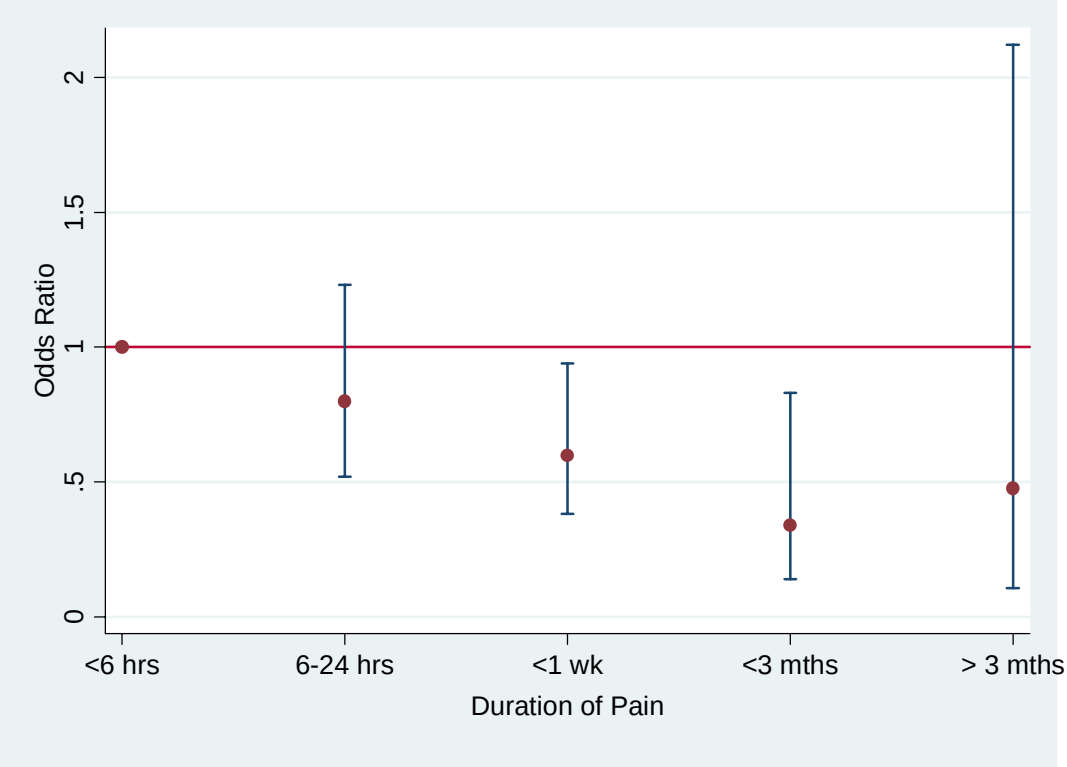
There was a significant decline in analgesic administration where drug or alcohol use was noted on the PCR, with the rate of no analgesia increasing from to 44.8% to 68.2% (P<0.001). However, just 63/1766 cases (3.6%) had a notation of alcohol or drug use on the PCR.

Analgesic Administration by Duration of Pain

Logistic regression analysis (Table 3-18) identified a trend to reduced analgesic administration as pain duration increases. Patients with duration of pain >24 hours

and <1 week were less likely to receive analgesia than patients with pain duration <6 hours (OR 0.60; 95% CI, 0.38 to 0.94; p=0.026) after adjusting for age, gender, initial pain score, and cause of pain. Patients with duration of pain between 1 week and three months were also less likely to receive analgesia (OR 0.34; 95% CI, 0.14 to 0.83; p=0.018). This relationship is illustrated by Figure 3-11:

Figure 3-11: Odds ratio of receiving analgesia by duration of pain



Adverse Effects

Evidence of adverse effects associated with analgesic administration was identified in this study. The total recorded incidence of nausea and/or vomiting among patients with pain was 138/1766 (7.8%). Nausea and vomiting was noted to be associated with administration of morphine in 18/263 cases (6.8%) and in 49/605 cases of methoxyflurane administration (8.1%).

Hypotension following morphine administration (defined as a fall of systolic blood pressure to < 100 mmHg following administration) was recorded in 5/263 cases (1.9%). In one of these cases methoxyflurane was also administered. There were no

cases of hypotension involving methoxyflurane as the sole analgesic. The cases involving hypotension are summarised as follows:

1. An 83 year old female with a history of cardiac disease, evidence of bradycardia (heart rate 50) prior to morphine administration and concurrent administration of sublingual glyceryl trinitrate (GTN) and intravenous frusemide, both of which are known to be associated with a risk of hypotension. The patient's chief complaint was chest pain. Her initial blood pressure was reported to be 140 by palpation, and this fell to 80/- following 1.8 milligrams of GTN and 5 milligrams of morphine. The patient's GCS was reported to be 15 at all times, and the final BP was 100 by palpation. No interventions to correct the hypotension were noted. (StudyID 0017)

2. A 70 year old male with a history of cardiac disease, evidence of tachycardia (heart rate 145) prior to morphine administration and concurrent administration of sublingual glyceryl trinitrate (GTN). The patient's chief complaint was chest pain. His initial blood pressure was reported to be 145 by palpation, and this fell to 90 by palpation following 0.6 milligrams of GTN and 2.5 milligrams of morphine. The patient's GCS was reported to be 14 (Eye opening = 3) following the hypotensive episode. Following 300 mls of intravenous fluid (Hartmanns) the patient's blood pressure increased to 120/70. The patient was given an additional 5 mg of morphine following the increase in blood pressure and was reported to have maintained this blood pressure to hospital destination. (StudyID 0177)

3. An 80 year old male with a history of cardiac disease, evidence of tachycardia (heart rate 120) prior to morphine administration. The patient's chief complaint was chest pain and shortness of breath. His initial blood pressure was reported to be 150 by palpation, and this fell to 90/- following 2.5 milligrams of morphine and 40 milligrams of intravenous frusemide. The patient's GCS was reported to be 11 (Eye opening = 4, Best Verbal Response = 2, Best Motor Response = 5) following the hypotensive episode. No interventions to correct the hypotension were noted. The patient's final blood pressure was noted to be 80/- and pulse rate 56. (StudyID 1581)

4. A 48 year old male previously well with no significant medical history. The patient's chief complaint was chest pain. His initial blood pressure was reported to be 135/95, and this fell to 90/- following 0.3 milligrams of GTN and 2.5 milligrams of morphine. The patient's GCS was reported to be 10 (Eye opening = 4, Best Verbal Response = 1, Best Motor Response = 5) following the hypotensive episode. Following 400 mls of intravenous fluid (Hartmanns) the patient's blood pressure increased to 140/95. The patient was given an additional 2.5 mg of morphine following the increase in blood pressure and was reported to have maintained this blood pressure to hospital destination. The patient's final GCS was recorded as 15. (StudyID 1644)

5. An 86 year old female with a history of Type 2 diabetes and dementia, complaining of left hip pain following a same-height fall. Her initial blood pressure was reported to be 160/-, and this fell to 95/- following 3 mls of methoxyflurane and 2.5 milligrams of morphine. The patient's GCS was reported to be 13 (Eye opening = 3, Best Verbal Response = 4, Best Motor Response = 6) following the hypotensive episode. No interventions to correct the hypotension were noted. (StudyID 1698)

Bradycardia (defined as a pulse rate < 60) following morphine administration was documented in 2/263 cases (0.76%). One of these cases also recorded an episode of hypotension (StudyID 1581). No episodes of bradycardia were associated with methoxyflurane administration. The two cases involving bradycardia are summarised as follows:

1. An 85 year old female with an acute episode of right upper quadrant abdominal pain of 10/10 severity was given 2.5 milligrams of IV morphine. Her heart rate was noted to decrease from 72 to 46. Blood pressure was 195 systolic prior to this episode of bradycardia and 145 systolic following the decrease in heart rate. The underlying rhythm was noted to be atrial fibrillation. No interventions to manage the bradycardia were recorded. Ten minutes after the episode of bradycardia the patient's heart rate was noted to be 76. Two further 2.5 milligram doses of morphine were given to manage pain that remained at 8/10, and these doses were not associated with any further adverse haemodynamic events. (StudyID 1302)

2. The second case is referenced in the section describing episodes of hypotension (StudyID 1581)

There were no cases of hypoventilation recorded – defined as a fall of respiratory rate to <12 or where breathing assistance was provided following analgesic administration.

A decrease in Glasgow Coma Score to <13 associated with morphine administration was documented in 2/263 cases (0.76%). No episodes of decrease in GCS <13 were associated with methoxyflurane administration. One of the cases involving a decrease in GCS also recorded an episode of hypotension and bradycardia (StudyID 1581) that has been described in the previous section. The other case also had an episode of hypotension and the case details are described in the previous section. (StudyID 1644)

No patient received the opioid antagonist naloxone hydrochloride to reverse adverse effects of morphine.

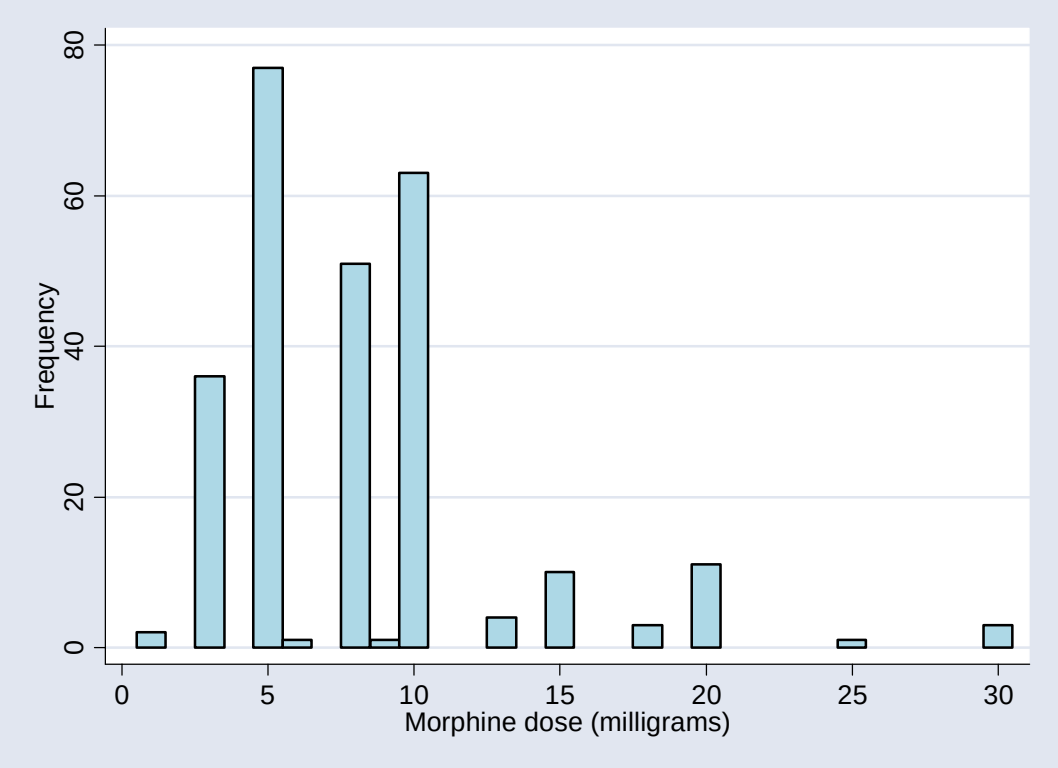
Factors Complicating the Assessment of Pain

During the data transcription process PCRs were searched for any evidence of problems that may have complicated the pain assessment process. Communication problems were found to be associated with difficulties in assessment of patients, with language difficulty reported in 31/1766 cases, dementia noted in 11/1766 cases and psychiatric illness noted in 11/1766 cases.

Morphine Administration

The frequency of morphine administration by total milligram dose per case is shown in Figure 3-12:

Figure 3-12: Frequency of morphine administration by dose (milligrams)



The median total dose of morphine per patient was 7.5 mg (SD 4.9, range 1 to 30 mg). The most frequent total morphine dose administered per case was 5 milligrams (77/263). Only 32/263 (12%) of morphine doses exceeded 10 milligrams.

Morphine Administration by Pain Severity

The relationship between morphine administration and initial VNRS pain category is shown in Table 3-19.

Table 3-19: Morphine administration by initial VNRS category

	Morphine administered		
	No (%)	**Yes (%)**	**Total**
VNRS category			
0	104 (98.11)	2 (1.89)	106
1 to 3	262 (94.93)	14 (5.07)	276
4 to 7	380 (80.00)	95 (20.00)	475
8 to 10	320 (74.59)	109 (25.41)	429
Total	1,066 (82.89)	220 (17.11)	1,286

Significant differences ($p < 0.001$) were observed between pain severity category and morphine administration. In cases where a VNRS was recorded, 109/429 (25%) of patients with severe pain (VNRS 8-10) received morphine, with the rate falling to 95/475 (20%) for patients having moderate pain (VNRS 4-7).

The difference between total cases of morphine administration (263) and total cases of morphine administration by VNRS category (220) is explained by some cases of morphine administration where pain severity was not recorded or cases where a different method of recording pain severity was used.

Morphine Administration by Pain Region

The incidence of morphine administration was associated with significant differences when analysed by pain region, with head ($P < 0.001$), cervical ($P = 0.022$), thoracic ($P = 0.036$) and upper limb pain ($P < 0.001$) showing significant differences. The lowest frequencies of morphine administration by body region were head (4.7%), cervical (8.6%) and abdominal (12%). Morphine was most commonly administered for upper limb (22.7%), pelvic (18.5%) and lower limb pain (17.1%).

Morphine Administration by Duration of Pain

The relationship between the administration of morphine by duration of pain is shown in Table 3-20:

Table 3-20: Morphine administration by duration of pain

	Morphine administered		
	No (%)	**Yes (%)**	**Total**
Duration of pain			
<6 hours	1,002 (82.47)	213 (17.53)	1,215
6-24 hours	202 (88.60)	26 (11.40)	228
>24 hours to <1 week	203 (91.44)	19 (8.56)	222
1 week to 3 months	39 (90.70)	4 (9.30)	43
>3 months	14 (100.00)	0 (0.00)	14
Total	1,460 (84.79)	262 (15.21)	1,722

Duration of pain was associated with significant differences in morphine administration (p=0.001), with the frequency of morphine administration declining with increasing duration of pain. Of those patients with pain duration < 6 hours 17.5% (213/1215) received morphine. When pain duration was recorded to be between 6 to 24 hours duration morphine was given in 11.4% (26/228) of cases, and where pain was recorded to be more than 24 hours duration and less than 1 week the frequency of morphine administration was 8.6% (19/222). No patients with pain duration > 3 months received morphine (n=14).

Morphine Administration by Cause of Pain

The association between the frequency of morphine administration and the cause of pain (trauma, cardiac, or other) is shown in Table 3-21:

Table 3-21: Logistic regression of factors associated with morphine administration

Variable	Odds ratio	95% CI	p-value
Age category (years)			
15-40	1.0		
> 40 & <= 60	1.42	0.92-2.20	0.114
> 60 & <= 80	1.34	0.86-2.07	0.193
> 80	1.33	0.80-2.20	0.266
Gender			
Male	1.0		
Female	0.61	0.44-0.84	0.002
Pain cause			
Cardiac	1.0		
Trauma	0.51	0.32-0.82	0.005
Initial pain score			
VNRS = 0	1.0		
VNRS 1-3	2.24	0.49-10.30	0.301
VNRS 4-7	11.96	2.86-49.95	0.001
VNRS 8-10	20.65	4.93-86.53	< 0.001

Logistic regression analysis found that patients with trauma pain were less likely to receive morphine than patients with cardiac pain (OR 0.51, 95% CI, 0.32 to 0.82; p=0.005) after adjusting for age, gender, initial pain score, and cause of pain. Age was not significantly associated with morphine administration.

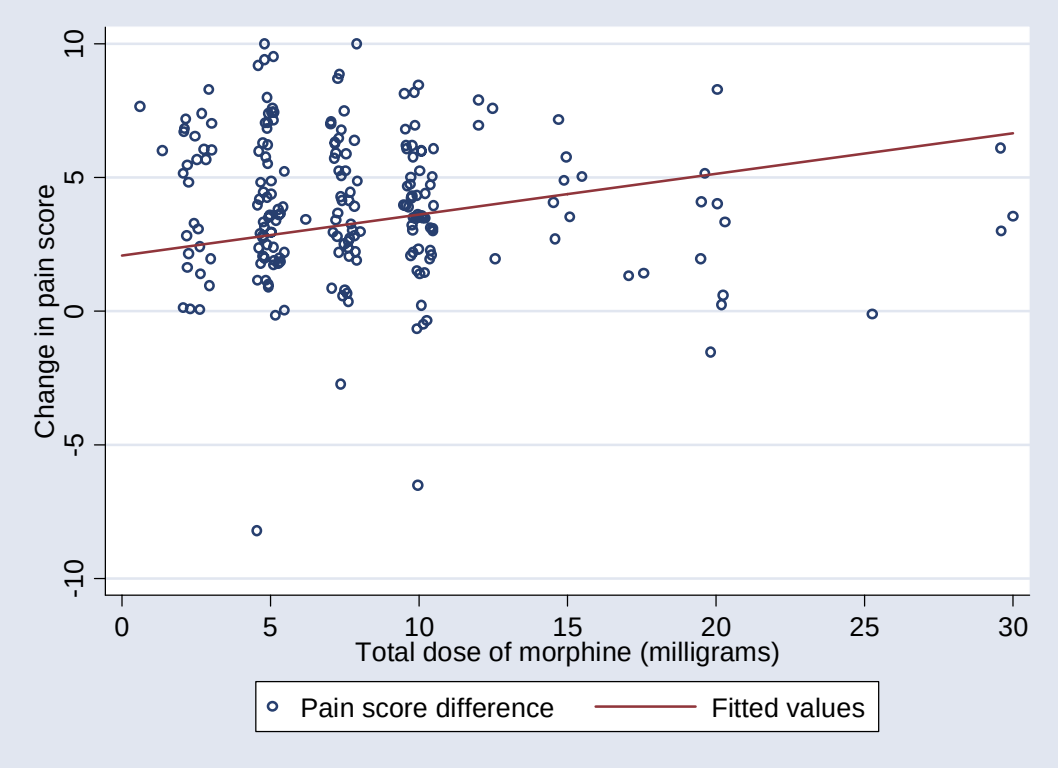
Morphine Administration by Age and Gender

Logistic regression analysis (Table 3-21) showed that females were less likely than males to receive morphine after controlling for type of pain, age and pain severity (OR 0.61, 95% CI 0.44 to 0.84). No significant differences in administration by age category were noted. Differences in analgesic use associated with the gender of the patient are detailed in a published paper based on this data that is included as Appendix E.[15]

Relationship between Morphine Dose and Change in VNRS Score

Figure 3-13 shows the change in pain score following morphine administration. Change in pain score (initial score minus final pain score) on the y axis is plotted against morphine dose in milligrams on the x axis. Although 262 patients received morphine, only 213 cases included a first and final VNRS score:

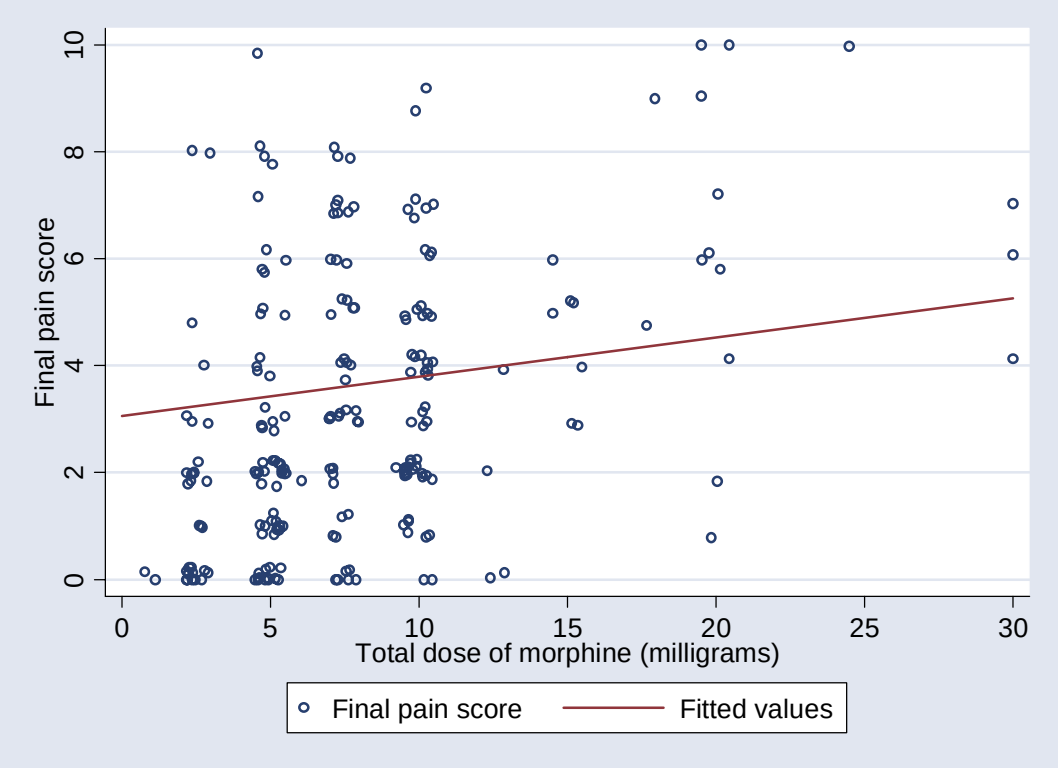
Figure 3-13: Relationship between morphine dose and change in VNRS score (n=213)



The result shows a trend towards greater reduction in pain as the morphine dose increases, but the variability in pain score reduction can be seen from the wide distribution of response in each dose range.

Figure 3-14 below shows the association between total morphine dose and final pain score, but does not take into account the initial pain score. As such, this graph does not suggest effectiveness of morphine, but it does show that some patients have a high final pain score despite morphine doses of up to 30 milligrams.

Figure 3-14: Association between morphine dose and final pain score (n=221)



Methoxyflurane Administration

Of the 605/1766 (34%) patients administered methoxyflurane, most were given 3 mls. A second dose of 3 mls (total dose of 6 mls) was administered to 31 patients (5% of those receiving methoxyflurane). Clinical Practice Guidelines in this setting prescribe an initial dose of 3 mls of methoxyflurane. This lasts approximately 25 minutes after which a second dose of 3 mls (total dose of 6 mls) may be given if the patient continues to report a VNRS of greater than 2/10. The maximum total dose per patient is 6 mls. Of those patients with VNRS recorded and reporting severe pain (VNRS>7) 301/429 (70%) received methoxyflurane, with 241/429 (56%) receiving methoxyflurane as the sole analgesic agent.

Methoxyflurane Administration by Pain Severity

The relationship between methoxyflurane administration and initial VNRS pain category is shown in Table 3-22:

Table 3-22: Methoxyflurane administration by initial VNRS category

	Methoxyflurane administered		
	No (%)	**Yes (%)**	**Total**
VNRS category			
0	100 (94.34)	6 (5.66)	106
1 to 3	250 (90.58)	26 (9.42)	276
4 to 7	295 (62.11)	180 (37.89)	475
8 to 10	128 (29.84)	301 (70.16)	429
Total	773 (60.11)	513 (39.89)	1,286

Significant differences ($p < 0.001$) were observed between pain severity category and methoxyflurane administration. In cases where a VNRS was recorded, 70% (n=301/429) of patients with severe pain (VNRS 8-10) received methoxyflurane, with the rate falling to 38% (180/475) for patients having moderate pain (VNRS 4 to 7).

The difference between total cases of methoxyflurane administration (605) and total cases of methoxyflurane administration by VNRS category (513) is explained by some cases of methoxyflurane administration where pain severity was not recorded or cases where a different method of recording pain severity was used.

Methoxyflurane Administration by Pain Region

Methoxyflurane administration was associated with significant differences when analysed by pain region, with head ($p <0.001$), cervical ($p =<0.001$), and thoracic ($p < 0.001$) regions associated with significantly lower use of methoxyflurane.

Abdominal ($p = 0.001$), pelvic ($p < 0.001$), lower limb ($p < 0.001$) and lower back ($p < 0.001$) regions showed significantly higher administration rates for methoxyflurane.

The lowest frequencies of methoxyflurane administration by body region were cervical (18.4%), thorax (19.7%) and head (20.8%). Methoxyflurane was most commonly administered for lower limb (51.4%) and lower back (56.6%) pain.

Methoxyflurane Administration by Duration of Pain

The relationship between the administration of methoxyflurane by duration of pain is shown in Table 3-23:

Table 3-23: Methoxyflurane administration by duration of pain

	Methoxyflurane administered		
	No (%)	**Yes (%)**	**Total**
Duration of pain			
<6 hours	764 (62.88)	451 (37.12)	1,215
6-24 hours	159 (69.74)	69 (30.26)	228
>24 hours to <1 week	156 (70.27)	66 (29.73)	222
1 week to 3 months	32 (74.42)	11 (25.58)	43
>3 months	10 (71.43)	4 (28.57)	14
Total	1,121 (65.10)	601 (34.90)	1,722

Duration of pain was associated with significant differences in methoxyflurane administration (p=0.054), with the frequency of use declining with increasing duration of pain. While 37% (n=451) of patients with pain duration < 6 hours received methoxyflurane, this fell to 30% (n=69) when pain duration was recorded to be 6-24 hours.

Methoxyflurane Administration by Cause of Pain

Significant differences in methoxyflurane administration were associated with cause of pain (p < 0.001), with patients having pain related to trauma more likely to receive methoxyflurane than those with cardiac pain (Table 3-24).

Table 3-24: Logistic regression of factors associated with methoxyflurane administration

Variable	Odds ratio	95% CI	p-value
Age category (years)			
15-40	1.0		
> 40 & <= 60	0.93	0.64-1.36	0.703
> 60 & <= 80	0.59	0.40-0.86	0.006
> 80	0.47	0.30-0.72	0.001
Gender			
Male	1.0		
Female	1.24	0.93-1.66	0.139
Pain cause			
Cardiac	1.0		
Trauma	29.12	13.66-62.05	< 0.001
Initial pain score			
VNRS = 0	1.0		
VNRS 1-3	1.23	0.48-3.16	0.659
VNRS 4-7	9.60	4.03-22.82	< 0.001
VNRS 8-10	38.80	16.16-93.15	< 0.001

Logistic regression analysis found that patients with trauma pain were more likely to receive methoxyflurane than patients with cardiac pain (OR 29.12; 95% CI, 13.66-62.05; $p < 0.001$) after adjusting for age, gender, initial pain score, and cause of pain.

Methoxyflurane Administration by Age and Gender

Significant differences in methoxyflurane administration by age categories were noted (Table 3-24), with those aged > 60 and <= 80 less likely to receive methoxyflurane than those aged <40 (OR 0.59, 95% CI, 0.40 to 0.86; p=0.006) after adjusting for age, gender, initial pain score, cause of pain and duration of pain. Patients aged > 80 were also less likely to receive methoxyflurane (OR 0.47, 95% CI, 0.30 to 0.72; p=0.001). There was no gender difference identified with methoxyflurane administration (p=0.139).

Discussion

Incidence of Pain

The results of this study demonstrate that pain is frequently encountered in paramedic practice in this study setting, with 52.6% of patients reporting pain as a symptom. This finding is similar to that shown by a smaller study undertaken in the UK which found an incidence of pain in 54% (273/502) of patients arriving at an emergency department by ambulance.[16] Reports of the incidence of pain in emergency department presentations include rates of 61%[17] and 78%,[18] showing that pain is a common complaint among people seeking emergency medical care.

There are few other published studies describing the incidence of pain in patients transported by paramedics. In 2002 McLean and colleagues attempted to measure the epidemiology of pain in the prehospital setting in the USA. A sample of patients visiting emergency departments was extracted from the 1999 National Hospital Ambulatory Medical Care Survey. The study found that 52% of patients arriving at an ED by ambulance had no information on pain documented on the patient care record despite evidence of narcotic analgesic administration in 13% of cases where no pain information was recorded. Although 20% of all patients where pain was documented reported moderate to severe pain, the inadequate documentation of pain in this setting and the design of the study is likely to have underestimated the true level of pain.[19]

Pain Assessment and Pain Severity Scoring

The high percentage of cases that included a record of pain severity assessment (1673/1766 cases, 95%) reflects the establishment of pain management as a clinical priority within the Metropolitan Ambulance Service (MAS). Paramedics are expected to assess all patients for pain and in those reporting pain to seek a self-report of pain severity, preferably using the 0-10 verbal numeric rating scale (VNRS). The level of compliance is monitored through a clinical audit process, with the frequency of pain scores on the PCR increasing from 54% in 2002 to the current level identified by this study.[20]

While a high level of compliance in recording pain severity on the PCR was noted during the study period, the data from this retrospective study cannot differentiate

between pain scores arising from the patient's self-report of pain, and the paramedic's recording of what they believe the patient's pain score to be. One case makes it clear that the score is generated by the paramedic rather than the patient, though in this case apparent language barriers may legitimise this process: "pain scores are estimates as pt doesn't speak English. Pt in obvious pain." (StudyID 0614)

While surrogate estimates of pain may be necessary where communication difficulties impair or prevent the use of a patient report of pain severity, this approach should be used on the understanding that paramedics may significantly underestimate the level of pain severity.[21] This tendency for health professionals to underestimate a patient's level of pain has also been reported in other settings.[22]

Several cases demonstrated discrepancies between the paramedic record of pain on the PCR and the record of pain severity that forms a component of the vital sign assessment section of the PCR. In some cases a description of pain in the history or assessment sections of the PCR was associated with a pain score of 0/10. The following examples illustrate this finding:

- Pain was rated as 0/10 on the PCR at all times despite a documented patient complaint of abdominal pain. (StudyID 0613)
- Pain score was recorded as 0/10 in all observations despite a documented patient complaint of a sharp pain in the right leg. (StudyID 0621)
- Initial assessment included documentation of pain in right leg. However, the pain score was always recorded as "0". (StudyID 0630)
- Pain score of 0 in all observations, despite a documented chief complaint of sharp intermittent abdominal pain. (StudyID 0834)
- A documented complaint of severe but intermittent abdominal pain was associated with a pain score that was documented as 0. (StudyID 0836)
- Pain in the right iliac fossa was the main complaint. However, no pain score was recorded in the vital signs section of the PCR. (StudyID 0839)
- First and final pain score was recorded as 0 despite a documented complaint of sharp localised abdominal pain. (StudyID 1051)

- The patient was assessed as having a dislocated shoulder. No record of pain severity was made and the paramedic remarked that "no analgesia given as pt tolerating pain." (StudyID 1253)
- The patient was complaining of "mild pain" of suspected cardiac origin as the patient was given 600 micrograms of glyceryl trinitrate. However, both the initial and final pain scores were recorded as 0/10. (StudyID 1317)

These cases may represent errors or omissions in recording the pain severity. It is unlikely that a patient reporting pain would score their pain as 0/10 if the value of the zero on this scale (no pain) was explained to them. However, this may represent patients' difficulty in interpreting the instructions or in understanding the term "pain". This may occur where there are language difficulties complicating the communication process. An alternative explanation may be that the score represents the paramedic's assessment of the patient's pain severity rather that the patient's self-report, which may have been influenced by behavioural or contextual cues.

While most records of pain severity used the verbal numeric rating scale (76.9%), the use of the adjective rating scale (ARS) or "other" methods may reflect the difficulty some patients have in assigning a number to their level of pain. The patient's inability to use the VNRS may be affected by language difficulties, cognitive impairment, or dysphasia due to existing medical conditions. An extended analysis and discussion of the assessment of pain in adults with cognitive impairment is described in a published paper that forms part of this thesis. This paper is included as Appendix H.[23]

The significant difference between the frequency of pain severity assessment for cardiac and trauma pain may reflect the emphasis on the management of cardiac pain as a key clinical performance indicator in this study setting. Some of the differences between the management of cardiac and traumatic pain identified by this study may be linked to beliefs that cardiac pain is linked to abnormal and potentially life-threatening pathology, whereas pain from soft tissue or musculo-skeletal injury is considered inevitable but self-limiting. This may stem from prior education and clinical practice guidelines that identify cardiac pain as a time critical emergency requiring early analgesia to minimise potentially adverse effects of pain related stress hormones on cardiac function.[12] The potential influence of beliefs that paramedics

hold regarding pain measurement and pain management will be explored through qualitative research presented in Chapters 5 and 6.

The frequency of documented pain scores is high when compared with other health care literature. Examples of the frequency of pain score documentation can be found in the US, where the Joint Commission – the agency responsible for evaluation and accreditation of health care organisations and programs in the United States – has published pain management standards that affirm that every patient has a right to have his or her pain assessed and treated.[24] While formal pain assessment and documentation is an accreditation requirement, for the first 6 months of 2007 the Joint Commission reported 8% health agency compliance with this standard.[25]

While the Joint Commission has no jurisdiction over Emergency Medical Services (EMS) in the US, the National Association of EMS Physicians Standards and Clinical Practices Committee has developed a position paper that recommends pain be assessed and documented in all patients treated and transported by paramedics.[26] However, evidence of compliance is scant. Where evidence of pain scoring rates in the prehospital setting are available, differences in study methodologies make comparisons difficult. However, one study in the US found that paramedics recorded pain severity scores in 63% (3416/5383) of cases involving adult patients.[27]

In Australia, the Council of Ambulance Authorities (CAA) – the peak body representing statutory and other providers of ambulance services of Australia, New Zealand and Papua New Guinea – has identified quality of pain relief as a surrogate measure of compassion and caring, and has recommended the development of clinical performance indicators that include reduction in pain. However, no data relating to the frequency of pain assessment by paramedics in this region has yet been published in the scientific literature or public domain.

The organisational requirement to use a pain scale for assessing severity in this study setting is commendable, as evidence shows that the mandated use of a pain scale for pain assessment in an emergency department (ED) increased the rate of analgesic interventions and reduced time to analgesic administration.[28] This initiative, along with the explicit clinical benchmark reductions in cardiac pain and pain from trauma are unique, as no other public evidence of benchmarks for pain reduction have been identified outside the Victorian ambulance services. Although there is a dearth of

evidence relating to effectiveness of pain management in the prehospital setting, the results from this study suggest that – when compared with evidence from other acute pain settings – pain measurement in this setting occurs more frequently than in other settings. Nevertheless, there appears to be scope for improvement in the management of pain, as a significant number of patients do not experience a clinically significant reduction in pain severity following paramedic care.

Change in Pain Severity

A considerable number of patients reporting pain (31.5%) had no change in pain severity score between the first and final assessment. However, this is not a particularly meaningful result when considered in isolation, as this may include patients with mild pain who did not receive or who refused analgesia. When considering those patients with severe pain (VNRS >7) at the first point of assessment, 26% (n=108) were documented to have severe pain at the final point of assessment. This finding demonstrates that a significant number of patients presenting with severe pain do not achieve a clinically significant reduction in pain following care by paramedics. Explanations for this finding will be investigated and described in Chapter 6. This will involve an analysis of factors that may influence paramedics' judgements and clinical decisions that may lead to a decision to withhold analgesia or to administer doses at sub-therapeutic levels.

It should be noted that the reductions in pain severity described by this study may be complicated by an inability to confirm whether peak analgesic effect was achieved prior to arrival of the patient at their destination, which usually coincides with the final set of observations including the final pain severity assessment. As the peak analgesic effect of morphine occurs within 20 minutes of intravascular administration,[14] it is possible that the final assessment of pain severity was undertaken prior to achievement of the peak therapeutic effect, particularly in cases involving short transport times. A limitation of this study is the inability to calculate time from analgesia to final pain severity assessment, as the time of drug administration was not transcribed from the PCR. Methoxyflurane has a shorter time to peak analgesic effect as this drug is rapidly absorbed following inhalation, and as such its documented effect is less likely to be influenced by transport times.

Although the stated aim of pain management in this practice setting is a reduction of the patient's pain severity to 2/10 or less,[12] the clinical performance indicator chosen by MAS for reporting the effectiveness of pain management practice is the number of cases of adults with cardiac or traumatic pain where the pain severity score was reduced by 3 points on an 11-point VNRS. In 2005–2006, MAS reported that paramedics lowered cardiac pain by an average of 3.6 points and traumatic pain by 2.8 points using this measure.[1] In 2006-2007 a reduction in cardiac pain was not reported, but pain associated with trauma was reduced on average 2.9 points out of ten. [29] The 2007-2008 annual report did not cite results associated with this clinical performance indicator.[30] These results should be interpreted in the knowledge that MAS converts categorical data arising from adjectives used on the PCR to describe pain severity in the absence of a VNRS to an arbitrarily determined score that enables the inclusion of this data with interval scale data obtained from VNRS scores.[31]

The calculation of group mean changes in pain severity to measure the adequacy of pain management practice is made difficult due to the heterogeneity of the population. As an example, a 3 point reduction may have alleviated pain where the initial pain was scored as 5/10, but may not have produced satisfactory relief when the patient's initial pain score was 10/10. In contrast to setting benchmarks for the achievement of physiological endpoints, such as a reduction in blood pressure that may be objectively validated, the subjective experience of pain produces a variable account of "reasonable" pain relief.

In order to report a change in pain severity following therapeutic intervention it is important to distinguish between a statistically significant change and a clinically significant change.[32] Attempts to define the latter have been driven by the need to find a way of comparing the efficacy of different analgesic therapies. Several studies have reported attempts to establish a minimum clinically significant difference (MCSD) in pain scores by identifying the change in pain severity scores associated with the minimum perceptible change in pain, either better or worse. Although some studies were undertaken in an experimental pain setting, a study of acute pain in an Australian ED found that the MCSD in pain score using a VNRS was 1.4.[33] A similar study in the US found that the MCSD was 1.39 +/- 1.05 (95% confidence interval, 1.27-1.51).[34] Although the MCSD has been found to be independent of initial pain

severity,[35 36] other studies have suggested that the MCSD is dependent of the initial score, with severe pain needing a greater change in pain score to achieve MCSD.[37 38]

A further analysis and discussion of the validity and reliability of pain scales is included in Chapter 6. This includes an analysis of the paramedic's understanding of the purpose of self-reported pain scores and the nature of the data returned from using these scales.

In this study, a total of 655/1218 patients (53.8%) with a record of first and final pain severity scores achieved a reduction in pain of 2 or more points. It should be noted however, that a 2 point reduction in pain on a 0-10 VNRS scale represents the minimum perceivable change in pain severity, and this is not synonymous with adequate analgesia, particularly in cases involving an initial presentation of moderate to severe pain. Although the reporting of the MCSD is relevant in clinical trials, it has limited relevance in reporting the efficacy of pain management in the clinical setting, including the prehospital environment. The reporting of a mean reduction of pain score may be mathematically appropriate where the data is ratio or interval, however, the more meaningful approach to verifying the effectiveness of analgesic interventions may be to ask the patient to rate their satisfaction with their pain relief.

The lack of consistency in reporting pain management performance data is partly a function of different reporting benchmarks throughout Australian ambulance services. The CAA has developed clinical performance indicator for outcomes such as survival from out-of-hospital cardiac arrest that are intended as a national standard, and these have been adopted by some Australian ambulance services. However, there are differences between the way that pain outcomes are measured and reported that make national comparisons difficult. For example, the CAA defines adequate pain relief from trauma related pain as a 50% reduction in the initial numeric (1-10) pain score by arrival at hospital, in any case where the pain score was 6 or greater. The performance benchmark is set at the 90th percentile achieving this reduction.[39] As this outcome is expressed as a percentile of cases achieving this indicator this data differs from the pain reduction outcomes reported by MAS, making inter-agency comparisons difficult.

Analgesic Use

The setting where the study was conducted consists of two-tier emergency ambulance response is used in this study setting, with Advanced Life Support (ALS) the base level of clinical care. A more advanced level of response, known locally as a Mobile Intensive Care Ambulance (MICA), is also responded to cases that are predicted to require a higher level of clinical care, such as traumatic injuries involving a patient with an altered level of consciousness or chest pain associated with severe respiratory distress. Analgesic options for both levels of clinician are methoxyflurane – an inhalational analgesic belonging to the fluorinated hydrocarbon group of anaesthetic agents – or morphine. ALS training was introduced in the year 2000 and this training introduced authority to administer morphine at an ALS qualification level. The maximum dose of morphine that ALS qualified paramedics were able to administer was set at 10 milligrams. In April 2005 the maximum dose was increased to 20 milligrams per patient, with a recommendation that the drug be given intravenously in 2.5 to 5 milligram increments every 5 minutes until the desired level of analgesia is achieved. At the time this data was collected, intramuscular administration by ALS paramedics required authorisation by a senior paramedic. MICA paramedics do not have an upper limit for morphine dose. The increase in maximum dose of morphine occurred just four months prior to the collection of data that forms the basis for this study, and this may be one explanation for the relatively few cases of morphine doses that exceed 10 mg.

This study revealed that of the 1766 patients reporting pain 15% (n=263; 95% CI 13-17%) received morphine, 34% (n=605; 95% CI 32-37%) received methoxyflurane, with 6% (n=104; 95% CI 5-7%) receiving both. The frequency of morphine use exceeds that reported by a US study where paramedics administered morphine for painful conditions to 4.9% (250/5099) of adults (aged >17 years) with chest pain, extremity fracture or burns.[27] A more detailed analysis of morphine administration by cause was not possible in this US study due to the paramedics' limited ability to accurately classify the cause of pain during the prehospital phase of care. In addition, no analysis of analgesic administration by pain severity was reported.

As there is little other published data regarding the frequency of analgesic administration for patients treated and transported by paramedics, other than those

studies already cited in the literature review (Chapter 2), evidence from emergency department settings is used to contrast the findings of this study. This is done while recognising the problem of generalising findings from studies with different patient populations and clinical settings, and where differences in research methods complicate the comparison of results.

An Australian study of pain management in an emergency department used morphine administration as an indicator of clinical quality with intravenous morphine the drug of choice in this setting for the treatment of severe pain. The study included all patients who had been given morphine in the ED, but excluded patients who had a diagnosis of acute pulmonary oedema or those who had been given other analgesics or morphine prior to ED arrival. The results showed morphine administration rates of 185/2070 (8.9%) for patients with chest pain, 209/1868 (11.2%) for fractures, 383/2197 (17.4%) for abdominal pain, and 39/59 (66.1%) for renal colic. The authors found that morphine administration significantly ($p < 0.05$) varied by triage category, age of the patient, time of arrival and type of illness. No attempt was made to compare morphine administration with pain severity.[40]

In a US study of 354 patients with pain treated in an emergency department, patients aged > 7 years self-reported pain severity using an 11-point Verbal Numeric Rating Scale (VNRS-11). The mean pain score recorded at first point of assessment (ED triage) was 6.6/10, and 47% of patients reporting pain received analgesic while in the ED. Patients who did not receive analgesia (53%) had a mean pain score of 5.9/10.[34]

A multi-centre study in the US that examined pain management in patients (aged >=8) with moderate to severe pain who presented to an ED (n-842) found that 61% (n=506) of patients received analgesics, with 21% receiving morphine. The authors conclude that analgesia in this setting is underutilised.[41]

A study of 450 trauma patients aged >15 and GCS >13 admitted to a trauma centre in the Netherlands found that the mean initial pain severity rated by patients using a VNRS was 5.9/10. Just 19% (n=83) patients received pharmacological intervention for pain, with two thirds of patients reporting moderate to severe pain at discharge.[42]

Differences in Analgesia Administration by Cause

This study found that patients with pain deemed to be of cardiac origin were more likely to receive analgesia than those with pain from trauma (OR 4.14, 95% CI 2.37 to 7.23). This finding may reflect the significant organisational importance placed on the management of cardiac chest pain. Unlike pain from trauma, which may be seen as a predictable and innate response to tissue injury, cardiac pain is recognised as a sign of a potentially life-threatening pathology that needs to be managed promptly and effectively. At the time of this study the majority of paramedics employed by MAS had completed the same vocational training program, which emphasises the adverse effects of unrelieved cardiac pain. These include increased myocardial workload and myocardial oxygen consumption due to a pain-mediated increase in stress hormones. In contrast, pain from trauma may be seen to be a necessary signal of tissue damage that prompts the individual to develop avoidance and harm minimisation strategies. The hypothesis that traumatic pain is seen as protective, inevitable and less harmful than cardiac pain may explain the significant differences in analgesic interventions in this study.

Further evidence for the greater emphasis placed on the treatment of cardiac pain is a change in paramedic clinical practice guidelines since this study was completed. The practice guideline applying to the management of cardiac chest pain at the time of the study described the use of morphine while the patient's pain remained greater than 2/10 using the VNRS. A new guideline published in September 2006 now advises paramedics that "the goal of pain management in these patients is to resolve pain completely if safe to do so".[43]

Differences in Analgesia Administration by Pain Region

Pain was reported to involve the head region in 13.4% (236/1766) of cases, yet this region was associated with the lowest rate of analgesia (29.7% of cases). Methoxyflurane was the most frequently used analgesic for head pain (49/236, 20.8%). When head pain was analysed by cause, the pain was categorised as traumatic in 17.8% of cases (101/236), and "other" in 13.1% of cases (132/236). Although headache was not a contraindication for either methoxyflurane or morphine administration in this study setting, the clinical practice guideline requires ALS paramedics to consult with a medical officer at the intended hospital of destination to

gain approval for morphine administration for cases of undiagnosed headache. However, MICA paramedics do not need to consult to administer morphine in this setting. As a large proportion of cases of head pain were categorised as "other" – which included all non-cardiac medical causes – this may have influenced the rate of analgesia in cases of head pain. Pain due to migraine has been shown to respond well to phenothiazines such as metoclopramide.[44 45] Although paramedics can administer metoclopramide in this study setting, the only indications for this drug at the time of the study were nausea associated with cardiac chest pain or nausea associated with morphine administration.

Morphine use was low where pain was coded as arising from the head (11/236, 4.7%), cervical (13/152, 8.6%) or abdominal (51/425, 12%) regions. Patients with abdominal pain were also less likely to have their final pain score reduced to <=2 ($p < 0.001$). In contrast, 175/425 (41.2%) of patients with abdominal pain received methoxyflurane.

Although abdominal pain is not listed as a contraindication or precaution under the morphine drug information used by paramedics in this setting, some concerns regarding the possibility that analgesia may mask the surgical abdomen and complicate the diagnosis still appear in the literature. For example, the drug data for morphine in the 2008 version of an Australian drug compendium states that "the administration of morphine or other opioids may obscure the diagnosis or clinical course in patients with acute abdominal conditions".[46]

The advice that morphine should be avoided in the case of the acute abdomen was promoted by a popular medical text that was first published in the 1920s. The author, Zachary Cope, in his book Early Diagnosis of the Acute Abdomen stated that "though it may appear cruel, it is really kind to withhold morphine until one is certain or not that surgical interference is necessary, i.e. until a reasonable diagnosis has been made".[47] It was not until the 20th edition, published in 2000, that the error of this advice was recognised: "The realization, likely erroneous, that narcotics can obscure the clinical picture has given rise to the unfortunate dictum that these drugs should never be given until a diagnosis has been firmly established".[48]

The decision to administer or withhold an analgesic may be influenced by observations of patient behaviour and evidence of tissue injury or physiological

derangements assumed to be associated with pain. The latter include evidence of autonomic nervous activity such as tachycardia and pallor that is associated with severe acute pain. However, the validity and reliability of vital signs in assessing pain severity has been questioned in a published paper that is included as Appendix G.[49] An analysis of paramedic beliefs and attitudes regarding pain assessment in relation to the role of vital signs in validating the patient's self-report of pain will be undertaken in Chapter 6.

Differences in Analgesia Administration when Associated with Drug or Alcohol use

Notation by the paramedic of alcohol or drug use on the PCR was associated with a significant decrease in analgesic administration for patients reporting pain. A suspicion of drug seeking behaviour is one possible reason for this finding. This belief is explicitly stated by a paramedic record of care for a patient suspected of heroin use. In a case involving a 32 year old male reporting 10/10 abdominal and melena the paramedic notes that the "Pt admits to heroin use – spoons and needles evident in bedroom." Although the pain severity is recorded as 10/10 the paramedic notes that the patient "is resting comfortably. Easily distracted, very chatty en-route. No signs of pain/ discomfort" (StudyID 0437). The suspicion that the patient's report of pain may be unreliable is supported by the notation that the patient is "seeking analgesia". This is despite a lack of evidence of any direct request for analgesia or clinical evidence that discredits the patient's self-report of pain. This theme will be explored in Chapter 6.

Differences in Analgesia Administration with Duration of Pain

A trend to decreasing rates of analgesia as the recorded duration of pain increased was noted in this study. Statistically significant differences in analgesic rates were associated with pain durations of >24 hours to < 1 week, and 1 week to 3 months. Pain greater than 3 months was not significant, partly due to the small number of cases (n=14) producing a wide confidence interval. The reason that patients with duration of pain of >24 hours to < 1 week are 40% less likely to receive analgesia and those with duration of pain between 1 week and 3 months are 66% less likely to receive analgesia are not clear. There was no significant difference in documented

rates of refusal of analgesia by duration of pain. It is acknowledged that patients with chronic pain may have developed tolerance to opioids prescribed for their pain, and that this tolerance may provide challenges in managing an escalation of their pain. However, this does not account for significant differences in the frequency of paramedic-initiated analgesic administration associated with duration of the pain.

An examination of the paramedic narrative on the PCR in cases of chronic pain that were not offered analgesia suggests that one reason for the different rate of analgesia is related to concerns about the reliability of the patient's report of pain. One case involving a 74 year old female with a report of 10/10 chest and abdominal pain did not receive analgesia, with a note from the paramedic that the "Pt is a regular with MAS - Despite pain being 10/10 pt showed no signs of severe pain" (StudyID 0285).

One possible explanation for this finding is the possibility that paramedics feel ill-equipped to deal with chronic pain, particularly if the patient is under the care of a pain management specialist and is complying with their current management regime. This may be a function of contemporary paramedic education programs, which generally spend little time discussing the management of chronic pain. The under preparedness of paramedics in caring for patients with chronic pain in this setting is evidenced by the lack of any learning objectives on this topic within the curriculum used to teach the majority of paramedics employed by MAS.[50] The emphasis of paramedic education has traditionally been the management of acute health emergencies. As such, paramedics tend to identify their role as one of management of acute medical and trauma emergencies, and as such they may see the management of chronic health problems as the remit of other health professionals.

While the effect of chronicity of pain on paramedic clinical decisions is largely unreported, there is evidence that nurses tend to underestimate pain severity and negatively stereotype patients with chronic pain,[51] and that physicians' assess chronic pain as a lower management priority when presented with clinical vignettes of patients presenting with acute and chronic pain.[52] However, there is no evidence of paramedics' attitudes towards patients with chronic pain, and as such this requires further investigation to establish whether chronicity of pain influences paramedics' clinical decisions regarding analgesia. Given that chronic pain is associated with older age, receiving a disability or unemployment benefit, lower levels of education,

and high levels of psychological distress,[53] it is important to determine whether bias or stereotyping affects paramedics' clinical decision making in cases involving chronic pain.

Refusal of Analgesia

In a retrospective study of this kind the reported rate of refusal of analgesia (10.9%) cannot be attributed to the patient's informed decision to refuse consent. Where patients do refuse analgesia this may be due to a preparedness to tolerate pain without drug intervention, a belief that analgesia is only for severe pain, or concerns about analgesic side effects or the possibility of addiction.

The low rate of refusal in cases of pain believed to have a cardiac origin (2.6%) may reflect the greater awareness of cardiac pain as a potentially life-threatening condition. It is not clear whether the patients with chest pain were better informed about the risks and benefits of analgesia and whether this influenced the incidence of refusal.

Some patients appeared to prefer continuation of their own medication, for example oral morphine (MS Contin). In one case the patient was noted to prefer alternate therapy "pt declined pain relief - drank own port". (StudyID 0330)

In some cases the paramedic provided annotations on the PCR that indicated some doubt about the veracity of the patient's self-reported pain score. For example, a case involving a 34 year old female with acute abdominal pain included the following record of pain severity: "?? 9". It was noted that the patient declined analgesia, and the final pain score was recorded to be 9/10 (StudyID 1780).

Comparison rates of refusal between national and international practice settings are hampered by a lack of published data. A study of analgesia in the prehospital and inter-hospital setting (n=209) found a rate of refusal of 10.5%.[54] In a study of patient desire for analgesia at the point of emergency department triage,[55] the authors reported that only 49% of patients (n=392) expressed a desire for analgesia, despite a mean initial pain score of 7.1 using an eleven-point VNRS. It should be noted that a study of desire may not be synonymous with refusal after offer of analgesia, as the latter may suggest to the patient that the clinician recommends analgesia with the patient then free to choose whether they accept the offer or not. Evidence that the

patients may not have been informed about the benefits of relieving their pain is highlighted by the finding that patients with chest pain were less likely to desire analgesia. The fact that the most common reason for not wanting analgesia was that the "pain was tolerable" suggests that the patient may be verbalising their expectations of the clinician's assessment. Conformation of patient informed non-consent cannot be reliably calculated using retrospective case review methodology, but requires the use of a prospective observational study. In cases where this method has been used the authors found that no patient refused analgesics in a study of patients reporting pain (n=216) and transported by ambulances staffed by physicians.[56] A prospective study of patients with pain in an ED setting found that 1.4% (3/209) patients refused an offer of analgesia.

The reason for the relatively high level of refusal in this study requires further investigation. It is possible that the documentation of a refusal to accept analgesia is a means of avoiding analgesic administration and subsequent clinical audit where the paramedic believes that analgesia is not warranted. For example, in one case the paramedic recorded that the patient refused analgesia and added the notation "has been drinking wine today" (StudyID 0003).

Adverse Effects

A retrospective review of PCRs was unable to make any conclusions about the cause of documented adverse effects of analgesic administration due to the large number of uncontrolled variables that may have had some influence on adverse effects. For example, while hypotension may be an adverse effect of morphine administration, in this study four of the five cases of hypotension were complicated by co-morbid pathologies, advanced age, and potentially confounded by concurrent administration of medication that may also be associated with hypotension.

Common adverse effects associated with morphine administration include "constipation, light headedness, dizziness, sedation, nausea, vomiting, sweating, dysphoria and euphoria."[46] Less common but serious adverse effects include hypotension, hypoventilation, syncope and bradycardia.

The incidence of nausea and/or vomiting associated with administration of morphine of 18/263 (6.8%) in this study is similar to other published data. Comparative studies

include a prospective observational study of nausea and vomiting following morphine administration in adult patients presenting to an emergency department with acute pain, which found an incidence of vomiting of 2.4% and an incidence of nausea of 9.3% at 60 minutes after morphine administration.[57] Another ED based study of morphine related nausea and vomiting in adult patients in an emergency department found an incidence of 3.7%.[58]

This study documented a very low incidence of the other adverse effects associated with analgesic administration. This is consistent with studies of adverse effects of analgesia in hospital settings. In a large Australian study of patients suffering adverse effects of analgesia for acute pain in hospital settings, 17 patients from 20,989 (0.081%) required naloxone for the management of respiratory depression associated with analgesic administration.[59] The same study reported a rate of hypotension associated with analgesia for acute pain of 0.26% (46/ 17,610).

Although there is very little published evidence of analgesic-related adverse effects in the prehospital setting, in one small prospective study of morphine use for patients reporting pain in a prehospital setting (n=216), there were 21 adverse effects noted, but "none required treatment". The most common was nausea (7%, 16/214 patients receiving morphine) followed by sedation (1%, 3/214 patients receiving morphine). There was one case of hypotension and no cases of hypoventilation. The mean dose of IV morphine in this study was 9.0 ± 5.7 mg.[56]

In a prospective study of nurse-initiated analgesia in the ED involving 349 patients, 10 episodes of hypotension were recorded, with supplemental oxygen the only intervention required. There were no recorded episodes of hypoventilation, bradycardia, or reduced level of consciousness.[60]

The incidence of analgesia-related adverse events documented in this study confirms that, while serious adverse events may occur, the rate of occurrence is low and in each case the adverse effect appears to have been successfully managed by paramedics. Two of the five cases involving hypotension required intervention in the form of intravenous fluid administration. No cases required the administration of the opioid receptor antagonist naloxone to reverse adverse effects of morphine.

Cases of Pain with No Analgesia Documented

Paramedics in this study setting use morphine or methoxyflurane for analgesia. While the use of morphine was previously restricted to MICA paramedics, an upgrade of qualifications for all paramedics to Advanced Life Support (ALS) level that commenced in 2003 included authorisation to administer morphine at this new clinical level. Prior to the introduction of ALS paramedics were authorised to administer methoxyflurane for pain. At the time of the study 77% of paramedics in MAS were authorised to administer morphine.

In one case the patient's initial pain score was recorded as 6/10, but the treating paramedic noted that the patient "looks comfortable talking and smiling therefore pain relief withheld" (StudyID 1398). This patient did not refuse analgesia. Explanations of this disparity between the patient's report of pain and the paramedic's judgements regarding the need for analgesia are explored in more detail in Chapter 6.

Short transport time was cited as the rationale for not giving morphine in two cases. In one (StudyID 0182), the patient's initial pain score of 10/10 was reduced to only 9/10 after the administration of methoxyflurane. The actual transport time in this case was 17 minutes. In another case involving a patient with "moderate" chest pain analgesia was withheld "due to close proximity to hospital" (StudyID 1357). Transport time was four minutes.

In these cases the treating paramedic may not have appreciated the fact that time to destination is not synonymous with time to analgesia, given the delay to triage and eventual treatment in the hospital. For example, mean time to analgesia from a patient's arrival at the ED has been recorded to be 113 minutes in a US study.[61] In a recent Australian study of time from ED triage to analgesia found that the median wait was 79 minutes, and that an extended time to analgesia was associated with time of presentation and increasing ED patient volumes.[40]

Cases involving severe pain (VNRS 8-10) that did not have any documentation of analgesia were analysed to identify reasons. Of the 49 cases, 17 (35%) had a documented refusal of analgesia. Comments recorded by paramedics indicate that

concerns regarding drug seeking behaviour or the veracity of the patient's self-report of pain may have influenced their decision to withhold analgesia.

Behavioural Cues used to Validate the Patient's Self-report of Pain Severity

Several cases included comments recorded by the treating paramedic that questioned the patient's self-report of pain or pain severity. This suggests that paramedics are using several cues other than the patient report to guide their clinical decisions to administer or withhold analgesics. This issue will be elaborated on in Chapter 6. The following examples reveal that the patient's behaviour may have influenced the paramedic's clinical judgement and decisions regarding analgesic administration:

- A 78 year old male with thoracic pain of 24 hours to 1 week duration did not receive analgesia. The first and final pain scores were 6/10, but the paramedic noted that the patient "does not appear distressed." There is no record of the patient having refused analgesia (StudyID 0052).

- A 70 year old male with chronic pain classified as cervical, thoracic and abdominal in location did not receive analgesia despite a first and final pain score of 6/10. The paramedic noted that the "Pt states 6/10 pain but looks comfortable talking and smiling therefore pain relief withheld." There is no record of the patient having refused analgesia (StudyID 0138).

- A 74 year old female reported severe pain due to pain in the cervical, thoracic and abdominal region of < 6 hour duration. The paramedic noted that "Despite pain being 10/10 pt showed no signs of severe pain" The first and final pain scores were recorded as 10/10. No analgesia was given to this patient and there is no record of the patient having refused analgesia (StudyID 0285).

- A 54 year old female was classified as having non-cardiac thoracic pain of short duration (< 6 hours). The paramedic noted that "Pt describes pain as excruciating [but] pt chatting happily on arrival at hospital" No numeric pain score was recorded and no analgesia was given. There is no record of the patient having refused analgesia (StudyID 0406).

- A 25 year old female reported 8/10 abdominal pain. No analgesia was given as the paramedic noted that "analgesia not offered because of serial abuse" (StudyID 0481).
- A 30 year old male reported 8/10 abdominal pain. The paramedic noted that "Pt has psych hx? Penthrane [methoxyflurane] seeker, asked for it on numerous occasions by name". There is no record of the patient having refused analgesia. The final pain score was 8/10 (StudyID 0486).
- A 21 year old female is recorded to have 10/10 abdominal pain. The paramedic noted that "Pain 8/10?? Pt speaking full sentences, quiet, appeared in minimal distress." The final pain score was 8/10 after 3 mls of methoxyflurane (StudyID 0579).
- A 67 year old female is recorded as having 9/10 thoracic and abdominal pain. The paramedic recorded that "Pt states 9/10 and 5/10 but appears quite comfortable holds normal conversation." 3 mls of methoxyflurane was given (StudyID 0738).
- A 32 year old female with head, cervical and lower back pain is reported to have 9/10 pain of duration < 6 hours. The paramedic noted that "pain not obvious, nil penthrane due to? kidney impairment". No morphine was administered. The final pain score was recorded as 9/10. Evidence of alcohol or drug use was noted. There is no record of the patient having refused analgesia (StudyID 0802).
- A 45 year old female is recorded to have 10/10 abdominal pain of short duration (< 6 hours). After 3 mls of methoxyflurane the patient's final pain score is 9/10. The paramedic noted that "pt appears comfortable with nil distress" (StudyID 1046).
- A 30 year old female is recorded to have 10/10 abdominal pain of between 24 hours and seven days duration. The patient was given 3 mls of methoxyflurane. The paramedic noted that "pt moving/walking easily - does not appear to be in a lot of pain." The final pain score was 8/10 (StudyID 1241).
- A 67 year old male is recorded to have 5/10 abdominal pain of < 6 hours duration. The paramedic noted that "pain relief withheld - pt not distressed." The patient's final pain score was not recorded (StudyID 1254).

- A 53 year old male is recorded to have 7/10 abdominal pain. No analgesia is given and there is no record of the patient having refused analgesia. The paramedic has noted that "Pt coping without pain relief" (StudyID 1701).
- A 37 year old female is reported to have 9/10 abdominal pain of duration < 6 hours. No analgesia is given and there is no record of the patient having refused analgesia. The paramedic has noted "Pt smiling & laughing ? pain score." The final pain score is reported as 9/10 (StudyID 1768).

Other Factors Affecting the Provision of Analgesia

Communication difficulties involving language differences were noted in thirty one cases. This complicated the assessment of the patient's pain, and this may have influenced the effectiveness of pain management strategies.

In the MAS, morphine is given by intravenous injection, although ALS paramedics may administer intramuscular morphine following consultation, however MICA paramedics do not face this restriction. The study identified 20 cases of unsuccessful cannulation. However, this is likely to be underreported. Only three instances of IM morphine administration were documented (StudyIDs 1164, 1370, 1683). An outline of these cases is presented below:

- Case involved a suspected fracture to the neck of femur following a fall in a 91 year old female. Two 2.5 mg IM doses of morphine reduced the patient's pain score from 10/10 to 8/10.
- Case was a 95 year old female with a four day history of chest pain. Cannulation was unsuccessful and a 5 mg IM dose of morphine reduced the patient's pain from 10/10 to 0/10.
- Case involved a suspected fractured neck of femur following a fall. The 77 year old female patient rated their initial pain score as 10/10. After 5 mg IM morphine the final assessment of the patient's pain severity was "not as bad". However, assessment of pain severity on three other occasions between the initial and final observations was noted to be "severe" or "same".

Although the clinical level of the paramedic (ALS or MICA) may have had some influence on pain management practice, the clinical level of the treating paramedic

cannot be ascertained as data identifying the clinician was removed by MAS during the data de-identification process.

Limitations

This was a retrospective, observational study that used a convenience sample of patient care records. Errors in documentation associated with this method may have occurred, including the possibility of documentation errors or bias in recording patient observations and drug therapy as well as transcription errors. Secondly, 108/1766 of the cases in this study were coded as response category 3. These cases represent those that may have been managed by emergency ambulance crews due to the unavailability of referral services such as non-emergency transport. The total number of response category 3 cases during the study period is unknown. This study design precludes analysis of patient reports of pain that were referred to other agencies, representing a potential weakness in the study design. Data identifying the paramedics involved in each case was removed from the PCR prior to access by the researcher. This prevented an analysis of pain management by clinical level of the paramedic. The study was conducted at a single ambulance service in a major metropolitan area and this limits the ability to generalise the findings to similar emergency medical services.

Conclusion

This study described the incidence and nature of pain and pain management practice in within an ambulance service in Melbourne, Australia. An analysis of pain management practice revealed a high rate of assessment of pain severity, which is consistent with organisational expectations by MAS. The formal assessment of pain severity helps to identify pain in patients who may not otherwise volunteer this information, provides clinical data that supports judgements regarding interventions that may alleviate pain, and enables evaluation of intervention efficacy. Although the measurement of pain severity is commonly reported, evidence arising from the paramedics' narrative recorded on the PCR suggests some degree of dissonance between the patient self-report of pain severity and the paramedic's observation of pain-related behaviour. In some cases involving a report of severe pain, analgesia was not administered. Some of these cases included comments that may conceal

concerns regarding the veracity of the patient's complaint due to inconsistencies between the patient's report of pain and behaviour observed by the paramedic.

Pain-related behaviour is influenced by several variables that include age, context, culture and the patient's sense of control of the pain. This means that for a given injury, significant inter-personal differences in behavioural response to pain may be observed. This makes the use of behavioural cues to determine the presence and severity of pain a potentially unreliable tool.

It is acknowledged that patient beliefs and values will influence pain management practice. Pain management practices are also influenced by ambulance service support for prehospital pain management as evidenced by organisational policy, clinical practice guidelines and clinical benchmarks for pain reduction. What is not well known is how paramedic clinical decision making is influenced by organisational factors or by the many cues arising from the patient environment, which may include socioeconomic status, gender and cultural cues that may be associated with stereotypes of pain-related behaviour.

This study found that a significant proportion of patients with pain do not receive analgesia, or receive analgesia in doses that may not be clinically effective even when their pain is categorised as severe. Paramedic's judgements and decisions in cases involving pain may be affected by behavioural cues, so that explicit displays of pain-related behaviour as well as minimal patient expression of pain may both influence pain management decisions. The research presented in Chapter 6 will explore the potential influence of patient behaviour on paramedic pain management practice

This study also noted disparities in analgesic use associated with gender, cause of pain, location and duration of pain. For example, females are less likely to receive morphine than males, despite having significantly higher levels of pain severity at the initial assessment. There is also evidence that concurrent drug or alcohol use affects pain management decisions. In order to investigate possible reasons for these variations in practice this thesis will undertake a qualitative study of paramedics' knowledge, beliefs and attitudes associated with the way individuals perceive and express pain. This will also investigate attitudes regarding pain assessment and management. Chapter 4 details the qualitative study methodology, and Chapter 5

reports the results. Results of the qualitative analysis and the explication of a theory that accounts for variations in practice are presented in Chapter 6. The research outcomes and implications for practice are presented in the conclusion of the study (Chapter 7). This links the findings of the quantitative study with the qualitative analysis to propose strategies that aim to inform both paramedic education and practice in order to improve patient care.

List of References

1. Metropolitan Ambulance Service. Metropolitan Ambulance Service 2005-2006 annual report. Doncaster, VIC: MAS, 2006.

2. Department of Human Services. Non-emergency patient transport: Clinical practice protocols. Melbourne: Programs Branch, Metropolitan Health and Aged Care Services Division, Victorian Government Department of Human Services, 2006.

3. Victorian Ambulance Services. Clinical practice guidelines. Melbourne, Victoria: Victorian Ambulance Services, 2006.

4. Todd KH. Pain assessment instruments for use in the emergency department. Emerg Med Clin North Am 2005; 23(2):285-95.

5. Berthier F, Potel G, Leconte P, Touze MD, Baron D. Comparative study of methods of measuring acute pain intensity in an ED. Am J Emerg Med 1998; 16(2):132-6.

6. Maio RF, Garrison HG, Spaite DW *et al*. Emergency Medical Services Outcomes Project (EMSOP) IV: pain measurement in out-of-hospital outcomes research. Ann Emerg Med 2002; 40(2):172-9.

7. Landis JR, Koch GG. The measurement of observer agreement for categorical data. Biometrics 1977; 33(1):159-74.

8. Altman DG. Practical statistics for medical research. London: Chapman and Hall, 1992.

9. AMPDS. Advanced Medical Priority Dispatch System. 10.2 edition. Salt Lake City, UT: Medical Priority Consultants, Inc, 1996.

10. Metropolitan Ambulance Service. Call referral service [Web Page]. 2006; Available at http://www.ambulance-vic.com.au/Main-home/Doing-it-Better/Call-Referral.html. (Accessed 15 July 2007).

11. Fosnocht D, Homel P, Todd K *et al*. 193: What Does a Pain Score of "X" Mean Anyway? Classification of NRS Pain Severity Scores for ED Patients

Based Upon Interference with Function: ACEP RESEARCH FORUM. Ann Emerg Med 2006; 48(4, Supplement 1):60.

12. Victorian Ambulance Services. Clinical practice guidelines: chest pain/ discomfort of a cardiac nature (CPG:A0401) and pain relief - non cardiac (CPG:A0402). Melbourne, Victoria: Victorian Ambulance Services, 2006.

13. Lord B, Cui J, Woollard M. Ambulance call triage outcomes for patients reporting pain: a retrospective cross sectional analysis of pain score versus triage level. Emerg Med J 2009; 26:123-7.

14. The MIMS annual. Crows Nest, NSW: Intercontinental Medical Statistics (Australasia), 2008.

15. Lord B, Cui J, Kelly AM. The impact of patient sex on paramedic pain management in the prehospital setting. Am J Emerg Med 2009; 27(5):525-9.

16. Chambers JA, Guly HR. The need for better pre-hospital analgesia. Arch Emerg Med 1993; 10(3):187-92.

17. Cordell WH, Keene KK, Giles BK, Jones JB, Jones JH, Brizendine EJ. The high prevalence of pain in emergency medical care. Am J Emerg Med 2002; 20(3):165-9.

18. Tcherny-Lessenot S, Karwowski-Soulié F, Lamarche-Vadel A, Ginsburg C, Brunet F, Vidal-Trecan G. Management and relief of pain in an emergency department from the adult patients' perspective. J Pain Symptom Manage 2003; 25(6):539-46.

19. McLean SA, Maio RF, Domeier RM. The epidemiology of pain in the prehospital setting. Prehosp Emerg Care 2002; 6(4):402-5.

20. Cooper G. Pain management performance in Metropolitan Ambulance. Melbourne: Metropolitan Ambulance Service, 2002.

21. Luger TJ, Lederer W, Gassner M, Lockinger A, Ulmer H, Lorenz IH. Acute pain is underassessed in out-of-hospital emergencies. Acad Emerg Med 2003; 10(6):627-32.

22. Solomon P. Congruence between health professionals' and patients' pain ratings: a review of the literature. Scand J Caring Sci 2001; 15(2):174-80.

23. Lord B. Paramedic assessment of pain in the cognitively impaired adult patient. BMC Emerg Med 2009; 9(20):doi:10.1186/1471-227X-9-20.

24. Joint Commission on Accreditation of Healthcare Organizations. Improving the quality of pain management through measurement and action. Oakbrook Terrace, IL: Joint Commission Resources, 2003.

25. Joint Commission. Joint Commission online: most challenging standards and requirements for first half of 2007 [Web Page]. February 2008; Available at http://www.jointcommission.org/Library/jconline/jconline_february_2008.htm. (Accessed 24 June 2008).

26. Alonso-Serra HM, Wesley K. Position paper: prehospital pain management. Prehosp Emerg Care 2003; 7(4):482-8.

27. Hennes H, Kim MK, Pirrallo RG. Prehospital pain management: a comparison of providers' perceptions and practices. Prehosp Emerg Care 2005; 9(1):32-9.

28. Nelson BP, Cohen D, Lander O, Crawford N, Viccellio AW, Singer AJ. Mandated pain scales improve frequency of ED analgesic administration. Am J Emerg Med 2004; 22(7):582-5.

29. Metropolitan Ambulance Service. Metropolitan Ambulance Service 2006-2007 annual report. Doncaster, VIC: MAS, 2007.

30. Metropolitan Ambulance Service. Metropolitan Ambulance Service 2007-2008 annual report. Doncaster, VIC: MAS, 2008.

31. Metropolitan Ambulance Service. Clinical information notice No. 2003/11: assessing and recording pain scores. Doncaster, VIC: MAS, 2003.

32. Todd KH. Clinical versus statistical significance in the assessment of pain relief. Ann Emerg Med 1996; 27(4):439-41.

33. Holdgate A, Asha S, Craig J, Thompson J. Comparison of a verbal numeric rating scale with the visual analogue scale for the measurement of acute pain. Emerg Med Australas 2003; 15(5-6):441-6.

34. Kendrick DB, Strout TD. The minimum clinically significant difference in patient-assigned numeric scores for pain. Am J Emerg Med 2005; 23:828-32.

35. Kelly AM. The minimum clinically significant difference in visual analogue scale pain score does not differ with severity of pain. Emerg Med J 2001; 18(3):205-7.

36. Todd KH. Patient-oriented outcome measures: The promise of definition. Ann Emerg Med 2001; 38(6):672-4.

37. Cepeda MS, Africano JM, Polo R, Alcala R, Carr DB. What decline in pain intensity is meaningful to patients with acute pain? Pain 2003; 105:151-7.

38. Bird SB, Dickson EW. Clinically significant changes in pain along the visual analog scale. Ann Emerg Med 2001; 38(6):639-43.

39. Council of Ambulance Authorities. Clinical performance indicators. Indicator area 5: Trauma pain relief. Flinders Park, South Australia: Council of Ambulance Authorities, 2001.

40. Forero R, Mohsin M, McCarthy S *et al*. Prevalence of morphine use and time to initial analgesia in an Australian emergency department. Emerg Med Australas 2008; 20(2):136-43.

41. Todd KH, Crandall C, Choiniere M *et al*. Pain in the emergency department: a multicenter study. Acad Emerg Med 2006; 13(5_suppl_1):S88-a, 89.

42. Berben SAA, Meijs THJM, van Dongen RTM *et al*. Pain prevalence and pain relief in trauma patients in the Accident & Emergency department. Injury 2008; 39(5):578-85.

43. Victorian Ambulance Services. Clinical practice guidelines: acute coronary syndromes (adult), CPG:A0401 and pain relief - non cardiac (adult), CPG:A0402. Melbourne, Victoria: Victorian Ambulance Services, 2006.

44. Kelly AM, Walcynski T, Gunn B. The relative efficacy of phenothiazines for the treatment of acute migraine: a meta-analysis. Headache 2009; 49(9):1324-32.

45. Colman I, Brown MD, Innes GD, Grafstein E, Roberts TE, Rowe BH . Parenteral metoclopramide for acute migraine: meta-analysis of randomised controlled trials. BMJ 2004; 329(7479):1369-73.

46. MIMS Online. Morphine Sulfate Injection BP (DBL) [Web Page]. 4 December 2006; Available at http://www.mims.com.au. (Accessed 23 June 2008).

47. Cope Z. Diagnosis of the Acute Abdomen. 2nd edition. London: Oxford University Press, 1921.

48. Cope Z. Cope's early diagnosis of the acute abdomen, revised by W Silen. 20th edition. London: Oxford University Press, 2000.

49. Lord B, Woollard M. The reliability of vital signs in estimating pain severity among adult patients treated by paramedics. Emerg Med J 2010; doi:10.1136/emj.2009.079384.

50. Monash University Centre for Ambulance and Paramedic Studies. Diploma of Ambulance Paramedic Studies: learning objectives. 2003.

51. Taylor AG, Skelton JA, Butcher J. Duration of pain condition and physical pathology as determinants of nurses' assessments of patients in pain. Nurs Res 1984; 33(1):4-8.

52. Green CR, Wheeler JRC, LaPorte F. Clinical decision making in pain management: contributions of physician and patient characteristics to variations in practice. J Pain 2003; 4(1):29-39.

53. Blyth FM, March LM, Brnabic AJM, Jorm LR, Williamson M, Cousins MJ . Chronic pain in Australia: a prevalence study. Pain 2001; 89(2-3):127-34.

54. Frakes MA, Lord WR, Kociszewski C, Wedel SK. Factors associated with unoffered trauma analgesia in critical care transport. Am J Emerg Med 2009; 27(1):49-54.

55. Singer AJ, Garra G, Chohan JK, Dalmedo C, Thode Jr HC. Triage pain scores and the desire for and use of analgesics. Ann Emerg Med 2008; 52(6):689-95.

56. Ricard-Hibon A, Belpomme V, Chollet C *et al*. Compliance with a morphine protocol and effect on pain relief in out-of-hospital patients. J Emerg Med 2008; 34(3):305-10.

57. Paoloni R, Talbot-Stern J. Low incidence of nausea and vomiting with intravenous opiate analgesia in the ED. Am J Emerg Med 2002; 20(7):604-8.

58. Bradshaw M, Sen A. Use of a prophylactic antiemetic with morphine in acute pain: randomised controlled trial. Emerg Med J 2006; 23(3):210-3.

59. Australian Council on Healthcare Standards. Australasian Clinical Indicator Report: 1998-2006. Ultimo NSW: ACHS, 2007.

60. Fry M, Holdgate A. Nurse-initiated intravenous morphine in the emergency department: Efficacy, rate of adverse events and impact on time to analgesia. Emerg Med Australas 2002; 14(3):249-54.

61. Abbuhl FB, Reed DB. Time to analgesia for patients with painful extremity injuries transported to the emergency department by ambulance. Prehosp Emerg Care 2003; 7(4):445-7.

Chapter 4: Paramedics' Beliefs and Attitudes Regarding the Assessment and Management of Pain

Introduction

This section of the thesis describes research that aims to elucidate paramedics' beliefs and attitudes regarding the assessment and management of patients with a complaint of pain. Chapters 1 and 2 provided a background and literature review on the management of pain in the prehospital setting. This was followed by chapter 3, which described the epidemiology of pain in patients transported by ambulance paramedics in Melbourne through a retrospective analysis and description of paramedic pain management practice. The results highlighted differences in analgesic interventions associated with gender, type of pain, location of pain and duration of pain, and publications arising from this analysis are presented as Appendices E and F. In order to further study these variations, this chapter presents the design of a qualitative study that involved a series of focus groups to explore paramedics' beliefs and attitudes relating to pain. Focus groups are a means of collecting qualitative data that may be used to explain social phenomena, and these groups comprised student paramedics as well as paramedics currently employed by Ambulance Victoria. This chapter describes the methodological procedures used to develop theories arising from the analysis of focus group narratives, which may assist in explaining variations in pain management practice observed in the quantitative study within this thesis. This chapter is followed by the presentation of the focus group results in Chapter 5.

Research Question

Clinical judgements underpin decisions regarding the management of health problems that paramedics encounter when called to a patient seeking care, and these judgements may be influenced by variables such as knowledge of contemporary pain management practice, clinical experience, and affective factors such as the individual's beliefs, attitudes and values. Evidence that the personal beliefs and attitudes held by health professionals can affect judgements regarding the patient's experience of pain was outlined in the literature review (Chapter 2). Although there

is considerable research published on this topic across several health settings, the literature review found only one published report of paramedics' attitudes and beliefs regarding the assessment and management of individuals with pain.[1] However, this descriptive study lacked a recognised methodological foundation and involved a small sample of paramedics that may not be representative of beliefs of a broader paramedic population. As such the research comprising this second stage of the thesis sought to answer the following questions:

- What are paramedics' and student paramedics' beliefs, attitudes and experiences regarding pain and the assessment and management of patients reporting pain in a community health setting?
- How might these beliefs and attitudes influence paramedics' clinical judgements in cases involving a patient report of pain?

Aims of the Study

Although clinical practice guidelines used by paramedics in this setting include explicit protocols for managing pain, variations in practice – such as those observed in the first stage of this thesis – may result from differences in paramedic knowledge, attitudes and beliefs regarding pain, and these differences may be associated with interpersonal variations in pain management practice. However, other variables may influence practice, and as such this qualitative study sought to elicit, analyse and explain variables that affect paramedic decision making in cases involving pain. Specific aims were to elicit attitudes and beliefs towards patients who report pain, and to explore the potential impact of these attitudes on paramedic pain management practice. Interpersonal differences in attitudes and beliefs will be investigated with a view to identifying reasons for variations. Specific aims were to:

- Identify factors influencing or inhibiting paramedic pain management practice, that may include individual, patient, organisational, educational or demographic factors affecting clinical decision making in cases involving patients reporting pain.
- Predict the likely impact of these factors on patient outcomes; and

- Recommend strategies that may promote effective pain management in the prehospital setting.

Methodology

This thesis combines a quantitative study of the epidemiology of pain and of pain management practice described in the first stage of this thesis with a qualitative study of paramedics attitudes and beliefs regarding the management of pain in an attempt to develop a comprehensive dataset that may enable the synthesis of new knowledge to better inform paramedic pain management practice. In addition, this knowledge may inform the education of paramedics to enable care of patients with pain that is consistent with contemporary standards.

The qualitative stage of the study described in this chapter is designed to elicit paramedics' attitudes and beliefs regarding the assessment, measurement, and management of pain. In this context, attitudes represent an intangible theoretical construct that may be inferred from the actions or observations expressed by an individual. While there are variations in the definition of this term, an attitude is generally described as a positive or negative affect against a psychological construct.[2] Attitude is not defined in terms of behaviour – although attitudes may be related to a tendency to certain behaviours – as attitude and behaviour may not be reliably correlated. For example, a person may behave contrary to a personal attitude if behaviour that reflects their attitude is at odds with group expectations or is likely to be associated with a risk of penalty.

An associated term – and one which is believed to be an anchor for attitudes – is that of individual *values*. Rokeach described a value as an "enduring belief that a specific mode of conduct or end state of existence is personally or socially preferable to an opposite or converse mode of conduct or end state of existence".[3] Thus, a paramedic who values stoicism in the presence of pain may express the attitude that overt signs of distress associated with a painful injury are a sign of personal weakness. However, this may not be associated with a disposition to ignore the patient's complaint if this is inconsistent with group norms and expectations in the paramedic's employment setting.

Individual beliefs refer to any personal viewpoint that is held to be true, and these beliefs are linked to attitudes and values. As an example, a paramedic may believe that certain cultural groups are predisposed to specific pain-related behaviours, and this belief may be reinforced by observation of exemplars that confirm this belief.

Study Design and Rationale

This study sought to elicit paramedics' narrative accounts of their clinical practice involving cases of pain in an effort to interpret and infer the meanings embedded in the narratives. The methodology selected for this purpose was Grounded Theory. A prospective observational study of paramedics caring for patients with pain using an ethnographic methodology may have revealed some rich data regarding management practice. However, this approach would not enable an understanding of the implicit meanings and reasons for individual actions and therefore a narratives approach was used.

Grounded Theory developed from research undertaken by Glaser and Strauss in the 1960s,[4] which led to the development of a method of qualitative research that involved the generation of theories to explain observations of human social behaviour using a systematic process of data collection and analysis resulting in theories that were "grounded" in the data. Theories that aim to explain an individual's personal interpretation and affective responses to the phenomena of interest arise from a systematic analysis of their narratives, which in the case of this study were generated in a small group setting where participants were invited to describe their experiences with pain and the care of patients with pain. In contrast to quantitative research involving the generation of a hypothesis that is then tested through a process of deduction in order to accept or reject the hypothesis, Grounded Theory proposes a means of conceptualising data so that theories emerge as the data is systematically analysed for themes or concepts and relationships between themes. The end point of this type of research extends beyond a description of the observations; rather the aim is to develop theories to explain what is observed.

Grounded theory proposes that the researcher does not approach the study of a phenomenon with preconceived ideas, but instead allows themes and concepts to emerge from the narratives of the research participants as they elaborate their lived

experiences of the topic of discussion. This form of research allows the individual to explicate their views, beliefs and experiences by sharing their perspectives of their social world with the researcher. A process of constant comparison of data comprising the narratives enables the identification of themes and categories and a consequent pattern of thematic data relationships.[5] This process concludes with the researcher assigning meanings to the research participant's words and actions in order to develop theories that aim to describe the participant's experiences. The resulting theories represent the construction of explanations of the data that emerge from the systematic analysis and interpretation of the content and relationships between the themes.

A search for the foundation for this model of inquiry reveals that Grounded Theory is centred on the perspective of "symbolic interactionism"[6]. This represents a method of explaining human behaviour – including group behaviour in social settings – that focuses on the use of symbols in communication. This involves the analysis of symbols as actions and the attachment of meanings to these actions to interpret social interactions. Research modelled on symbolic interactionism was first sited in the domains of sociology and social psychology, with the early underpinnings described by Mead[7] in 1934 and later elaborated by others including Blumer.[8] This theory proposed that the concept of "self" is a function of iterative interactions and relationships with other individuals in the subject's social environment. It follows that the meanings, or symbols, that an individual assigns to objects, situations and other people as a result of interactions in their social environment will determine their actions towards these entities, and that these interactions ultimately influence the individual's attitudes, beliefs and values. Further, the interpretation of self is dynamic and responsive to ongoing interactions with others and with changing environments. Each action is determined by the meaning assigned by the individual, with Blumer believing that "human beings interpret or 'define' each other's actions instead of merely reacting to each other's actions. Their 'response' is not made directly to the actions of one another but instead is based on the meaning which they attach to such action".[8] Thus the paramedic's assessment of a patient's report of a symptom such as pain will elicit different interpretations based on individual differences in the meaning assigned to the symptoms reported and associated cues

observed during the encounter. Grounded theory was chosen to enable the exploration and explication of the research participants' view of their world, and their interactions in this environment, in order to describe the range of personal meanings associated with the construct of pain.

The belief that new theories can arise from the data needs to be balanced with the possibility that the researchers may draw on existing theories and their prior experience and knowledge of the concepts when analysing the data, which may result in predetermined ideas about the nature of the theory.[9] In early editions of their seminal work, Glaser and Strauss posited the need to "ignore the literature of theory and fact on the area under study, in order to assure that the emergence of categories will not be contaminated …".[4] The authors recommend that any literature review should postdate the analysis, illustrating a belief that the genesis of new theories that arise from interpreting the data may be defective if influenced by the researcher's preconceived ideas and prior experiences. However, it is recognised that the idea of a "tabula rasa" approach to hypothesis generation may be unattainable if the researcher has personal involvement in the phenomena of interest. As such, the ability to approach the research with a blank mind may be an unreasonable expectation, a position taken by Corbin and Strauss,[5] who in a more recent explanation of the theory accept that researchers bring to the research process their perceptions, prior experiences, expectations, knowledge and biases so that "these aspects of self then become woven into all aspects of the research process".[5] It is recognised that "the construction of any theory, whether empirically grounded or not, cannot be started ab novo, but has to draw on already existing stocks of knowledge"[9] and in the current edition of their work Corbin and Strauss[5] now recommend the early development of explicit questions to focus the researcher's interest in a topic and to use these questions to guide the inquiry and to identify phenomena of interest and types of data to be collected. While this pragmatic approach to focusing the inquiry during the early stage of the design avoids the risk of overwhelming the researcher with data that may impede the general direction of discovery, this position appears to be at odds with the position taken by Glaser,[10] who sees these recommendations as a process of forcing data into categories in a way that risks the generation of creative insights, resulting in theory that is disconnected from its empirical base.

Although the basic tenets of Grounded Theory are consistently described in the literature, significant variations in the major literature regarding techniques for data generation and analysis have led to the synthesis of a technique for grounded theory analysis proposed by Eaves[11]. The work of Eaves has informed the design of this study, as has the more recent work of Corbin and Strauss[5] and Charmaz,[12]who have argued that the approach to Grounded Theory should be flexible rather than based on rigid rules.

The starting point for this research was the development of research questions that identify the domain of the study. Data that are studied in order to develop theories that help to answer the research questions may originate from interviews, questionnaires, focus groups, direct observation, or through related methods. Focus groups are a method of collecting qualitative data that involve small group discussions centred on a particular topic or issue. In this study, the focus group participants have a role in assessing and managing pain in patients that they are called to see, and as such the focus of the group discussions was pain. A facilitator asked questions of the group, rather than of individuals, and this strategy enables the participation of all group members in the ensuing discussion. Interaction between group members is a feature of focus group discussions, and these interactions help to identify interpersonal differences in attitudes and beliefs.

Focus group discussions were recorded with the participants' consent and an analysis of the transcript of each recording was undertaken on a line-by-line basis to identify phrases or key words spoken by individual participants that encapsulated ideas that were central to the discussion, and these were then coded *in-vivo* in the speakers own words. This initial coding attempts to "understand participants' views and actions from their perspectives",[12] and as such this coding identifies words symbolising actions and tacit meanings rather than concrete topics or entities. This encourages analysis of the meanings of the codes and may help to overcome the risk of premature closure of the coding through categorisations based on overly generic labels. The computer software program NVivo version 8[13] was used to manage the coding.

Further analysis of the initial in-vivo codes identified clusters of similar data. Labels were applied to these clusters, and these formed the basis of preliminary concepts that provided provisional explanations of phenomena. More focused coding followed to facilitate the sorting of similar concepts, and this process enabled the coalescence of concepts to form higher order categories. The data that emerged from the analysis of each transcript was compared with data arising from subsequent focus groups, and this informed the scope of questions put to subsequent groups. The process of ongoing comparison continued until no new categories emerged, a point known as "theoretical saturation." Rather than calculating a sample size to achieve an appropriate level of statistical power as would be the case in some quantitative studies, the sample size was determined retrospectively when no new concepts were generated from discussions in successive groups. The decision that saturation had been reached was a subjective assessment of the researcher, as it is impossible to know whether additional focus group sessions would yield fresh data.

Thematic categories began to develop through the identification of concepts that had shared properties, and these categories developed through constant comparisons with the data and with other categories that were also emerging. An examination of the linkages between categories and subcategories and well as the strength of the links and their significance occurred through a process of axial coding.[12] The final phase of this process involved the generation of a specific theory to explicate and define participants' beliefs and attitudes about pain. This is defined as a central or "core category"[5] that frames the overarching theme of the research.

Detailed notes, or memos, were attached to each of the codes in order to describe the concepts linked to the codes, and to enable the further development of categories that described theme relationships identified through the analysis of the transcripts, with this process also directing further analysis. Memos represent the researcher's conceptualisation of the embedded meanings and significance of the narrative, and these provide an opportunity to reflect on the significance of the data in a way that aims to avoid a superficial examination and acceptance of data as scientifically validated truth. Date stamped memos document the evolution of thoughts and theories in relation to the research topic, acting as a record of the researcher's thoughts and interpretation of the data at a particular point in the research project. As

new information comes to light through the use of a constant comparative process, perspectives may change, and the direction of the changes can be described in reference to prior knowledge captured by memos.

Although in an earlier edition of their book Strauss and Corbin recommended the categorisation of memos by operational, theoretical and coding themes,[14] by the following edition this advice had been renounced, with the authors instead describing broader uses for memos that include defining the properties and dimensions of the emerging categories, and to enable the elaboration of "relationships between conditions, actions/interactions, and consequences".[5] The rationale for this change of stance centred on the need to avoid prescriptive assignment of memo classes that may constrain the more fluid and dynamic process of writing that is a central feature on memoing. The authors' earlier advice also contrasted with that of Glaser, who believes that rigid categorisation of memos offers no advantage.[10]

While the analytical process requires the researcher to remain dispassionate and distanced from the emotional nuances within the data, the interpretation of the data is invariably affected by the researcher's own world views, particularly if the researcher has a personal attachment to the research matter. Methods available to control for this influence include a conscious awareness on the part of the researcher of the ways that their own attitudes and beliefs can affect the interpretation of the data, and the use of external parties such as research supervisors to check for evidence of this influence. Frequent reflection on the meanings attributed to the data helps to identify personal emotional responses to the narrative rather than a conceptualisation that is free of concealed meaning introduced by the researcher.

Study Setting and Participants

This study was approved by the Monash University Standing Committee on Ethics in Research Involving Humans (SCERH) protocol number CF07/0449 - 2007/0139: Paramedic attitudes and beliefs regarding pain assessment and pain management. Rural Ambulance Victoria and the Metropolitan Ambulance Service also approved the participation of paramedics employed by these agencies (Appendix C).

Focus groups participants were paramedics or paramedic students, with the groups stratified by clinical experience. Three levels of experience were chosen to form three groups. The first group involved students undertaking the first year of study in the Bachelor of Emergency Health (Paramedic) course at Monash University. These students either had no prior clinical experience or limited prior experience. In addition, some of these students had undertaken a brief clinical placement as part of their coursework prior to their involvement in the focus group, but this experience did not involve any responsibility for patient care; their role during the placement was as an observer of ambulance practice.

The second group involved students undertaking the final classroom component of study in the Diploma of Ambulance Paramedic Studies. Unlike the students in the first group, students in this second group are employees of Victorian ambulance services. These students undertake a pattern of blocks of study on the Peninsula campus of Monash University interspersed with workplace learning that is supervised by a clinical instructor or qualified paramedic. The block of study that these students were undertaking at the time of the focus group is known as "Stage 7" of their education. This is a two week full time study block that must be successfully completed before students are eligible to be confirmed as qualified paramedics. Students have approximately 2 years of experience as a paramedic prior to commencing this study block.

Group three involved qualified paramedics with a median duration of employment as a paramedic of 8 years. Students comprising this group were paramedics attending a course in advanced clinical training known as the Mobile Intensive Care Ambulance (MICA) course. Students selected for this course have demonstrated high levels of clinical skills, including clinical decision making. Several participants had significant clinical experience in health fields such as nursing prior to employment as a paramedic.

Students enrolled in paramedic courses conducted by the Department of Community Emergency Health and Paramedic Practice at Monash University during 2007 and 2008 were invited to participate in focus group discussions for each group described. Students self-selected to attend each of the advertised sessions and chose to

participate after providing informed consent. Students were advised that the focus group discussions were to be recorded and transcribed, but that all information regarding the students' identity would be removed from the transcripts.

Participants completed a form at the commencement of the meeting that captured data relating to their age, gender, length of employment as a paramedic (where applicable), and prior health care experience. Demographic data for each of the three groups is shown in Table 4-1.

Table 4-1: Demographic data for focus group participants (n=56)

Group 1.1		**Group 2.1**		**Group 3.1**	
n = 5		n = 9		n = 8	
Mean age	24.8	Mean age	32.6	Mean age	40.3
Male %	60.0	Male %	88.9	Male %	75.0
Female %	40.0	Female %	11.1	Female %	25.0
Group 1.2		**Group 2.1**		**Group 3.2**	
n = 8		n = 7		n = 9	
Mean age	23.0	Mean age	33.1	Mean age	39.4
Male %	25.0	Male %	57.1	Male %	66.7
Female %	75.0	Female %	42.9	Female %	33.3
				Group 3.3	
				n = 10	
				Mean age	37.8
				Male %	90.0
				Female %	10.0
Group 1 totals		**Group 2 totals**		**Group 3 totals**	
Total n = 13		Total n = 16		Total n = 27	
Mean age	24	Mean age	32.8	Mean age	39.07
Median age	21	Median age	32	Median age	39
Range	18-46	Range	25-44	Range	30-52
Male %	42.5	Male %	73.0	Male %	77.2
Female %	57.5	Female %	27.0	Female %	22.8
Ambulance employment years	N/A	Ambulance employment years		Ambulance employment years	
Mean		Mean	2	Mean	8.7
Median		Median	2	Median	8

Four participants (30%) from Group 1 indicated that they had prior clinical experience. This included experienced as a volunteer ambulance officer (Ambulance

Community Officer) and in first aid roles with organisations such as Red Cross and the State Emergency Services. One student indicated prior nursing experience, but the level of experience was not stated.

Six participants (37%) from Group 2 indicated that they had prior clinical experience, and this included interstate and international experience as a paramedic or ambulance technician. One student indicated prior experience as a nurse, and one with experience from the field of prosthetics and orthotics.

Participants from Group 3 had the greatest degree of both ambulance experience and clinical experience prior to employment as a paramedic. Fifty two percent indicated prior clinical experience in fields of nursing, including emergency department, operating theatre and critical care nursing, as a defence force medic, in aeromedical retrieval and in other paramedic employment settings.

Focus groups participant numbers averaged 8 (range 5-10). Each focus group was led by one facilitator to lead the discussion while another (the author) took notes and contributed additional questions to generate discussion on the topics of pain, assessment of pain, and the management of patients reporting pain. Questions for the initial groups were based on a set of questions that were generated to elicit attitudes on range of pain-related topics. However, the focus groups did not follow a defined path of questions. Instead, the question sequence was largely unstructured using open style questions. In order to encourage a broad dialogue opening questions typically included an invitation to the group to talk about "how well you think pain is managed in your work setting on the basis of the experiences that you have so far." Participants were invited to discuss a range of issues that included the assessment of pain, use of tools to measure pain severity, factors that affected the patient's expression of pain, the use of specific analgesic agents, and the organisational influences on pain management practice. Each focus group took approximately 60 minutes, and concluded with an invitation to participants to ask questions about the research or to provide concluding comments that were not addressed in earlier discussion.

Summary

This chapter has presented the methodological approach to the qualitative study about paramedics' beliefs and attitudes regarding the assessment and management of patients with a complaint of pain. Collection of qualitative data is facilitated through focus groups involving paramedics or paramedic students at three distinct levels of clinical experience. The stratification of the groups is designed to identify differences in attitudes or beliefs that may be linked to clinical experience within each group.

Data analysis will be undertaken using Grounded Theory methodology that enabled theories to emerge from the data. These theories developed from the narratives provided by the focus group participants, but also from the interactions that occurred between participants. As the participants in each group were known to each other a naturalistic discourse emerged that enabled analysis of the interactions between participants as well as the discourse of individuals. The results of the analysis of the focus group transcripts are presented in the following chapter (Chapter 5).

List of References

1. Jones GE, Machen I. Pre-hospital pain management: the paramedics' perspective. Acc Emerg Nurs 2003; 11:166-72.

2. Mueller DJ. Measuring social attitudes: a handbook for researchers and practitioners. New York: Teachers College Press, 1986.

3. Rokeach M. The nature of human values. New York: Free Press, 1973.

4. Glaser BG, Strauss AL. The discovery of grounded theory: strategies for qualitative research. London: Weidenfeld and Nicolson, 1967.

5. Corbin JM, Strauss AL. Basics of qualitative research: techniques and procedures for developing grounded theory. 3rd edition. Los Angeles: Sage Publications, 2008.

6. Annells M. Grounded theory method: philosophical perspectives, paradigm of inquiry, and postmodernism. Qualitative Health Research 1996; 6(3):379-93.

7. Mead GH. Mind, self, and society. Chicago: University of Chicago Press, 1934.

8. Blumer H. Symbolic interactionism: perspective and method. Berkeley CA: University of California Press, 1969.

9. Kelle U. "Emergence" vs. "Forcing" of empirical data? A crucial problem of "Grounded Theory" reconsidered. Forum: Qualitative Social Research 2005; 6(2).

10. Glaser BG. Emergence vs forcing: basics of grounded theory analysis. Mill Valley, CA: Sociology Press, 1992.

11. Eaves YD. A synthesis technique for grounded theory data analysis. J Adv Nurs 2001; 35(5):654-63.

12. Charmaz K. Constructing grounded theory: a practical guide through qualitative analysis. London: SAGE, 2006.

13. QSR NVivo [Qualitative data analysis program]. Version 8. Doncaster, Victoria: QSR International Pty Ltd; 2008.

14. Strauss AL, Corbin JM. Basics of qualitative research: techniques and procedures for developing grounded theory. 2nd edition. Thousand Oaks, CA: Sage Publications, 1998.

Chapter 5: Focus Group Results

Introduction

This chapter presents the results of the focus group discussions and the themes that emerged from the analysis of focus group transcripts. Focus groups comprising participants currently employed as paramedics (groups 2 and 3) began with an open question designed to generate general discussion about pain management practice. For example, an opening question was typically framed as "how well do you think pain is managed in your work setting on the basis of the experiences that you have so far?" Participants from Groups 1.1 and 1.2 (student paramedics) were asked a different opening question due to their limited clinical experience. For these groups, the participants were initially invited to broadly reflect on their own pain experiences and personal meanings of pain.

Data Analysis

Analysis of the focus group transcripts and audio recordings was undertaken to identify concepts using a model of theoretical sampling described in the previous chapter, with conceptual themes arising from the first round of focus groups informing the data collection in subsequent rounds. This process was cyclical, so that the analysis of the data led to the development of concepts and questions that informed further data collection. This process continued until a point of saturation was reached; no new concepts or themes arose from the focus group discussions. In the case of Groups 1 and 2 this point was reached after two focus groups were conducted. For Group 1 their lack of clinical experience may have constrained the discussion and generation of themes. While Group 2 participants had an average of two years clinical experience, it was also apparent that no new themes had appeared by the end of the second focus group. In fact, both the themes and strength of the themes were similar between both groups. This may be partly attributed to the similarity of the individual's work and learning environments. In contrast, Group 3 participants elaborated a richer source of knowledge and opinion, which may reflect their greater clinical experience as well as their more diverse pre-paramedic clinical experience. Analysis of themes arising from the first two Group 3 sessions led to the prediction that some additional themes may emerge following the second focus

group, and as such a third focus group was undertaken. Subsequent analysis of the transcript from this third group indicated that theoretical saturation was likely to have been reached after the third focus group.

Results

In response to the initial question about pain management in their employment settings a paramedic from Group 2.1 began by referring to the clinical benchmarks for pain management used by their employer (Ambulance Victoria), where practice is measured against prescribed performance benchmarks described elsewhere in this thesis. This participant responded to the question about pain management practice by referring to these performance indicators: "one of our key performance indicators in the job is how well you've managed pain so you've sort of got it in the back of your mind for any patient that has any type of pain". This response indicates an understanding that in this setting the employer considers pain management an important component of paramedic practice, and that this organisational policy influences practice. However, the response did not elaborate on the paramedics' acceptance of these standards or their ability to achieve these standards of practice.

In contrast, a paramedic in Group 2.2 responded to the opening question by describing the variability of pain management practice in their work setting. Among Group 3.1 participants a similar opening question generated agreement that pain management practice is generally good, with one participant rating the standard of practice as "6/10" in reference to a common mode of measuring the level of pain severity reported by a patient. Others in this group stated that pain management has "… improved in the last 7 or 8 years compared to what we use to have. It's just fabulous now". This comment was qualified by referring to recent improvements in the base level of clinical skills that resulted from the decision to train all ambulance officers in Victoria to Advanced Life Support (ALS) level. This advanced training includes the ability to administer drugs parenterally, which includes morphine for pain relief.

Analysis of all the focus group data produced four main theoretical categories with many linked subcategories. The main categories were linked to the central topic of investigation: dealing with pain. These four main categories were:

- Expressing pain;
- Assessing the patient;
- Believing the patient; and
- Caring for the patient with pain.

The complete model is illustrated by Figure 5-1. This shows the interconnectedness of the themes associated with each major category, but is not intended to represent a taxonomy of actions involving the assessment and management of a patients with a complaint of pain. The influence of these themes on paramedic decision making is elaborated in Chapter 6.

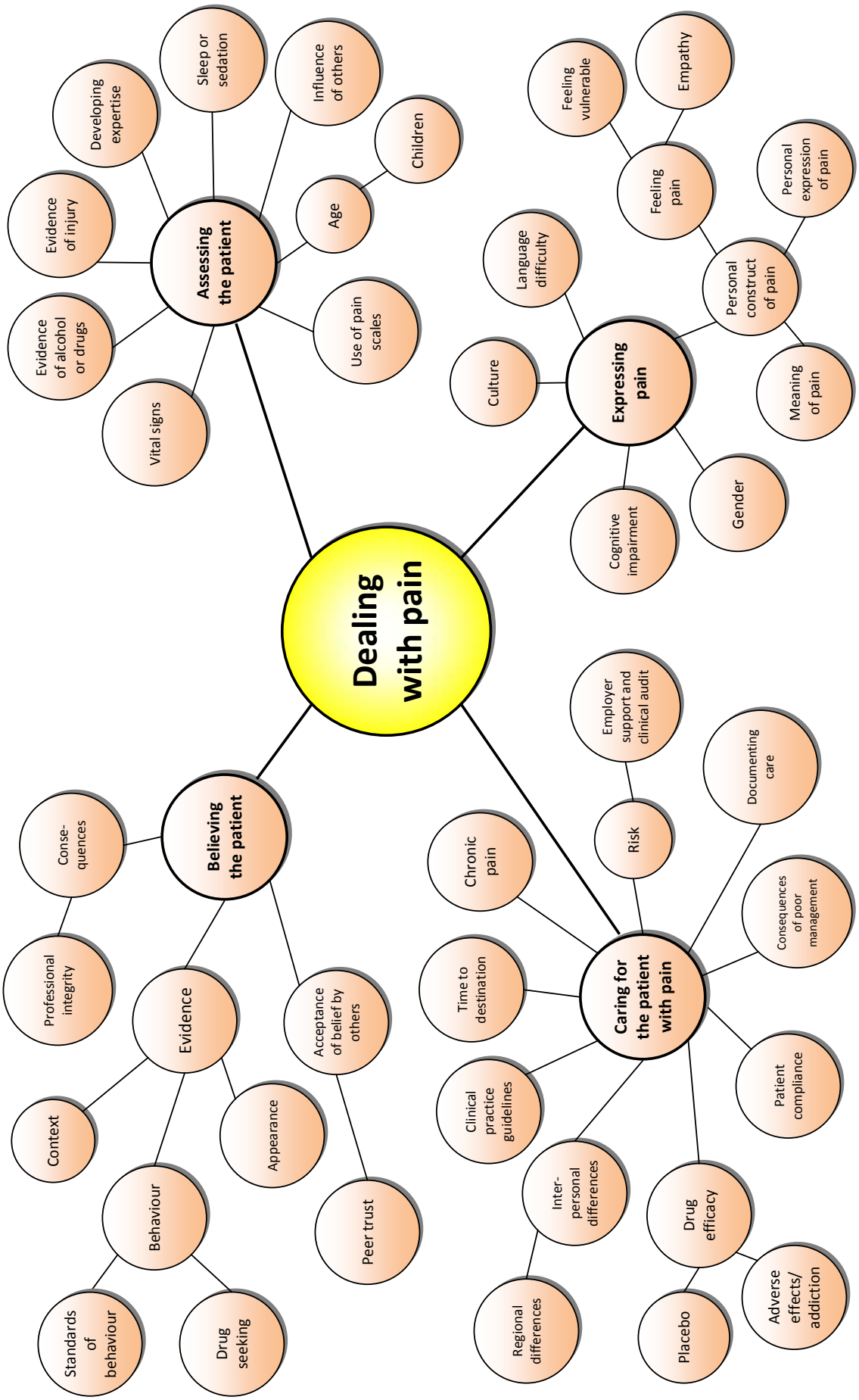


Figure 5-1. Themes associated with the central construct of dealing with pain

Detailed analysis of the transcripts and the explanation of the theoretical basis of the four main themes are presented as follows.

Expressing Pain

The personal interpretation of pain – and the outward expression of that process – is modified by personal and environmental factors outlined in Chapters 1 and 2. Focus group participants were able to reflect on their own experiences of pain and recognise how pain perception and meaning extend beyond the degree of nociceptor stimulation associated with an injury or disease process. When describing personal experience of significant pain, a participant from Group 1.1 spoke about the influence that disability had on their pain experience, and the way that pain "... intrudes on your life, what you want to do, your activities" (Group 1.1). In this example the participant describes a consequence of pain in relation to normal function, and suggests that functional impairment associated with injury may result in a greater emotional response due to fears about their ability to undertake normal activities. However, this concept did not emerge from other groups.

Apart from providing a verbal account of their pain, patients may express their pain by other non-verbal means. Paramedics are aware of differences in the way that people express their pain, as several variables that have the potential to influence expression were discussed by the groups. One of these variables was related to the individual's coping styles, which was recognised as being independent of culture, age or gender: "... if the person's a sook for example, they're a sook regardless whether they're from a certain ethnic background or from a particular sex or age group. I just think every person is different. You can't say women are more such and such. You can't say an age group is more such and such. I can think of people in every group that are one way or the other, to different degrees" (Group 2.1).

The attribute of "stoicism" was raised as a factor affecting the expression of pain, with one paramedic suggesting that prior experience with major conflicts such as war may inure a person to pain, thus affecting their expression of pain. However, this generalisation was questioned by others:

Paramedic: "What about the generation that went through the war?"

Paramedic: “They are very stoic.”

Paramedic: “I’ve had plenty of people who have gone through the war who are whingeing and sooking about everything.”

Paramedic: “Really?”

Emotional valency influences what paramedics recognise when assessing a patient with pain. However, the emotional component of pain is misunderstood as a confounding variable by one paramedic: “Sometimes that misinterpretation between emotional pain and physical pain. You say what’s your pain – it’s 10/10 – but then you talk to them further and they’re talking about ‘my hearts breaking, my son doesn’t talk to me anymore’” (Group 2.1).

A difficulty in communicating one’s experience of pain complicates the expression of pain, and this is reflected in a comment from a participant who relates his attempts to describe his chronic pain: “I think where it was tricky was um, with the chronic pain in particular, it was hard to really pin point exactly where it was coming from, you could feel where it was referring to, but um, it made, that’s what made it tricky was that I was feeling it in spots where there wasn’t actually any damage so I think that’s why I assumed that was that you, you could describe what you were feeling quite easily ...” (Group 1.1).

In another account, a participant also describe her efforts at describing her pain to medical staff: “I’ve actually had my appendix out ... and that was a bit of a episode for me, that was quite debilitating pain and I found one of the things was I actually struggled a bit to talk to people about it at the time, because it was so, I felt it was so crippling, I couldn’t, I couldn’t physically explain properly what was going on um, and, and how I felt, because I felt so sick as well” (Group 1.1).

The context in which the pain occurs is recognised by some participants as a variable that may affect the expression of pain. In describing a sporting injury where the pain related behaviours may be influenced by the presence of peers, one participant believes that “... you get guys that are tough as nails in front of their mates but as soon as you get them in the back of the car [ambulance], they just fold” (Group 3.3).

Personal Experience of Pain and the Development of Empathy

Understanding pain experienced by others may be influenced by the clinician's prior pain experiences, so that if a patient with an injury or disease that is similar to that previously experienced by the assessor, there may be a greater ability to empathise with the patient – to better understand their experience of pain. This is exemplified by the following statement: "If somebody presents with the same medical issue that I had, I'm probably a little bit more sympathetic in my pain management for that person, because I've been able to internalise it, I've been able to um, you know, I've been able to draw a relationship and a correlation to that so I tend to be a little bit more sympathetic in, in being um, really proactive with my pain management for those people" (Group 3.2). In exploring the effect that sympathy or empathy may have on pain assessment the interviewer asks:

Interviewer: "So when you say sympathetic, you mean you accept that their pain is greater than you might otherwise accept if you're being unsympathetic?"

Paramedic: "I think that's a real issue" (Group 3.2).

The ability to empathise with the patient was revealed by a Group 1.1 participant, who recounted personal experience in helping a person injured in a rock climbing accident. Following this account the interviewer asked "it sounds like you were able to empathise with him", and to this the participant agrees "Oh, definitely, definitely." Members of this focus group believed that the ability to empathise with the patient represented an important professional trait: "... being empathetic towards someone … being able to tell what people are going through as well is quite important I think. Being able to like, yeah, being able to put yourself in their shoes I think, that will come with more experience on the road I'd say" (Group 1.1).

Interviewer: "So you think it's important to be able to have empathy …"

Participant: "I think so, I think, yeah."

Participant: "It's invaluable." (Group 1.1)

However, behavioural expectations may affect the ability to empathise with the patient if their behaviour is inconsistent with personal standards: "... you naturally feel more sympathy for people who are brought up and behave as you do and who

are a bit British stiff upper lip and a little bit more stoic about pain and don't run around screaming and express it verbally" (Group 3.1). The influence of patient behaviour on the assessment process is described in more detail in a later section under the heading "believing the patient".

There was other evidence that paramedics may use their own experience of pain to infer pain in others. In responding to a question about how paramedics assess pain, one participant responds: "... we use our own experiences of what we feel pain is and you know, what it, what it means to us, but we then also use the tools that we're given to be able to assess that and it really, it, it moulds with one..." (Group 3.2). This suggests that in some situations an empathetic consideration of the patient's experience has the potential to influence the assessment of pain.

Personal differences in the meaning of pain were evident among focus group participants, and the analysis of this theme resulted in the development of a category labelled "personal constructs of pain". An example involves beliefs about an individual's tolerance to pain, which is reflected in the following comment. When asked about how they deal with pain they have personally experienced a participant from Group 1.1 admitted that – despite several serious injuries associated with extreme sports – he was not concerned about pain; "Personally I try and, I just ignore it I suppose. I don't really like pay much attention to it". This individual saw pain as a natural part of the body's warning system, and believed that "getting rid of it [pain] is not always a good thing".

Others related adverse effects of treatment for pain that they had experienced: "I actually got a little bit too much morphine one time and thought that I was flying off the bed...", and shared concerns about the effect of analgesics on their health: "... I was more feeling that I was doing detrimental stuff to other organs in my body. I was so scared because I had these other operations and taken so many other pain killers that I was scared 'Oh, what's this doing to my liver?'" (Group 1.2). Another participant related their unwillingness to use a patient controlled analgesia (PCA) device following surgery: "I had the self medication one [PCA] when I had my appendix out but I was scared of Panadol at the time, so I didn't want to press the button and I hardly ever pressed it, but the nurses kind of told me I should press it..." (Group 1.2). However, the possibility that patients' fears about adverse effects of

analgesics such as morphine may influence their willingness to accept paramedic-initiated analgesia did not feature in any focus group discussions.

An interesting insight from the patient's perspective came from a Group 1.1 participant who related her experience of being asked to rate her pain in a hospital setting: "... it was really, really bad pain ... they asked me what the score would be out of ten and I had, and I did pause and I did think about it and I said I think for me it's nine, and they said what's the worst pain you've ever had and I said, this is the worst pain I've ever had um, but I did feel that because it was such a high score maybe they would think that I was a bit of a wuss because I could still talk, I could still hobble around and that sort of thing". When asked by the focus group facilitator why it was important that the medical staff did not think that she was "a wuss", she answered "Because I don't want to be called a wuss, I mean I was serious about the pain that I was experiencing and I wanted them [medical and nursing staff] to treat me seriously and to, to understand that that's how I felt and be treated appropriately and according to that pain ... you think they will take you more seriously if you say nine...". In this example the participant strategically balances the report of pain severity between what she actually feels, and what score she thinks will be believed by the medical and nursing staff. If this is a more common occurrence among others in pain it may represent systemic recalibration of the pain to achieve a level that is deemed to be believable by those undertaking the assessment.

Following this discussion the group was asked whether they thought that their personal experiences and beliefs may have an impact on their pain management practice:

Interviewer: "Have you thought about how those beliefs might impact on, or affect, patient care when you're at the stage where you're going to be able to be giving morphine ..."

Participant: "No, because, for me I've had someone in my family that was quite sick and died of cancer and I was the one looking after them and to me, I don't enforce my wills on other people. That's what I believe and I don't impose it on anyone else, so I have a totally different view of it when I'm looking after somebody else" (Group 1.2).

The understanding that people express pain in many different ways, and that the assessment of pain may be partly influenced in the patient's behaviour and the comparison of pain-related behaviours with expected norms is reflected in this account of pain experienced by a close family member:

" ... my dad had a triple A [Abdominal Aortic Aneurism] and he was lying on the um, the resus [resuscitation] room on, on the bed and he was quiet, did not say a thing, and I said, 'how are you feeling', he said, 'this is the worst pain I've ever had', and I said [to the nursing staff] 'so can he please have some pain relief' and um, he, they said, 'well he's not in pain', I said, 'he is in pain' and um, and they eventually gave him some. But the nurses were reluctant to do it, because he wasn't complaining. And my dad's Italian, but I mean he's obviously just a stoic person" (Group 3.2).

Control over pain and knowledge of the temporal nature of the pain also featured in some discussions: "... just going back to my knee, you know, every time that I had to do my physio or I had to get up on a treadmill and start running, it hurt like, it hurt so bad, but I knew that it was temporary and that all I had to do was not push it that far that I did any more damage, but just push through that pain barrier and then eventually it would get better. But I could understand that if I was in that situation and you know, that pain was never going to go away, I wouldn't have had motivation to get up onto the treadmill". In this example the knowledge that the injury would heal and that the pain was a short-term problem may have affected their ability to cope with the pain.

Motivation to deal with pain is believed to be linked to competing responsibilities: "It's also the motivation behind it. I mean, if you've got someone that's you know, say bedridden, their motivation to feel better isn't going to be the same as someone that has a family, has kids, has responsibilities – things of that nature. So it's also about your motivation behind it" (Group 1.2).

While empathy may be considered an important attribute that aids in the understanding of the patient's pain experience, and one that is influenced by prior pain experience including personal experience, there is a risk that health professionals who are frequently exposed to patients suffering pain will become desensitised to their plight, ultimately diminishing the capacity for empathy:

Interviewer: "There's been a lot of discussion about whether it's possible to understand someone else's pain. Because it's their pain, it's very subjective, not yours. What's it like to be with someone [with pain]?"

Paramedic: "Desensitised."

Paramedic: "I think yeah, over time."

Interviewer: "Are you desensitised do you think?"

Paramedic: "Yep" (Group 2.1).

In contrast, participants with limited clinical experienced provided several examples of situations where they could experience another person's pain: "... it's pretty distressing for people to watch other people in pain ... you really do feel like you take on you know, some of that pain" (Group 1.1).

The discussion on the theme of desensitisation continues: "I think sometimes you are desensitised before you arrive at a job, depending on what it is given to you as [the nature of the call]" (Group 2.1). This suggests that the clinical decision making process begins before the patient encounter. The paramedic's expectations of patient presentation and motive for calling an ambulance may be considered prior to seeing the patient on the basis of the call information, and if this does occur the effect on the eventual clinical judgement needs to be considered. This process of making judgements regarding the nature of the call and the formation of opinions regarding the appropriateness of an ambulance response has the potential to generate bias that may affect post-encounter reasoning and clinical judgements.

Cognitive Impairment or Language Difficulties

Several participants recognised the effect that cognitive impairment or communication barriers had on the individual's ability to express their pain. This issue is closely connected to the assessment of pain.

Assessment of pain in patients with dementia pain was recognised as a significant challenge: "Patients that I find kind of confronting to deal with are dementia patients and patients with disabilities, who have um, communication um, deficits um, which it makes it hard to initially assess the pain, for instance, like you know, the old Nanna

whose sitting quietly in the chair and then you go to lift her up um, to put on the chair and then she sort of starts flapping and screaming and that sort of thing, but settles down, but she's talking about severe pain in the hip, now she's had a fall, but you know she's like, it's hard to try and gauge what's going on or um, you'll often go to community um, housing residences for people with disabilities and they're non-verbal, but they look distressed and it's sort of hard to make this you know, to, to look at this person, and say, well how much pain do they appear to be in um, and to gauge the pain …" (Group 2.2).

The need to involve carers in the assessment, and the importance of behavioural cues in non-verbal patients was acknowledged: "... and often it's the person whose the carer who hopefully knows this person who says well when they're in a lot of pain, they shift from side to side and that's how I know they're in pain..." (Group 2.2). Considerable discussion occurred in relation to this theme of the difficulties associated with assessing pain in patients with cognitive impairment. Cognitive impairment associated with diseases such as dementia is likely to increase as the population ages, and this disability may compromise the assessment of patients with pain. In order to develop an understanding of approaches to pain assessment in this population, and to identify approaches to pain assessment that may have utility in the paramedic practice setting a literature review was undertaken, which was published in the journal BMC Emergency Medicine. This paper is included as Appendix H.

Communication difficulties discussed by focus group participants included language barriers, and this was believed to potentially affect the individual's ability to communicate their experience: "... one that I get a lot where I work is language barriers, and trying to get any understanding, of not necessarily a score out of 10, but any understanding of how bad is your pain. It is a massive dilemma." (Group 2.1) When asked how a paramedic might deal with a situation where the expression of pain is inhibited by language, the paramedic suggested "A lot of mimes. Large, small, medium pain [using hand signals]. You use a lot of facial expressions, a lot of hand movements, translators, if you can get em" (Group 2.1).

While the use of an interpreter service is an option for establishing more effective communication in these situations, group participants reported few instances of interpreter use. When an interpreter was used, the result was sometimes frustrating:

"I've used the interpreter service once. I found the interpreter service ... it was effective but it was very slow. Quite a cumbersome process, um and sometimes I sort of think, well I could use that but get a similar-ish result for a lot more [may mean less] frustration than if I use, you know, the two or three Italian words that I'll be able to use with regards to pain. And that's purely from hearing patients use them, that's not because I've learnt Italian" (Group 2.1).

When effective communication cannot be established, one paramedic stated that "... it comes down to your observations and your gut. When you've, you've lost your diagnostic tools because of the environment um, you kind of do tend to, to lean towards your instinct cause you've lost your diagnostic tools" (Group 2.2).

Gender as a Variable in the Expression of Pain

The first phase of this thesis identified a significant difference in morphine administration between genders, with female 40% less likely to receive morphine than males. It was anticipated that some possible explanations for this difference might arise from the analysis of focus group discussions.

While a belief that gender affects the expression of pain was acknowledged by some focus group participants, it was also acknowledged that a consistent relationship between ways of expressing pain and gender were not always observed:

Interviewer: "So are there any differences between men and women, males and females and the ways in which they experience pain?"

Paramedic: "Certainly in the way they express it."

Interviewer: "Do you want to just explain that?"

Paramedic: "It's not an easily explainable thing but I guess it has aspects of cultural base as well as gender base, but sometimes men are you know 'I'm a man. I have to not show my pain', whereas some women are more you know 'It's okay to express that I'm in pain'. But often you get the case where you've got a teenage guy who's blubbering away with what you perceive to be a relatively minor injury and you get an elderly lady who's got a NOF [fractured neck of femur] and whether it's a neuropathy or whether she's just hard as nails, she doesn't complain about it" (Group 3.3).

While this paramedic acknowledged that generalisations about gender and the expression of pain are not reliable due to the broad range of variables affecting the perception and expression of pain, in contrast a less experienced paramedic from Group 2.1 expressed a belief that the expression of pain by males could be seen as a dichotomy between extreme stoicism or complete absence of control over the pain, whereas females exhibit a broad range of emotions: "Blokes are black or white. They're either stoic to a point of, they're their own worse patient, or you know, they'll cry over a broken finger nail. There's no in between. Whereas women tend to cover all broad bands."

Within Group 2.2 the belief was expressed that women have a higher pain tolerance: "I think women have got, not as a you know, in, as a general rule, I think women have a higher pain tolerance to men um, especially in the early um, sort of twenties sort of age bracket ... I mean obviously you can't set a general rule for everyone, but as if you were to sort of put them into groups, I would say that I think women have a higher pain tolerance". What effect this belief of a higher pain tolerance had on the expression of pain was not clear. However, in the context of discussions about pain associated with childbirth, (Group 1.2) there was a belief that " ... women are more equipped to deal with a bit more pain than what men are, for sure". The basis for this belief was that females are biologically primed to deal with pain associated with childbirth, and that this biological difference conferred a higher tolerance of pain in females.

Age as a Variable in the Expression of Pain

The potential influence of age on the expression of pain generated little discussion, with only three references from two groups. There was however, a belief that increasing age conferred a greater ability to manage pain – perhaps through life-long experience in dealing with pain – and that older people managed pain better than younger individuals, resulting in more expressive behaviour among younger patients with pain: "Well, you know, the younger male certainly does seem to be affected by pain more, you know, you'll often see that younger, that category of patient having sort of a vagal response to their, to their pain as well. Whereas the, you know, older patients who have had a bit more experience um, tend to sort of have started to

manage their own pain um, whether it just be to block it out or, or whatever, or just to accept it" (Group 3.2).

While discussing the effect of gender on the expression of pain a belief was shared that differences in expression are not so much due to gender but are linked to generational categories:

Paramedic: "I would, um, tend to actually say it's not necessary male or female, it's a generation. There does tend to be a generation out there that don't have coping mechanisms at all and I don't know if that's because …"

Interviewer: "Which generation is that?"

Paramedic: "Oh, probably our age. Somewhere between say 25 and 40" (Group 2.1).

However, this belief was not shared by all member of this group: "I would totally disagree with that. I think that's nonsense". While the paramedic making the original statement about the effect of generation on expression of pain attempts to elaborate on her theory, the dissenting student continues: "I just think that's rubbish. I think there's, um [name deleted] might have had a couple of experiences with that group but she hasn't experienced the 99% of people in that group that are perfectly great at handling those situations. And you can find wimps and sooks in every group, every sex, every … the whole. I even disagree with the whole ethnically based [argument] ..." (Group 2.1).

The Influence of Culture

Discussions regarding the influence that culture has on the expression of pain occurred in each of the seven focus groups.

Interviewer: "... do people express pain differently from different cultural groups?"

Paramedic: "Definitely."

Paramedic: "Definitely."

Paramedic: "Definite cultural responses to pain."

Interviewer: "Can you give us an example?"

Paramedic: “Italians seem to be very vocal about it.”

Paramedic: “I went to a Chinese um, gentleman who’d taken half his hand off with an angle grinder and he only had two out of ten pain.”

Paramedic: “Yeah, similarly I had an Asian man with a fractured um shaft of femur, fallen I think about three or four metres off a ladder and he was sitting there as happy as Larry, he just did not complain at all, the whole way” (Group 3.2).

Several gave examples of cases to support a belief that culture has a significant influence on the expression of pain: “I’ve seen a, a Vietnamese man with a badly fractured femur and he was clearly in distress, he was pale and he was sweaty and he was grimacing, but he would only report it as a two or three out of ten, despite clearly being from my, looking at him and assessing him, he seemed to be in a great deal of pain ... I mean you’re looking for, to define it in terms of pain score because it can make a difference to what drug you can give, for example, you know if it’s five or whatever you’d be looking for morphine, but if they keep saying it’s only two, but you think it’s really a seven well that’s something that you might be able to discuss with them and draw out how they’re coping ...” (Group 3.2).

In this situation the paramedic has acknowledged that the number the patient assigned to their pain may not be an accurate reflection of the pain they are actually suffering. This may be due to language difficulties that confound attempts to use the scale, or it could be that the patient is unwilling to report the true extent of his discomfort. The paramedic suggests that in these cases he would engage in an extended dialogue with the patient in an attempt to reveal a more accurate picture of their pain, as failure to do so may leave the patient with unmanaged pain.

When asked by the interviewer for accounts of the way that the paramedic interprets the patient’s response in the situation described, where the injury appears to be more painful than the patient admits, one paramedic offered “... [the] emotional control in that situation was staggering, fantastic and so he genuinely wasn’t in severe pain because he just, you know, blocked it out somehow, so he controlled himself and his emotions...” (Group 3.2).

While much of the discussion by focus group participants has centred on situations where patients may overstate their pain, this is one example of a situation where the

paramedic appears concerned about the possibility of underreporting that may be associated with cultural norms. This is also one of the few examples of engagement with the patient in a process of communication that attempts to reveal a more detailed impression of their complaint in order to guide treatment. In other discussions regarding the assessment of pain the assessment takes into account obvious injury, behaviour, vital signs, and the patient's pain severity score, but those discussions rarely involved accounts of more comprehensive dialogue with patients in an attempt to better understand their feelings.

When discussing differences in the expression of pain across ethnic groups, the Italians were cites as an example of an ethnic group who openly exhibit their distress: "Italians and Mediterraneans can be very passionate and demonstrative and crying and screaming, whereas your WASPs [White Anglo-Saxon Protestants] may be a little bit more stiff upper lip. Just a cultural difference. Also, Arabic origin people I've found to be very, ah they may be screaming and wailing with pain, that, I don't know, your traditional white Australians may not express so freely" (Group 2.1).

The effect that the presence of family members may have on the assessment of pain was highlighted by one paramedic: "Mediterranean's, Greeks, Italians ... you're not just going to one person you are going to the whole family and the extended family so there's a lot of emotion in the room. And if you remove the emotion from the room, like put the person in the truck, and it's just that one person, so then you are able to get a little bit more of an accurate pain score" (Group 2.1). This suggests that extrinsic emotional factors can affect the emotional state of the patient, thus complicating the assessment of their pain.

In contrast to the Italians, Asians were considered to be very stoic in the face of pain:

Paramedic: "... I found the Asian community very stoic as well, especially the elderly Asian population …"

Paramedic: "Very stoic." [Several agree]

Paramedic: "Old Chinese men just crippled with pneumonia and arthritis won't say boo." (Group 3.1).

In another group similar beliefs were presented: "... some cultures that are just very stoic, like I mean one example would be the Asians as a general rule. They just – I've seen some patients where they've got their leg hanging off and they're walking around going 'Sorry to bother you'" (Group 3.3).

Culture is defined as "the sum total of ways of living built up by a group of human beings, which is transmitted from one generation to another".[1] As such, the term is not limited to concepts of ethnicity. People who have been raised "on the land" have been described as having a particular ability to exhibit stoicism in the face of adversity, and this stoicism is believed to extend to their expression of pain: "We've got farmers up home like that. You know they've got a frown on their face and they're saying 'no, I've got no pain'" (Group 3.1). The discussion continued with a paramedic suggesting that this attribute was unique to rural residents: "You know that's a rural thing". Discussion continued to focus on farmers: "... you know they've had a tough upbringing and pain just wasn't in their management. If they had pain they used to tolerate it" (Group 3.1). Further, "They don't want to be a nuisance; they don't want to be a pest". There was no discussion on whether Asian farmers represent the most stoic of all patients.

The question of whether culture affects the way people express pain, or whether culture confers differences in pain perception was addressed in the following dialogue:

Interviewer: "So I guess my question is, does the culture differences change the way in which people express pain or do they change the way in which people feel pain?"

Paramedic: "Express it."

Paramedic: "I think both" (Group 3.2).

Religion also featured in the discussion of differences in expressing pain, with the suggestion that the gender of the paramedic assessing the pain affects the patient's willingness to express their feelings and to participate in the assessment process: "Muslim men are very, very difficult for a female paramedic crew. They just want to roll around and scream. They don't want to talk about how much pain there is; they don't want to give you any information..." (Group 3.1).

In discussing behaviour that is believed to by typical of Muslims, a paramedic commented: "What's that … renal colic. That's the one they all seem to get. They writhe around like a fish on a stick" (Group 3.1). However, as the discussion continued some believed that the context also affects the expression of pain: "But that's in front of Muslim women, they won't do that. But if they're in a room full of men at a social function I find that maybe they don't want to show that sort of weakness in front of women or something like that. Cause they are in a very sexist sort of society that they live in" (Group 3.1).

When asked by the interviewer for comments on how an understanding of cultural differences and the need to be sensitive to the differences and needs of different cultures, a paramedic volunteered the following:

Paramedic: "Oh, we get a lecture on cultural sensitivity and remembering that there are different cultures."

Interviewer: "Is that helpful?"

Paramedic: "No, because everyone just giggles over 'winging wog syndrome' which you are not allowed to use and it's not a term favoured in ambulance. It's like dunny job" (Group 3.1).

The recognition that culture and ethnicity can influence the way that individuals express their pain, and that these differences should be accepted when assessing people from different cultures is summarised by the following comment:

"The thing with the cultural awareness thing it taught me that, it might seem silly that one group of people – and it will be a predictable group of particular ethnicity – might respond in a certain way that seems a bit melodramatic whereas others might, especially Asians might be very stoic and quiet about their pain. But without actually understanding the intricacies of each cultural group if you just understand that they have pretty much done what their parents have done, and what they've shown them what their grandparents showed them, so if all I'd seen was my grandmother sitting in a corner crying when she had pain then that's probably what I'd do, you know. Or if I'd seen them running around doing this 'awwwww' through the house then I'd do that. So it might seem silly to us if we're sort of an observer who is removed a little bit and says well if one person can behave sensibly with the same sort of pain and the

other one behaves like a bag of worms and it's silly. But if that's all they'd ever known, what they saw from their parents, then of course they act that way. They're not doing it to piss you off or to play it up. It's only what they know" (Group 3.1).

While there was strong agreement within and between groups on the influence of culture on the expression of pain, there was one dissenting voice: "I even disagree with the whole ethnically based [argument]. I reckon you can find as many Italian groups who are stoic and as strong and don't want to call an ambulance because I don't want to bother anyone…" (Group 2.1).

Assessing the Patient with Pain

When a question regarding the participant's confidence in their pain assessment ability was put to Group 3.1 some participants stated that they were "reasonably confident" or "pretty confident" in their ability. However, members of this group recognised interpersonal differences in the ability to assess pain that were succinctly summarised by the following comment: "I think all paramedics think they really are shit hot at assessing pain, and I've seen some really bad efforts at assessing pain" (Group 3.1).

There is a substantial evidence base referred to in Chapter 2 that shows that health professionals are poor judges of a patient's level of pain, with a tendency to underestimate the pain the patient is experiencing. In these focus group discussions some participants related their understanding of this phenomenon, as when asked "how reliable do you think your assessment of someone else's pain is?" the responses included "unreliable", with one participant commenting that "it's easier to tell whether someone is either in pain or not in pain, but the degree of the pain is very difficult to tell" (Group 1.1). This reflection is of note, given that it arose from a Group 1 participant with very limited clinical experience. A participant in the same group (also with limited clinical experience) opined that "if you go in there with an open mind and you listen to everything they say, then you can pretty well relate to how they're feeling, but if you go in there with your preconceived ideas and assuming that they're going to be okay, then you know, you're not going to be able to relate". The comment about the need for an open mind suggests that the participant sees a need to control for the potential effects of stereotyping, bias and

preconceived expectations in assessing patients with a complaint of pain, and this belief will be contrasted with those held by experienced paramedics later in this chapter. The part of this statement that addresses a need to "relate to how they're feeling" suggests that this person believes it necessary to try to understand or empathise with the patient's experience to better understand their symptoms. The construct of empathy will be expanded in a later section, and the understanding of empathy and preparedness to engage in an empathetic relationship with the patient will be compared across the clinical levels represented by the different focus groups.

Assessment of pain involves a clinical examination of body regions that are associated with a report of pain in order to gather information about whether palpation or changes in posture palliate or exacerbate the pain. This is done to establish whether the pain is associated with visceral structures or whether there may be musculoskeletal or soft tissue involvement, as the treatment for a complaint such as chest pain depends on a differentiation between a cardiac or musculoskeletal origin of the pain. Assessment also involves establishing the events leading up to the onset of the complaint, previous medical history and current diagnoses and medications. Measurement of pain severity is done through the use of validated pain rating scales. While these scales enable the patient to quantify their pain in a way the enables repeated measurements over time, which informs the effectiveness of the management of the complaint, there is evidence that paramedics are concerned about the validity and reliability of pain assessment tools such as the Numeric Rating Scale (NRS), and these concerns were cited across focus group participants currently employed as paramedics (Groups 2 and 3). One paramedic questions the validity and reliability of the NRS tool by asking "Do you think we're better off finding a better way? Cause it seems to me the rating out of 10 is just highly inaccurate" (Group 3.1). The topic of pain scales is expanded in a later section (Chapter 6) that elaborates attitudes and beliefs regarding the use of pain scales to assess pain severity.

Although the focus of discussion was pain, there was recognition that although pain may be the chief complaint and reason for ambulance attendance, pain may be yet one symptom among a broader set of complaints and clinical signs, and that the purpose of pain assessment is to gather information that may lead to a provisional diagnosis that identifies a cause for the pain – such as myocardial ischemia – in order to guide management of the problem. As such, the assessment of pain was compared

to the assessment of other complaints such as dyspnoea, with one participant making the following observation: "In terms of assessing pain it's no different to assessing anything else. We could be talking about a patient being short of breath right now. If someone tells you they're short of breath you're going to clinically assess them and work out for yourself whether or not you'll need to intervene. Pain is no different – someone tells you they're in pain, you need to work out for yourself whether or not you're going to intervene" (Group 3.3). This implies that a report of pain does not automatically trigger analgesic intervention, but that a more holistic assessment is undertaken to arrive at a judgement or diagnosis which then guides treatment or management.

Participants were aware that the assessment of pain involves the identification and analysis of a broad range of cues that include physiological changes and behavioural cues as well as the patient's expression of their symptoms. A comment was offered that "I can only make an assessment of pain based on what I can see, what I can hear and so I've got my vital signs and I've got visual cues and using those you can make an assessment of what you think is pain" (Group3.3). This statement suggests that the assessment of a patient reporting pain involves the construction of a coherent picture of the clinical problem, which perhaps represents an attempt to codify the cues in order to inform the management of the complaint.

Age

Some participants related a belief that the expression of pain changes across the lifespan and that communication abilities associated with extremes of age have the potential to complicate the assessment of pain. This is evident in the statement: "… you can't have a rule for assessing pain that works for all ages" (Group 3.3).

Although the challenges associated with the assessment of pain in children would be known to experienced paramedics, participants in the focus groups with limited clinical experience (Group 1) were also able to share some experiences in assessing pain in children: "I've had [at a school camp] you know, um, twelve year olds, thirteen year olds break arms and dislocate things and um, even have blisters, girls with quite bad period pain and that sort of thing and it can be very hard getting them to talk to you about, particularly with kids, how they're feeling and putting your

finger on exactly what's going on with them" (Group 1.1). This comment acknowledges difficulties in explaining or elaborating an individual's pain experience, which may involve age-related communication skills. Pain is an intangible construct that may inhibit simple classification and communication of the characteristics of this experience, particularly in those (i.e. children) with little prior pain experience, or when the individual's vocabulary is limited by age or language skills. The comparisons made between pain arising from serious injury (fracture) and superficial injury (blisters) as well as the comparison between pain arising from injury and that arising from normal physiological processes such as menstruation suggests that this person has developed a belief arising from their personal experience in caring for children that it is difficult to distinguish between "serious" and "superficial" pain on the basis of the child's self-report of their experience.

In this study setting, paramedics are encouraged to use a pain scale specifically designed for non-verbal infants and young children.[2] In addition, the Faces scale is available for children who can verbalise but who have difficulty comprehending the abstract process of assigning a number to their pain in the way required when using the NRS scale. While the use of these scales may improve the identification of pain in children, the frequency of use of these scales could not be determined as the first stage of this thesis excluded patients aged less than 15 years of age.

Although the use of paediatric pain scales forms part of the assessment of pain in children, behavioural cues and the parent or carer's assessment of the child's pain also form part of the assessment process: "For young children you have to use their parents. They have the best knowledge of their child's behaviours, it's really going to be a behavioural thing, will be the big cues" (Group 3.1). Parents may be able to describe changes in the child's behaviour that may give clues to the possible presence of pain. However, the parent's ability to estimate the severity of pain experienced by the child has been shown to be affected by the same tendencies to underestimate pain that have been found to occur when health professionals attempt to estimate the pain severity experienced by adult patients.[3] This research has questioned the appropriateness of using a parent's estimation of pain severity as a surrogate for the child's experience.

Although the estimation of pain severity by parents and the paramedic may at times be poorly correlated with the child's experience, significant changes in behaviour can help to form an impression of the pain. One example cited by a paramedic involved an atypical response to a painful injury: "... it was a child who had obviously deformity, was a very stoic child and had previous breaks before and not really worried, but she was really agitated, her mum was there saying ... [if] she hurts herself even if it's pretty bad, she will get up and keep going, but the fact that she stopped was a concern to her mum" (Group 2.2).

While one participant reported their success in using the Faces scale to assess pain in children "I've used the Wong-Baker face scale before and it worked great" (Group 2.1), a participant in the same group expressed their concerns about the use of this scale: "I don't like that, the faces thing, because to me it always looks like an emotional thing and I always feel that, um, you know, if I hold it up to the child to say look ... they'll think 'I'm unhappy', so it's the unhappy face" (Group 2.1). In this case the participant appears to believe that emotions may cloud the assessment of pain, without realising that the affective dimension of the pain experience is inevitably linked to emotions. In this instance the paramedic may be expressing a need to cut through the emotional overlay to reveal the true "physical" pain.

Patient Behaviour

Behavioural cues have been cited by participants in each focus group as an important input to the process of patient assessment, which eventually leads to the formation of a problem statement or diagnosis. Symptoms such as nausea, depression, fatigue or pain may lack overt physical manifestations but may be associated with behavioural responses, and these cues help to verify the presence and severity of the complaint to establish the possible cause and to guide management. Paramedics may be aware that when a patient reports that they feel short of breath this symptom can be associated with derangements in ventilation, perfusion, diffusion, or combinations of these aetiologies. The path to a provisional diagnosis takes in information about each of these parameters, so that – for example – adequacy of ventilation is assessed by seeking evidence of respiratory effort, which may include overt evidence of increased respiratory rate, chest expansion, and use of accessory muscles. The vital signs will be evaluated as hypoxia and/or hypercarbia generally result in an increase

in pulse rate. Other cues such as the patient's posture may be evaluated, given that the patient may attain a position that maximises respiratory effort. An inability to speak in sentences or phrases may indicate the severity of the event. Thus, while the patient may be asked to rate their breathing difficulty (dyspnoea) on a scale of 0 to 10 in the same way that other symptoms such as pain may be scored to enable an expression of severity, it is usually unnecessary to do this as the spectrum of clinical cues provides a unambiguous confirmation of the patient's complaint; there is a high degree of symptom certainty due the presence of relevant evidence in the form of related clinical findings.

In contrast, a complaint of pain may be associated with subtle or even absent changes in vital signs (see Appendix G) and few other items of evidence to support the symptom, particularly in cases of pain that are not associated with obvious tissue injury. In the absence of obvious causes of the symptom the paramedic may conduct an extended search for cues, which may include an assessment of disability or of behaviours thought to be associated with pain. Comments offered by some focus group participants support a hypothesis that paramedics expect that certain behaviours will be associated with reports of pain and that the behaviours will be correlated with the severity of the pain: "I mean, we all have an idea of someone who is ten out of ten pain is someone who's yelling out, rolling around, inconsolable [whereas] someone who's one out of ten pain might be calm, quiet, no obvious sort of visual cues" (Group 3.3). However, the experience of one paramedic reveals that association between pain severity and behavioural cues is not always reliable: "... sometimes someone will tell you they're nine out of ten pain and they're sitting there and they're calm and their pulse is low and their blood pressure's good and they're not anxious at all and they're saying its nine out of ten, well they've obviously got some pain, but is it a nine out of ten? Don't know" (Group 3.3). The potential for mismatch between the patient's reported severity and the observed behaviour and vital signs such as pulse rate and blood pressure has apparently caused this paramedic to question the veracity of the patient's report. What is not clear is whether the paramedic believes that this is an atypical situation where the behaviour is moderated by cultural beliefs or a stoical disposition, or whether the patient is exaggerating their report of pain for motives that may include a need for analgesia to

support an addiction. This concept will be expanded in the section dealing with drug-seeking behaviour.

Evidence of Injury

The first stage of this thesis identified significant differences in the frequency of analgesic administration based on the cause of the pain, with patients reporting pain considered to be cardiac in nature four times more likely to receive analgesia than patients with pain due to trauma, despite the often overt visual cues associated with trauma that help to predict or confirm the presence of pain. Even where the patient doesn't volunteer information about pain, the nature of the injury may be assumed to be associated with a high probability of pain. However, a comment by one paramedic (Group 3.1) suggests that in some circumstances there is no reliable association between overt injury and pain: "... there may be some traumatic injury and we go 'that must be sore'. But it doesn't necessarily mean it is sore." Examples where this disassociation is believed to occur was not elaborated. However, the same paramedic volunteered a belief that pain without overt signs, such as pain of a medical origin, is more difficult to assess: "... with medical pain you don't have that visual sort of thing, so I think sometimes it might get under treated." (Group 3.1)

A belief that pain in the absence of overt evidence of origin may be under assessed and under managed is reflected in the following comment: "I think instinctively sometimes you have a desire to manage traumatic pain more aggressively because you can see it. It's an obvious thing. If someone's got abdominal pain, which could be any variety of things, which could be causing any severity of pain, it's a bit less tangible and therefore it can be a bit harder to relate to, because you can't see it. And so subconsciously I think maybe it's not managed as aggressively" (Group 2.1). However, while this belief suggests that pain arising from trauma may me more likely to be treated as it is more open to external validation, this belief is in conflict with the evidence arising from the first stage of this thesis.

Visual cues – or signs – associated with injury may coalesce to form a constellation of findings associated with pain that leads to a schema representing the significance of the injury and an associated estimate of pain severity, and this may be reflected by the following statement: "... you walk in with somebody who's got a severe

traumatic injury, you always say, well that's, that's an injury that you would expect would elicit a, a great deal of discomfort, a great degree of discomfort, so you automatically, I suppose in your mind, give it your own pain score, you know, that's, that's a ten out of ten injury or an eight out of ten injury, or you walk into the person who has no traumatic injury and appears not unwell and you might think to yourself, well if there's any pain there at all, it's only a two, and that's before the person's even spoken to you I think" (Group 3.2).

The potential influence that the absence of evidence of a likely source of the pain has on decision making is reflected in this comment: "Everyone undervalues the significance and the potential significance of abdominal pain, particularly in the elderly. It's always constipation. No one ever thinks it could be something more serious. And I don't think we pay enough attention to really assessing properly what it is" (Group 3.1).

Use of Pain Scales

Discussions regarding the use of pain scales were noted in six of the seven focus groups. This category had the third highest number of coded references after the categories of "drug seeking behaviour" and "development of expertise in assessment and management", with 51 coded references spanning over 3500 words.

Throughout the focus groups there was a general belief that pain scales such as the NRS provide limited – and potentially misleading – information about the patient's pain. When asked for suggestions about better of assessing pain, one participant stated the belief that "We need to, to draw our focus away from, from that number scale" (Group 3.2).

Concerns regarding the reliability of the score derived from tools such as the NRS is evident in the following comment: "There's a severe limitation to having a one to ten scale in that not everyone's working from the same base and a really good question is 'are you comfortable?' can be a much more valid question than 'what number is your pain right now?'" (Group 3.3). The reference to "the same base" suggests a belief that the NRS is flawed due to the lack of a universal reference point for the upper boundary of the scale. While the value of "no pain" (0/10) is generally agreed, the lack of an objective standard for "worst pain" (10/10) is viewed as problematic. This

illustrates a conceptual misunderstanding, as the use of the scale is designed to open a dialogue with the individual to identify the nature of their personal distress associated with their pain. As such the "most pain imaginable" boundary is a personal reference point that is independent of any other reference. The paradox in the cited argument is the author's belief that a more valid measurement of pain severity is to question the patient regarding their level of comfort, when the NRS is designed to do this, albeit in an inverse fashion by enabling the patient to express their current level of discomfort.

The possibility that paramedics learn to develop an internal pain scale based on personal standards or norms of pain reporting and behaviour, and that this scale is then used to validate the patient's self report arises from the following comment: "I think by the time you seen a couple hundred patients that there are varying degrees of pain you start to structure in your mind some form of scale, I don't know, I don't think it's qualifiable but you, you sort of, from experience I know that these sort of people, these people, these sort of conditions tend to have a lot of pain..." (Group 2.2).

One participant saw the pain score as a distraction: "It's very easy to get focused on chasing a number and wanting to get that number down and whether it means anything or not you can have a patient who looks perfectly fine and presents quite comfortable and yet says the pain is 10 out of 10. So you become focussed on chasing that." (Group 2.1) In this group there was general agreement that the pain severity scale is but one component of the overall assessment process: "I think we're too focused on giving it a number when it's actually more than just a number" (Group 2.1).

While there is strong evidence of disquiet regarding the value of the score derived from a pain assessment tool such as the NRS, there is also evidence that paramedics see the tool as important for monitoring trends in condition following the implementation of strategies to relieve pain. One participant states that a "... reason we do a pain score is to see the trend. So whether it's eight out of ten for this guy and four out of ten for this guy, once you give them pain relief they go down or they're going up – that's what we're looking for. To see whether it's working and it doesn't really matter if this guy says it's eight and this one says it's four. We want to

know whether our analgesic's working or not or whether they're getting worse" (Group 3.3). However, the opportunity to measure trends in response to treatment may not occur unless the patient's report of pain and associated clinical cues results in a paramedic judgment that the complaint warrants intervention.

A belief that the pain score helps to document trends in a patient's level of pain, rather than provide an absolute indicator of severity, is also shared by a Group 1.1 participant with very limited clinical experience: "I think where it's effective [the NRS] from what we've seen of it ... you can see if there's a change in the pain, it's more like a relative point score, not necessarily how much it really hurts, more how much pain has been um, reduced by the treatment we're giving so I think it's effective in that sense …"

The utility of the tool in observing trends in pain severity following treatment is confirmed by a Group 2.2 participant, who responds to a question from the interviewer about the usefulness of the pain scale: "I think it's useful for determining whether your pain relief is working, but I don't think it's useful in determining severe, moderate or mild pain. Because everyone's um, idea of pain is different, because of their past experiences. Nobody's ever had an excruciating pain before, so, a mild pain might appear to be excruciating to them...". While this acknowledges the utility of the scale in documenting trends, this comment also represents a fundamental misunderstanding of the intent of the tool: that patients cannot state that they have a 10 unless they have prior experience of "10" against which they can compare their current experience.

A paramedic in the same group (2.2) continues by expressing their concern that "... the problem is, it becomes so arbitrary they, they just seem to make the number up on the spot...", without realising that the number *is* "made up" or constructed by the patient as an expression of their pain, rather than an expression of what it should be according to the paramedic's predetermined model of pain. This statement provides a hint that a "made up" number, as opposed to a metric that can be objectively validated, represents a less real or less valid measurement outcome.

Although discussion in each group raised concerns about the validity of pain scales, the reliability of the numerical rating of pain severity also featured in discussions, with beliefs expressed that the score is unreliable, and that patients can sometimes

give a number that suggests that they have overrated their pain. However, there was also acknowledgement of situations where the number may appear too low: "I guess sometimes for all the pain scores which are too high, there's often pain scores which are too low. So you go to the nursing home and the little old nanna's done the fall. She's shortened, rotated her leg. You go to move her and she, and she guards, and you ask her 'are you in pain' and they say no. So I think sometimes for every bit of overscoring there's underscoring as well" (Group 2.1).

In response to the question "Can you tell me how you assess pain?", a participant in Group 3.1 responds: "I think it's a combination of everything, I mean you can use your pain scale until the cows come home but it's also sympathetic responses, patient positioning and I think you've got to accumulate the whole lot together you can't just turn around and say, … well you know because I've had people sit and look at me and [I] go what's your pain level out of zero to ten and they're sitting there and they'd say it's a 10, and they're sitting there looking like this [sitting still without expression] and you'll get other people who are in obvious discomfort and quite severe discomfort and they might only rank it about a 5. So it's a pretty inaccurate tool". Another participant (Group 3.2) stated that "I'd have a fairly good idea what I was going to expect to some extent before I ever put the, the pain score to them", suggesting that the patient's report is compared against the paramedic's assessment of severity, with the risk that the patient's report is dismissed if it is at odds with the paramedic's score. Another paramedic (Group 3.2) appears to support the reliability of the paramedic's assessment of pain severity over the patient's self-report through the following comment: "I think paramedics are really consistent, I think, in their ability to assess pain, even before the score I would have thought, but I don't think patients necessarily express the number very consistently with, in agreement with that...". The inference in this statement is that the patient's score is unreliable if it doesn't have a high level of correlation with the paramedic's own score of the patient's pain experience, and that the occurrence of a significant mismatch leads the paramedic to a point where they are forced to choose between the reliability of their estimation of pain score, and the score provided by the patient.

This miscalibration may be partly responsible for an unwillingness to believe the patient, the tool, or both. These comments may reflect a broader view of the validity and reliability of the NRS score. Whereas other tools used in the process of arriving

at a clinical judgement or diagnosis return quantifiable data that is considered both valid and reliable – such as that obtained from a test of blood sugar level, temperature, or blood pressure – data obtained from the NRS may be viewed as invalid if the purpose of the scale and its limitations are misunderstood. In some cases the paramedic appears to believe that the NRS score should be associated with predictable pain-related behavioural cues that are consistent between individuals. However, this is inconsistent with a contemporary understanding of the factors affecting inter-personal variability in pain expression.

When asked by the interviewer "How useful do you think it is then in general to put a number on pain?" a participant from Group 3.1 replied "Very, very. But for me it's very contextual ... I'll pay a high regard to the other things about them. So, what's their blood pressure, what's their heart rate, what would you expect their heart rate and blood pressure to be in that setting if they didn't have pain, um and people sometimes understate their pain as well. But you can see they're some people who are so stoic that um, middle aged blokes like to be tough and little old ladies just say I don't want to bother you with my pain, you know, and yet you can see them gritting their teeth and sweating with the pain, so I think it's very useful as a relative term. If you've started off with an 8 even if the 8, when you decode it is really a 3, if it then comes down to a 6 then you know you are making progress so its relativity, is, for me, it's extremely useful".

This again highlights the acceptance of the NRS as a means of identifying trends in pain severity, but the absolute value appears to be less well accepted due to observed interpersonal variations in behaviour and vital signs associated with a particular score. The use of the term "decode" suggests that the patient's self-report of pain is modified or "recalibrated" by the paramedic in situations where the score has a poor correlation with their expected clinical findings, which may include behavioural cues and changes in vital signs.

Misconceptions regarding the purpose of the NRS as a means of elaborating an individual's expression of pain severity at the time of assessment are identified in a response to the interviewer's question about the definition of "10" on the NRS:

Interviewer: "So ten is the most experienced pain they've ever experienced or that they could imagine experiencing?"

Paramedic: "I always say as, as the, the most severe pain that they've ever experienced" (Group 3.2).

The response suggests that the paramedic asks the patient to compare their pain against their worst pain experience, rather than the recommended strategy of asking the patient to rate their pain along a continuum, with "0" representing no pain and "10" representing the worst pain *imaginable*. The former strategy is problematic if the patient has had limited experiences of severe pain. In addition, the question supposes the existence of a quantifiable benchmark for 10/10 pain. Support for the theory that paramedics may be looking for a benchmark, or reference point, against which to compare the patient's experience arises from the following statement provided by a participant who picks up from the previous comment: "... for men anyway, I think they have um, often have different levels to, of experience to draw on, for women if they've um, had childbirth, it's a good reference point, it seems for them, that's generally their most painful experience, yeah, for men, it's sometimes harder to give them the, to come with the good reference point" (Group 3.2). The desire to compare the patient's current pain experience against a "worst pain scenario" is evident in the reference to childbirth as an exemplar for 10/10 pain. The problem with this approach is that childbirth is a personal experience associated with different levels of emotional meaning which can modulate the feeling of pain. In addition some mothers may experience reduced pain perception due to therapeutic interventions such as caesarean surgery or analgesia. One focus group participant drew on her personal experience of childbirth and the comparison of this with other episodes of pain by suggesting that "breaking my toenail off was more painful than childbirth" (Group 2.2). The speaker elaborated on her experience of pain associated with childbirth by stating: "… I mean, it's a nice pain because you know what you're going to get at the end of it I suppose …" (Group 2.2).

Although concerns and misconceptions regarding the need to establish a reliable benchmark to represent the most severe pain, there is also evidence that some participants have an understanding of the use of the tools that more closely matches the intended use:

Paramedic 1: "But it comes also down to the different way that people ask about the pain scale, like [name deleted], you were talking about having ten as the worst pain

you've *experienced*, but for me I would, I'd like ask you what's the worst pain *imaginable*, because they may have only experienced a small amount of pain and so, and that, the worst pain imaginable gives me an idea of about how, once again, they're hanging on and how, how dire is …"

Paramedic 2: "But what do you perceive as the worst pain imaginable?"

Paramedic 1: "… that's what's subjective to everybody, everyone, and it's just an idea of where they're at, with the pain, you're in pain but where are you at, how can you cope, how will you cope with that"

Paramedic 2: "Because could you be worse, could you be better, yeah"

Paramedic 1: "And that's why it is, it is subjective and people may never have experienced the worse pain imaginable, but if you can imagine what the worse pain imaginable is, is this close to that, or is, are you, are you doing better than that ..." (Group 2.2).

Some comments identify a belief that patient unfamiliarity with the tool, or difficulties in using the tool to report their pain, may contribute to problems of reliability: "Some people have got no idea how to interpret it still…and like you go in and you might spend half an hour, well not half an hour, but go in, try and take every angle and they still, they still, it's still misrepresented" (Group 3.2). When the interviewer asks "What do you mean misrepresented?" the paramedic replies: "As in that, that, they can't understand, or they can't give you a number, either it's because of the way they're feeling the pain or the state that they're in or they just don't get it." The response did not address the question about "misrepresentation" of the score, but nevertheless suggests that some patients are unable to provide a score for reasons highlighted elsewhere in this thesis. However, the comment regarding misrepresentation could be interpreted as a concern regarding the congruence between the patient's report and the paramedic's assessment of the complaint.

The belief that other factors affect or contaminate the report of pain is a recurring theme, which is reflected in the following comment: "I've had people in the back [of the ambulance] and you've said "Tell me about your pain" and they've said 'My pain's 11' so that's an indication that there's something else going on as well. So, you know there might be something else going on underneath as well, so looking at it

– and the physical's very important, very important, I mean that's what we do, we treat physical symptoms, but a lot of the time in the back of an ambulance you'll have people with other underlying issues which I think can compound pain" (Group 3.3). When asked by the interviewer to expand on their statement that "other underlying issues" can compound the pain, the participant offers "Like emotional distress" (Group 3.3). This reinforces earlier suggestions that the paramedics see a need to separate the physical (nociceptive) component of pain and the emotional/affective component to enable an accurate assessment of pain severity. However, when the patient provides an expression of their pain severity they are not just giving a measurement of nociception, as expression of pain is inextricably connected to the prevailing emotional state of the patient.

In all, there was a great deal of discussion about the use of pain scales, with some beliefs suggesting significant misconceptions regarding the purpose of pain scales. This was probably best highlighted by the following comment: "... no one's ever told me about this pain scale, are we supposed to put what the patient states [on the patient care record], or what you, our experience as a paramedic are we rating that pain" (Group 2.2).

Vital Signs and Their Use in Validating the Presence and Severity of Pain

Focus group participants made several references to the need to seek evidence to validate the presence of pain and to check the congruence of the patient's report of pain severity with their own assessment of severity: "There's physiological things too that you look for, like pale and sweaty, like sympathetic outflow, pale and sweaty, tachycardic, umm that sort of thing ...". The potential effect that a poor correlation between vital signs and acceptance of the patient's report of pain severity is reflected in the following comment: "... her heart rate was at normal rate and she just didn't have the other physiological signs of being in, in that amount of pain, but she was adamant that she was in pain" (Group 2.2).

While discussing the assessment of pain and clinical cues that help to identify pain, participants from other groups also discussed vital signs in the context of the assessment of pain:

Paramedic: "Do vital signs as well, like what their pulse is and their blood pressure is as well."

Paramedic: "… yeah, the vital signs, yeah ..."

Paramedic: "And often I think it's probably more relevant to, to um, assess those things before giving them the analogue [the NRS has historically been incorrectly known as the 'analogue' scale] of, of um, zero to ten because that's, you get such a varied answer with um, zero to ten" (Group 3.2).

The discussion between members of this group continues: "... you can see if someone's clearly in discomfort from their pain if they're heart rate's elevated um, what it's doing to their blood pressure ..."

When the interviewer asks whether evidence of other signs associated with pain makes the pain score redundant by asking "So you don't invariably ask for a, a number, is that right?" a paramedic responds "Um, not always or before I, I might ask it slightly differently according to what I've already assessed it as, based on their physiological appearance and their emotion distress" (Group 3.2). This suggests that, in this instance, the paramedic makes an assessment of the patient's pain severity prior to asking the patient to self-report their pain, and that this preliminary assessment influences further questions regarding the nature and severity of the pain. As such, a mismatch between observed signs such as pulse rate and the patient's report of pain may provoke further questioning to explore this disparity.

Vital changes were frequently cited as a useful indicator of pain severity, with an expectation that sympathetic nervous system activity increases as pain severity increases, producing signs such as tachycardia, pallor and sweating. As these physiological changes are under autonomic control rather than voluntary control, they are considered to be reliable signs that cannot be falsely displayed or manipulated. The same physiological variables form the basis of polygraph or "lie detection" testing. The belief in the utility of vital signs in validating pain is evident in the following comment that followed a question from the interviewer regarding paramedics' confidence in assessing pain: "When you take into consideration of all the other facets and not just the number out of 10 then it's, um, it's fairly reliable. Like vital signs and patient demeanour and things don't lie" (Group 3.1). As

confidence in the reliability of vitals signs in assessing pain was a major theme arising from the analysis of the focus group narratives, the dataset used for the first phase of this study (Chapter 3) was interrogated to identify the correlation between vital signs of pulse rate, blood pressure and respiratory rate and pain severity. The resulting analysis found a lack of evidence of significant correlation between vital signs and pain severity in this study setting. This research was developed as a paper that was published by the Emergency Medicine Journal. The paper is included as Appendix G.

Evidence of Drug or Alcohol Use

Participants related the effect that the patient's social situation – including evidence of drug or alcohol use or abuse – may have on their assessment of the patient's complaints:

"There are always social aspects to it too. I mean we've all gone to the patient who's intoxicated or a scum bag or something like that. Here you're making a judgment that 'Oh, I'm not giving you any morphine. You might get Penthrane' but you don't give them morphine because either you don't think they deserve it or you're concerned that they have other drugs or alcohol on board that might interact with it or whatever it might be but you withhold some pain relief based on a social judgment, effectively" (Group 3.3). This illustrates a potential for a bias involving judgements made on the basis of personal beliefs, rather than judgements formed through an objective and analytical approach to decision making. The situation related by this participant may represent uncertainty in decision making resulting from the belief that the patient's report may be unreliable, based on a belief that people affected by drugs or alcohol are unreliable informants due to the drug's effect on memory. Alternatively, a patient identified as a possible drug addict or drug abuser may be labelled as unreliable, which may have a partial association with societal expectations regarding appropriate standards of behaviour. Adding to this is the possibility that judgements are influenced by legitimate concerns about interactions between potential therapeutic medications and alcohol or illicit drugs the patient may have taken. However, the use of the term "scum bag" suggests that clinical decisions may be influenced by a patient's "worthiness" to receive care, particularly when their current health status is believed to be self-inflicted.

Pain in the Setting of a Somnolent Patient

Analysis of the focus group transcripts revealed several references to a questioning technique used in the assessment of pain that involves asking the patient whether they are able to sleep with the pain: "If I had one [patient] that said eight out of ten pain and I didn't think that it was a genuine eight out of ten I would say, 'Oh, do you think you could sleep with that?' They'd say 'Oh maybe', 'Do you think you need some pain relief or would you rather wait until you get to hospital?'" (Group 3.3). This example of an approach to assessment could be seen as a strategy to postpone or avoid the need to administer an analgesic after a more extended search for cues to support the patient's report failed to achieve concordance with their clinical impression. The question regarding the patient's ability to sleep is unusual in that it adds little to the clinical picture given that sleep is biologically inevitable, so that patients may eventually sleep despite having severe pain. This participant continued by relating a possible strategy for dealing with this hypothetical situation in the event that the patient responded to the paramedic's answers in a way that indicated that they maintained their report of severity and desire for analgesia: "... generally what I do if they say no they can't sleep with it 'No, I think I need pain relief and it's eight out of ten' I would give them some and you might not go for the narcotic, you might just do the Penthrane" (Group 3.3). In this case the paramedic is describing a low risk interventional strategy – as Penthrane is considered a safer drug than morphine – where the paramedic continues to hold concerns regarding the severity of the patients reported symptom.

A link between sleep or sedation and the patient's report of pain severity was cited on several occasions in the context of concerns regarding the veracity of the patient's report of pain. One paramedic believes that the ability to sleep is incompatible with a report of severe pain when roused: "Well, someone tells you it's a 10 out of 10 but you have to wake them up for them to tell you that. It's not a 10 out of 10" (Group 3.1). The apparent dissonance between a report of severe pain and the ability to sleep is further highlighted: "... they are saying its 8/10 but they're actually they've fallen asleep with the Penthrane and it's dropped out of their hand ... and they've woken up and they've said it's 8/10 and hasn't changed..." (Group 2.1). Another paramedic from the same group reaffirms this belief: "... if they say its 10/10 and they're dozing in the back, then that also says that there is probably something missing from the

picture", with the inference that the report of pain is inconsistent with the observed behaviour (Group 2.1). More overt evidence of the belief that the patient may not be providing a truthful report of their pain if they are able to sleep is shown by the following comment: "... when you get the patient that you have to wake up to tell you they are still in 8/10 pain and it is sort of when you get that response that you realise well, their version of 8/10 pain is clearly very different to mine" (Group 2.1). This last comment reaffirms the theory that paramedic has established a personal benchmark for behaviour associated with a report of severe pain, and that the ability to sleep while reporting severe pain is inconsistent with their expectations. It follows that where this mismatch is encountered the prevailing attitude could be one of disbelief of the patient's report of pain.

Although a belief that sleep or sedation is incompatible with a report of severe pain is evident among focus group participants, evidence suggests a poor correlation between sedation and pain. A study that investigated the relationship between sedation and relief from pain in patients receiving titrated doses of morphine for postoperative pain found that sedation is not synonymous with analgesia, and concluded that "morphine-induced sedation should not be considered as an indicator of an appropriate correct level of analgesia during intravenous morphine titration",[4] with this finding subsequently confirmed by a similar study in 2007.[5]

Discussion regarding the basis of the belief that somnolence or sedation is an appropriate and accurate measurement of analgesia suggested that Clinical Instructors (CI) may be instrumental in the development of this belief: "... a lot of them [CI] will use the um, they'll say to the patients well could you sleep with this pain, a lot of them seemed to think that's, that's a good indicator [of the level of pain]" (Group 2.2). Subsequent discussions revealed that the "sleep test" may indeed be a truism that has been adopted by paramedics in this setting and passed down over generations by paramedics who have accepted this maxim without questioning relevance or evidence supporting this belief. One explanation for the emphasis on sedation as an important observation following opioid administration involves the finding that sedation may be a precursor for respiratory depression, one of the serious complications of opioid administration. A patient who is able to be roused but who is unable to stay awake is considered to be at risk of the development of respiratory depression.[6] However, a situation where a patient is comfortable or pain free yet

drowsy but easily roused is considered an appropriate treatment benchmark for the management of acute pain with opioids.[6]

Development of Expertise in the Assessment and Management of Pain

When asked about how paramedics develop expertise in pain management, participants identified their initial education as a foundation for practice, but believed that expertise was highly dependent on clinical experience. The lack of depth of pain management in paramedic education curricula is recognised by one paramedic: "In my experience, in ambulance, there's very little in the way of formal education into pain management, pain assessment and so forth, aside from sort of being handed what's a, a relatively blunt tool in terms of an analogue pain score [NRS], um, you're pretty much left up to your own devices beyond that" (Group 3.2).

This is reinforced by the comment that "... no one sort of says to you well you're taught the one to ten scale, and here I'm going to expand on it by telling you this, it's just a, it's just an experience thing" (Group 2.2).

Workplace learning was believed to be influenced by the paramedics responsible for the supervision of novices. One paramedic proposed that early clinical exposure to different approaches to pain assessment enabled the comparison of good as well as poor practice, and from this the novice learnt to develop personal strategies for the assessment of pain. Participants acknowledge the diversity of approaches to pain management within the workforce, and acknowledge that pain practice can be poor as well as excellent. A practice example that was believed to be poor was related as follows: "... when I was a student there was one person who said she had pain and my CI suggested that she didn't have pain, we're not giving her anything, we'll just take her to hospital as she is because she only wants pain relief. I did this and felt terrible about it afterwards and will never do it again" (Group 2.1). Although there may have been valid reasons for withholding analgesia that were not evident to the novice, this example revealed that the Clinical Instructor may not have believed the patient, and that this was at odds with the student's assessment. In this case the experience may have helped shape the student's approach to subsequent situations that share similar features with the cited case.

Discussion regarding the development of expertise in pain management is evident in the following focus group excerpt, where the participant elaborates the way in which he conceptualises his clinical decision making:

"We learnt to assess pain the same way we learnt to assess short-of-breath patients, the same way we learnt to assess chest pain. You're given some basic tools at the start of your career and as you go through you pick up from everyone else around you and even through watching doctors and nurses in hospital and how they treat your patient ... and you've got this experience bank behind you where you can then start to make … and I don't think they're necessarily subconscious decisions, but they're intuitive decisions. You might not go through a conscious thought process to get to the end point, but like [name deleted] was saying, you've seen renal colic before and you see something that looks like renal colic and smells like renal colic and sounds like renal colic you might intuitively make that decision that this patient is going to get pain with it because you've seen this before and it really hurts. So when they say nine out of ten pain, I believe it. But then you might come across different situations where you're pattern matching in your head [and] it doesn't quite match something that you've seen before or it's something that you maybe haven't come across, so you don't understand what's going on; you need to assess that longer before you start to make that decision because there's no intuitive pathway there for you, if that makes sense" (Group 3.3).

This participant describes a search for known patterns of presentation based on certain causes of pain. The reference to intuition may be another way of expressing a belief that the identification of the problem arises from a process of matching prior exemplars to the current situation through an automatic or subconscious process rather than through a conscious analysis and evaluation of competing hypotheses. In the example cited, previous exposure to patients exhibiting a typical constellation of symptoms and behaviours associated with renal colic is believed to result in the early explication of this diagnosis in subsequent cases that present with patterns of behaviour, history and complaints known to be associated with renal colic. It is only when the pattern is disordered or inconsistent with familiar patterns that the paramedic undertakes a conscious and more thorough analysis of data that may involve hypothesis generation and testing to include or rule out competing explanations for the patient's presentation. However, if the extended search for

clinical cues fails to confirm a diagnosis that is consistent with the findings, there is a risk that the paramedic may disbelieve the patient's report of their symptoms, which may include disbelief of the severity of their pain. This situation could conceivably result in inadequate or inappropriate management of the patient's complaints.

Further evidence of the development of expertise in assessment is associated with having a repository of exemplars developed through exposure to known conditions, which is reflected in the comment: "I think a lot of it's [assessment of pain] subconscious – all those cues we've talked about, yeah, just use them all I suppose and end up making a decision based on that..." (Group 3.3).

There was limited discussion on other means of developing expertise in the assessment and management of pain. Mentoring from experienced paramedics other than those with direct supervisory responsibility was mentioned, although this was clearly not a formalised process and the availability of mentors varied across employment regions. Peer debriefing after interesting cases was cited as a means of developing knowledge. No references were made to seeking advice from other health professionals. No mentions were made of case reviews, where paramedics may have an opportunity to learn about the hospital management of the case, the eventual medical diagnosis and management plan. If these opportunities were available they may provide a means of contrasting the paramedic management and diagnosis with the eventual medical diagnosis, enabling the comparison of management plans which may facilitate reflection on the paramedic's management of the patient.

Only one reference was made to journals or external sources of information that may be used to inform practice: "I'm a big believer in finding an article on something that I'm interested in at the moment and getting myself some background knowledge, so if I'm looking into something I'll go to the library and find an emergency medical journal and, and have some, do some reading, so I have a bit, a bit more of an, a base knowledge I guess. I'm a big believer in that" (Group 1.1).

Believing the Patient

Focus group participants cited many examples of situations that represented a mismatch between the patient's report of pain and the paramedic's own assessment of the presence and severity of the patient's complaint. The belief that patients may

not always be providing an accurate or truthful account of their pain was a recurring theme throughout each of the focus groups. This belief was associated with themes of "accepting the patient's complaints", "believing the patient", and "trust" that arose from discussions between focus group participants. The constant comparative process of data analysis that underpins grounded theory resulted in the coalescence of themes to arrive at a category labelled "believing the patient". While beliefs regarding the patient's motive for falsifying their symptoms or medical history were not always consistent, one theme that did arise from focus group discussions involved a belief that some patients may be providing false information in order to obtain analgesia. This will be further explored in the section describing drug seeking behaviour.

While there was evidence that some participants disbelieved the patient's report, there was also evidence that while participants were aware of the potential for patients to be dishonest in reporting their symptoms, it was acknowledged that the detection of dishonesty was complex and challenging. When the discussion in Group 1.1 turned to whether a paramedic should be able to accept or believe the patients report of pain, one participant stated that "I don't think you can double guess people's, people's um, pain though, if they say they've got pain, they're going to have pain and I don't think you have the right to, to question that" (group 1.1).

Evidence of interpersonal differences in a clinician's willingness to accept the patient's report of pain was reflected in a paramedic's description of a mismatch between a student's assessment of the patient and the CI management of the case. In this example the CI advised the student that analgesia was withheld due to inconsistencies between the patient's report of pain and their observed behaviour: "... but I couldn't reconcile that with what I was seeing. You know the guy looked to be in severe pain all the time. He should have got pain relief, I think. So that made me more determined to not let something like that happen when I was practicing [as a qualified paramedic]" (Group 2.1). This may however, reflect a naive view of a novice who failed to identify cues that raised legitimate concerns about the veracity of the patient's report of pain. The tendency to believe the patient may diminish with experience, perhaps due to encounters where the paramedic feels they have been tricked or deceived by the patient.

Discussion among focus group participants highlighted a need to determine whether the patient's complaints were "genuine" as opposed to fabricated, which might be suspected if the patient had other motives for seeking analgesia:

Interviewer: "So one of your questions is to work out whether this pain is genuine. Is that right?"

[several murmur agreement]

Paramedic: "You always go through a system, well I do, always go through a system, of, you know, like there are people who are clearly genuinely in pain. And you treat all people in pain, but, you know, like someone who's severely in pain and … is perhaps more genuine will get 5 milligrams [of morphine] straight up whereas someone else will get titrated" [administration of small doses to examine the effect of a drug] (Group 3.1).

This suggests that where this paramedic has doubts about the severity of pain reported by a patient, this doubt may trigger a more conservative approach to management. The "system" mentioned in this case that is used to detect non-genuine complaints was not elaborated.

Paramedics in one group described a belief that there exists within the ambulance service a culture of requiring the patient to prove that their complaint of pain is legitimate:

Paramedic: "There currently is a very strong culture in ambulance of 'prove to me' [that the pain is real]."

Interviewer: "Do you think that's the case?"

Paramedic: "Absolutely. A lot of people I've worked with will, not flat out refuse [analgesia], but it's like they almost make the patient say, you know, 'prove to me you're in pain', rather than I'll accept it on face value that you have pain and I'll give you something for it. And I'm not sure why that is. Whether it's because they're been desensitised or been burnt in the past so to speak by people seeking or …" (Group 2.1).

While the discussion involving the acceptance of the patient's report of pain generated significant interest, the discussion also revealed a broad range of beliefs. While some participants were worried about possible consequences of believing a patient who was later found to be untruthful, there were opposing beliefs regarding a willingness to accept the patient's account of their symptoms: "I'm going to weigh into this, it's hard to prove that they're not in pain, so then in that sense, it is our ... job to make the patients as comfortable as possible and in the absence of evidence to the contrary then it, it will hard to justify not [providing analgesia …" (Group 2.2).

There was some evidence that a willingness to believe the patient altered over time as the paramedic gained clinical experience: "... you believe everything the patient says to you and then you just, then as you become more experienced um, that's when you can start changing your assessment" (Group 2.2). The reference to "changing your assessment" may refer to the development of higher order analytical skills that enable the paramedic to test the veracity of the patient's report. This may also represent a heightened awareness of the potential encounter with an untruthful patient and the consequences of uncritically accepting an individual's report of pain, which may be linked to organisational influences such as clinical audit of practice that affect the individual's decision making process. If the development of clinical experience does involve a transition from belief to disbelief, the factors that may influence the development of this trait have not been described in previous paramedic research. As the paramedic describing this belief had approximately two years clinical experience, another unknown is whether with further experience the paramedic learns how to "suspend disbelief" by consciously reflecting on the potential for bias in their clinical decisions.

In exploring differences in a willingness to believe the patient based on clinical experience it is worthwhile examining the beliefs provided by Group 1 participants, who typically have little clinical experience: "... if you go in there [to the patient encounter] with an open mind and you listen to everything they say, then you can pretty well relate to how they're feeling, but if you go in there with your preconceived ideas and assuming that they're going to be okay, then you know, you're not going to be able to relate ..." (Group 1.1), and "... you can't go 'No, I don't understand how you have pain, so I'm not giving you anything'. You've got to trust that they understand their own body to a certain degree and you have to trust

that the normal person is a decent person and they're not all just drug takers and wanting to get the next hit..." (Group 1.2). The difference in attitudes between the novice groups and those with experience as a paramedic warrants further investigation. A possible explanation for these differences in attitude may be associated with limited experience in assessing patients who report pain, and the possible erosion of professional integrity that may follow from experiences of "being tricked" by a patient who was later discovered to be engaging in drug-seeking behaviour due to addiction.

Behaviour Influencing Belief

Assessment of an individual's complaint of pain involves an evaluation of several clinical cues that lead to a judgement about the nature of the pain and the need for clinical interventions to manage the pain.

Participants recognised that one of the factors affecting their judgment of the person's complaint involves the comparison of clinical cues against an established pattern of behaviour associated with pain. However, not only are paramedics beliefs about what constitutes normal behaviour likely to differ between individuals, but the patient's behaviour is affected by several factors that have been previously discussed. The problem in trying to establish a normal – and therefore truthful – pattern of pain-related behaviour is reflected in a comment from a student (Group 1.2) paramedic: "You have to accept that everyone's not normal … whatever normal is".

In some cases, paramedics describe a mismatch between the patient's report of pain and the observed behaviour as well as the possible consequence this mismatch may have on the diagnosis and subsequent treatment. For example, a participant relates the following: "... they meet you at the front door, they've got their hair in their rollers, they're making a cup of tea and they're telling you their pain is ten out of ten, I'm less likely to be as willing to give them pain relief as I would be to patient Y, who ... can't even open the front door, you can see them crouched over on the floor, half their leg's missing, you know, what, whatever it be, you're probably going to be a little bit more offering of your pain management I suppose" (Group 3.2). While this example may have provided unrealistic exemplars at each extreme of presentation, in this example the paramedic appears to be associating pain severity with interference

with function, which is reflected in the behaviours described. While severe pain of sudden onset may conceivably impair mobility, severe pain that is chronic may result in some habituation resulting in less overt functional disability.

The potential for significant inter-patient variability in the behavioural expression of pain is recognised by a participant who states that "... one patient will say they've got ten out of ten pain and be happily sitting up talking not grimacing, yet another person whose obviously writhing around in pain is going, 'it's only two out of ten' um, so it's hard to get yardstick of, of which one to go to" (Group 2.2).

Although the use of behavioural cues to confirm or validate the patient's report of pain severity may involve the recognition of patterns of clinical cues thought to be associated with severe pain, patterns that are inconsistent with the paramedic's expected norms may lead to a rejection of the patient's report of pain and the development of an alternative diagnosis of deceit or malingering behaviour. Behavioural cues are a useful source of information and these cues should contribute to the development of the clinical picture. However, in doing this the paramedic needs to be conscious of the variables – such as age, chronicity, culture, and coping strategies – that may produce what the paramedic perceives to be atypical behaviour leading to distrust of the patient's report of symptom severity. Decision making that occurs in association with unrecognised bias may prejudice the quality of care provided to the patient. Where the patient's report of pain is inappropriately dismissed a failure to treat pain or the early closure of the diagnosis may be considered forms of clinical error. The recognition of the potential for bias regarding behavioural norms and the effect this may have on management is reflected in the following comment: "… so in, in us only judging people by that [behaviour] then we're really, really under managing pain generally speaking, because there are some people who are so stoic even though you know that they must be in incredible pain, that they can sit there and not be agitated" (Group 2.2). The potential impact on management is exemplified by the following comment: "... if they're, if they're not looking that distressed you know, and they're able to talk to you um, you're not going to go, you're not going to go in hard as far as um, analgesia goes ..." (Group 2.2). This example suggests limited consideration to involving the patient in the decision making process in order to more fully evaluate the patient's needs. Given that there were few references to the involvement of the patient in the clinical

decision making process, paramedics may see a limited role for patient involvement in decisions affecting their health and wellbeing.

The use of behavioural cues to identify the presence of pain and to infer a level of severity has an important role in the assessment of patients where a self-report is unavailable. This includes pre-verbal children, the cognitively impaired, and those with communication or language difficulties. Tools have been developed to aid in the assessment of pain in the cognitively impaired.[7-10] However, when the clinical picture is uncertain or ambiguous the paramedic may rely on intuitive decisions that are prone to bias. It is clear that there is no standard of pain-related behaviour,[11] and attempts to validate the patient's report of pain based on associated behavioural cues may lead to disbelief of the patient's report if the behaviour is inconsistent with the paramedic's expectations.

Concerns about Motive: Drug Seeking Behaviour

References to "drug-seeking" behaviour were identified in each of the seven focus groups. This was a dominant theme arising from the analysis, and the most frequently coded theme with 65 references containing almost 4000 words of transcript.

Several participants gave examples of cases where they felt they had been fooled by a patient into administering analgesia, where it was apparently later shown that the patient was malingering to obtain drugs to support an addiction to opioids: "I've been caught several times by junkies" (Group 3.1). However, a consequence of labelling patients inappropriately was also recognised: "... it's easy for some ambos to label it [the complaint or presentation] as an opiate seeking sort of behaviour and really they are just belittling the patient" (Group 3.1).

The following comment suggests a belief that one of the roles of a paramedic is to screen patients for the possibility of drug-seeking behaviour, and to act as a gatekeeper to prevent access to health services where drug-seeking behaviour is suspected: "There's quite a few out there that you don't even see that we will leave at home and not treat, but have a bit of a talk too, who are just seeking opiates or benzos [benzodiazepines] or whatever, and they don't even make it as far as the A&E department, but they're on our radar" (Group 3.1). This statement suggests a

paramedic role in surveillance, identification of deceitful individuals and the implementation of diversion strategies. However, others reject the notion of a gatekeeper role: "If you've got somebody – we all talk about the hypothetical renal colic – if you've got a male wriggling round on the bed, sweaty, with loin pain, what other clues are there that he's got a drug seeking behaviour unless you know him and that? I'm not the keeper of the pain relief so if I think a person's in pain I'll tend to give them morphine" (Group 3.3). Some saw the issue of inappropriate requests for analgesia as part of a larger problem of inappropriate requests for an ambulance: "It's not just the pain relief – it's an abuse of the service, full stop, isn't it?" (Group 3.3).

The possibility that some patients who frequently present to the ambulance service or other health services with a complaint of pain may reflect a case of pseudoaddiction,[12] where the behaviour is due to poorly managed pain rather than a true addiction. This possibility is recognised in the comment "... that's also not to say that people who are perhaps presenting as seeking don't have genuine conditions of pain as perhaps that's a little trap you can fall into reasonably easily in assuming they were, 'oh I've seen you five times in the last week and you're beginning to annoy me', they may have a genuine condition that requires management" (Group 3.2).

The risks involved in believing a person who is later proved to be exhibiting drug-seeking behaviour tend to reflect a concern that the behaviour will be reinforced through acceding to their request for analgesia. However, the effect that a perception of deceit may have on the paramedic's professional integrity is also evident:

Paramedic: "I think there's a concern too of looking silly ... you give a drug seeking patient pain relief and you get to hospital and they go 'Oh they're just a drug seeker'…"

Paramedic: "You feel like you've been had."

Paramedic: "Yeah, you feel like you've been had and that insults your personal pride …" (Group 3.3).

The potential for professional "loss of face" as one outcome of believing a patient who is later found to have fabricated their complaint in order to obtain drugs by deception was a recurring theme throughout some of the focus groups. The feeling of being tricked by the patient after the paramedic had assessed the complaint and

provided treatment in good faith was summarised as a feeling of "being used" (Group 3.3). The loss of face when the paramedic believes that the patient has deceived them is graphically highlighted in the following exchange. When asked for an example of deception linked to drug-seeking behaviour the paramedic offered the following case: "... her story was that she was bitten by a snake four months ago, and she was in continuous pain and I can't remember all the details, anyway um, I got into the hospital and um, they just went like this, 'oooh, not her again, you haven't given her anything have you', and I had. I'd given her some pain relief, and then yeah, and I just thought, I had my suspicions, but when somebody's telling you they're in severe pain, who are we to not say …" When this paramedic was asked how she felt when the apparent deceit was revealed she replied "I felt like I wanted to go and smack her to be honest, because she'd a made a fool out of me" (Group 2.2). However, the paramedic was reassured by another member of the group "... it's our job to give pain relief to people who say they're in pain, and if she's taking advantage of what we do for a living, then that's a shame, but you shouldn't feel foolish about that" (Group 2.2).

Although there were several other references to being "fooled" by patients, this belief was balanced by an opposing belief: "... at the end of the day as [name deleted] was sort of getting at before, what's the big evil? At the end of the day you've given someone something and they've gone 'Thank you very much' and pissed off [left the hospital prior to assessment] and you feel pissed off but 'oh well, these things happen', and if the cost of that is that you don't give pain relief to someone who actually really needed it, then that's an unacceptable cost" (Group 3.3). This belief was further elaborated with an example: "The way I look at is if I went to someone like that and I went 'You're a drug seeker – I'm not giving you any drugs' and then we get to hospital and it turns out they've got a fractured ankle and they are actually in a world of hurt, I'd feel pretty shit about that" (Group 3.3). It was not clear whether this belief arose from concern that the patient may have suffered unnecessarily, or whether the paramedic was disappointed in the quality of their clinical judgement.

Although focus group discussions regarding patients who may be dishonestly seeking analgesia tended to be dominated by a fear of being "tricked" by a person with an addiction, there was also evidence that some paramedics experienced some

positive reinforcement in deciding to believe the patient: "... we discussed the fact that they were known drug seekers and I gave them pain relief. And one of them the following day was, he caused a ruckus at the hospital because they wouldn't give him any pain relief while they set his wrist, which was fractured. And I felt really good that I actually gave him pain relief. I went in there, and although I discussed not giving him pain relief, I listened to his symptoms and gave him some analgesia" (Group 2.1).

Although the extent of discussions on this topic suggested that encounters with individuals who were seeking analgesia to support an addiction are common, the true extent of this problem is not well described. When asked how frequently paramedics encountered situations where the patient appeared to be engaging in drug seeking behaviour one volunteered "I've never seen that [in two years of ambulance experience]" (Group 2.1). While others in the group agreed with this assessment, others disagreed: "Umm, every couple of months I suppose I might come across one [patient with drug-seeking behaviours]. But it's certainly not a weekly event or a daily event, nothing like that. It's one out of every couple of hundred – I suppose – patients. It's not a common event" (Group 2.1).

There was evidence that when a history of opioid abuse is known, the possibility that the patient may have a genuine complaint of pain must be considered: "I did have a patient once who, um, was an IV drug user, admitted to being an IV drug user but was in obvious distress, and me and my partner actually said, well, he could be seeking, he could be not. So, just because he has this addiction doesn't mean that he couldn't be having a cardiac event; that he couldn't be having events that are causing him pain which therefore would need something for to control. How effective it's going to be … well it's not our job. It's to try and give them something, take them somewhere else where they can have further management" (Group 2.1).

The locus of beliefs that patients may be malingering in an attempt to obtain morphine may be linked to prior experience and education. The effect that the latter may have on the establishment of this belief is highlighted by one paramedic: "At school [ambulance training centre] they spoke about seekers, and they spoke about … they went into it quite a lot didn't they, with the ambos giving lectures" (Group 2.1). It is possible that there is a strong belief that significant numbers of patients

may be trying to obtain analgesics to support an addiction may be a truism handed down to new generations by paramedics employed to teach pain management who may not be using reliable evidence to inform their teaching.

The topic of drug seeking behaviour also generated discussions among Group 1 participants, many of whom had limited clinical experience. However, even with the limited ambulance experience they may have had – which consisted of a few days travelling in an ambulance as an "observer" without a patient care role – participants related some instances of paramedics expressing concerns about the veracity of the patient's complaints, that in some cases led to analgesia being withheld. The participants who gave these examples generally felt uneasy about whether the patient's complaints had been appropriately dismissed: "... if they're [the patient] asking for the exact drug and they know exactly how much they want, then yeah, you know, you can sort of say you like suspect that, but you still have to treat it as if it is an eight out of ten pain" (Group 1.1).

Caring for the Patient with Pain

When a question about how well focus group participants thought pain was managed in their employment setting there was a tendency to believe that pain management practice was good, particularly since the introduction of morphine for ALS paramedics, but that there was potentially room for improvement: "I think it's not bad but it could be better" (Group 3.1).

One possible reason for the belief that the effectiveness of pain management practice could be improved is seen in comments that acknowledge the influence that paramedics' attitudes or beliefs may have on the clinical decision making process: "I think it could be better. I think it is such a subjective thing and a lot of people put their own, they project their own sort of ideas and feelings onto the patient I think, in terms of what pain they are feeling. I believe it could be done better" (Group 2.1).

The possibility that the patient's social situation influences the management of pain is reflected in the following comment: "... I've seen on numerous occasions patient X with a broken ankle in Toorak will get immediate pain relief, morphine, whatever it requires, the patient Y in the backblocks of St Albans ... they might get a bit of Penthrane thrown at them, but then, you know, just driven off to hospital, and there

seems to be a, a projection of the paramedic's own inherent biases or summing up of the patient or scene …" (Group 3.2).

The influence that cause of pain has on pain management practice is reflected in the results from the first stage of this thesis, which found that patients with pain considered to be cardiac in origin were four times more likely to receive analgesia than patients with pain from trauma. When exploring possible causes for this disparity one paramedic acknowledged the difference: "I think we manage chest pain well. But not other forms of pain" (Group 3.2), with another proposing a possible cause: "... chest pain is dangerous; chest pain is a sign of something very wrong that can get worse and you need to actually have a fairly careful course of management of it. Whereas an isolated traumatic injury is not going to get any worse, not much worse unless you don't RICE [rest, ice, compression, elevation] it properly and all that, but it's pretty isolated and it's not going to evolve into another nasty thing that is going to cause hemodynamic problems or something, usually. Whereas the chest pain thing is something that has a higher emphasis for us. In fact it is even emphasised in our guidelines recently, acute coronary syndrome to get pain down to zero if you can for various cardiac reasons. It's emphasised" (Group 3.1).

An alternative explanation for the finding that pain from trauma is not managed as effectively as pain associated with a cardiac event is elaborated by a paramedic from Group 3.2, who recounted a belief that complex operational environments associated with cases of injury may cause the paramedic to focus on higher management priorities: "I think from the trauma aspect ... a lot of junior people [novice paramedics] out in the field, I think we miss pain, adequate pain relief in trauma because sometimes people are overwhelmed by other things going on with that particular case type and it's not until further down the track they start and realise oh, maybe I should give something for pain and, and by then um, it's probably less effective and by the time you get to hospital they've not had adequate pain relief."

When considering pain management options, the consequences of morphine administration in terms of the effect the pharmacological intervention may have on hospital stay was cited by one paramedic: "...perhaps the patient won't be in the emergency department very long, maybe a quick procedure and then they'll be discharged home with their own pain relief, um, sometimes if, if the pain's managed

well with the Penthrane, um, then they can be seen in the ED department, the Penthrane wears off very quickly, they can be put on their oral meds, and sent home with that, whereas morphine is a little bit longer and they have to be observed in the ED department and effects the patients stay in the hospital a little bit further, so it's not something you'd immediately jump to, for something that might be in the back of your mind, if the Penthrane's working then maybe that's a good place to stop" (Group 2.2).

The use of non-pharmacological options to manage pain was also acknowledged: "It's not always about giving a drug. You often go to a job and you think "ooh, they're in pain" and I must give them something for that. But it could be that you are able to position them and transport them in such a manner that they are relatively pain free" (Group 2.1).

The End Point of Pain Management

Although the clinical practice guidelines that inform practice in this setting state that an ideal endpoint for cardiac pain is a severity score of 0/10, and for other pain a desirable endpoint is 2/10 or less, there was some debate about whether these were achievable goals. Some paramedics believed that in injuries such as dislocations, the only way to achieve significant pain relief is to reduce the dislocation "...the only thing that's going to take away their pain completely is to relocate the hip" (Group 2.2).

One paramedic stated that assessment of risk of adverse drug effects would be one factor guiding his attempts to reduce pain: "... [if] it was safe to do so, like if I wasn't having any you know, um, like depressing conscious state or anything like and I was giving it well spaced, yes, I mean sure, that's, there's no reason just to pull up [stop giving the analgesic], but it's not something that I shoot for as to absolutely get rid of all pain …" (Group 2.2). The reason for having a goal other than 'no pain' as an endpoint where there was no evidence of drug-related adverse effects was not elaborated.

Clinical Practice Guidelines

Focus group participants were comfortable with their clinical practice guidelines (CPGs) used to inform the care of patients with pain, in that they understand the content and intent of each guideline. However, while they see the guidelines as objective practice statements, the interpretation of when to apply a particular guideline appears to be complicated when symptoms cannot be objectively validated. In the case of a complaint of pain as the cardinal symptom, the decision to intervene with analgesia may be complicated by uncertainty about the veracity of the patient's complaint:

"Certainly reading our clinical guidelines you know it's pretty black and white sort of as to what we're attempting to achieve depending on the various cases. However, I guess it becomes very arbitrary when you take into account that the people's responses to, you know, we ask them to give us a pain score and they are very variable. We then have to make up our mind that we believe this person truly is in pain or they're a person that likes to exaggerate sort of how they're feeling" (Group 2.1).

The student suggests that the CPGs are "black and white", but that the assessment of pain is "arbitrary". A dictionary definition of this term is "subject to individual will or judgement; discretionary".[1] It is not clear whether the paramedic sees the expression of pain as arbitrary, or whether they view this as having discretionary power to accept or reject the patient's self-report of pain. Other definitions of "arbitrary" include "capricious; uncertain; unreasonable".[1] This term is repeated in this focus group transcript, and in the broader context of the discussions it becomes apparent that the term is used to refer to a patient's complaint of pain that is considered to be unreasonable or unreliable.

When asked the question "How useful are the guidelines and how to do you use them?" an experienced paramedic from Group 3.1 replied "Well, they are very useful. They give you somewhere to start and a path to go down but I've found in my experience that if you can justify just moving out of that guideline a little bit, then that's not a problem". Although this statement suggests that guidelines may be adapted to suit the specific clinical situation, this view is at odds with the beliefs of

another paramedic in the same group "... step outside the guideline you'll get your arse kicked" (Group 3.1).

A belief that CPGs are sometimes unreasonably inflexible is observed in the following comment regarding the prescribed route of administration of a drug: "The thing that annoys me too is we've been taught to give IM injections, we've been taught to cannulate, we've been taught morphine, midazolam, Penthrane and all these different things but we can only use them in this setting, under these conditions. If you can't get IV why can't you give IM?" (Group 3.1).

In additions to concerns about the paramedic's ability to modify the guideline by modifying the route of drug administration, a belief that the current guidelines may not enable effective analgesia due to limited scope of drug choice and dose is highlighted by the following comment: "I've got someone in severe pain that I think is very severe, they're stating it's very severe, and I give them pain relief and it's not as effective as I wanted it to be, that's when I start stressing. That's when I start get frustrated, you know, the tools I've got aren't working" (Group 2.1).

In discussing the range of analgesic options available to paramedics, a focus group participant with experience in another ambulance service believes that there is a benefit in having access to a wider range of drugs to better suit the range of pain-related situations presented to paramedics: "... there's certainly a much wider range of drugs that we could be using um, having come from the [name deleted] ambulance service the advanced paramedics had recourse to using morph and midaz [midazolam] for pain relief, they had ketamine, they had entonox, they had a reasonable wide range of, so you could tailor what you use to the individual situation, which um, as [name deleted] was saying, we're pretty limited here, we've got two drugs …" (Group 3.2).

A perceived need for additional drugs to fill a perceived gap between methoxyflurane and morphine is reflected in this comment: "... is there a role for paracetamol or Nurofen for lowering the pain? So you've got someone who's got an ache as opposed to a pain and you know that the green stick [methoxyflurane] is overkill, morphine is overkill, but they're sore. So a couple of Panadol and you know quite well you get to hospital and the nurses will chuck them a couple of Panadol. So I'll have to see whether it's, be it Panadol, Nurofen or something…" (Group 2.1).

Organisational Influences: Clinical Audit and Influence of Peers

Regular audits of patient care records are performed in this study setting to enable reporting of the achievement a range of clinical benchmarks, which include benchmarks for the reduction of pain. In addition the audit process ensures compliance with practice guidelines and monitors adverse events. When asked whether the audit influences practice several paramedics agreed: "I think you're very naïve if you think it didn't" (Group 2.2).

The effect of clinical audit on practice has been described in relation to avoidance of punishment for actions that are inconsistent with practice guidelines and organisational policy. In one focus group, a hypothetical situation was described where a clinical audit showed that one paramedic was administering more morphine to patients than other paramedics in the area. One group participant (Group 3.2) responded by stating that he had been in that situation, and was criticised for excessive morphine use: "I was asked why I was handing out so much morphine and whether they [the patients] really needed it and I was asked if I was aware of the impact on the budget that it had..." It was suggested that the auditor did not attempt to discover whether the frequency of morphine administration represented appropriate practice, and if so, this may have highlighted conservative dosing by other crews. In response to the admission of high frequency of morphine use for patients reporting pain, another member of the group states "You should be congratulated." However, the original speaker replies "Well that was my feeling, but that certainly wasn't the impression I got from my colleagues in the room or the team manager, perhaps I'm a bit of a big softie and these patients don't deserve it and so forth, that was the, the general gist of the conversation" (Group 3.2). No evidence of reward for good practice was identified from analysis of the group transcripts.

While some participants described a belief that the CPGs function as guidelines that can be varied if the rationale for the variation is safe and clinically sound, others stated beliefs that the CPGs could not be varied under any circumstance, and attempts to do so were likely to be met by disciplinary action: "...there are a couple of officers who have done it [practised outside the clinical guideline] and been hauled over the coals, and generally we are congratulated by the hospitals and killed by the Service..." (Group 3.1).

However, the ability to modify practice appears to be linked to regional differences in the acceptance of this practice. When discussing the use of midazolam – a sedative and anticonvulsant – as an adjunct to pain management, a paramedic states that "... in my area, the [name deleted] area, there has been some paramedics do that, midazolam/morphine mix and they've been patted on the back by the Service for doing it because it's been a good result, the patient's been comfortable, they've travelled well ... you've got them to the hospital, the hospital is wrapped in the way the patient's been presented and the patient's had a good trip down. Whereas just one hour across the other side of Victoria, if the paramedics do it they're getting smacked over the back of the head" (Group 3.1). Some of the frustration in relation to the use of midazolam for the management of pain – which is not currently approved for this purpose in the study setting – is paramedics' knowledge that this drug is used for pain management by paramedics in some other Australian states.

Regional differences in support for requests to modify practice have been noted: "That's the complete opposite to our area. We've talked about it a couple times already about how we can consult. We can ring the [name deleted] Hospital or [name deleted] Hospital or whatever and get some guidelines to step outside, or just ring the MICA officer who's on the job in [name deleted] and say 'look this is what we've got, we want to do this, what do you reckon? 'That's alright, no worries, off you go'" (Group 3.1).

The beliefs of peers regarding the management of pain can be a significant influence on the individual's pain management practices: "...my partner went crook at me for the next half an hour for giving him [the patient] analgesia" (Group 2.1).

Further examples of peer influence on practice is evident in the following: "… one job I went to, the guy said 'oh, severe abdo pain' and my partner was treating and he said do you think you'd be able to walk to the ambulance with it, and he said 'oh yeah', and he climbed up the ambulance into the steps, you know. No problems, there was no grimacing or anything ... later on the partner said 'he wasn't in pain I wasn't giving him anything'. And that was fair enough. But I think now that I'd be able to make the decision – he says he's in pain, I can't feel it, it doesn't look like he's in pain, but let's give him something to start with and see how we go from there" (Group 2.1).

Time to Destination

Short transport times between the scene and the hospital were occasionally cited as influencing the effectiveness of pain management. The issues linked to this theme included the influence of short transport time on decisions to treat, and the efficacy of analgesics where a full therapeutic effect may not be achieved before handover to hospital staff. As an example of the latter a paramedic stated that "I went to a guy the other day with a query fracture, and he was really, really distressed and we could not, we did not get his pain even remotely under control before we got to the hospital and he had a significant amount of morphine" (Group 2.2). However, where there are no other injuries that dictate urgent transport, this may be an example of a situation where more time could be spent on scene managing the patient's pain prior to transport. In balancing the risks and benefits of such a scenario, paramedics may be conscious of the employer benchmark set as the maximum scene time, which is 20 minutes from first contact with the patient to departing the scene. As compliance with this benchmark is audited there is a real possibility that inadequate pain relief at the scene may be partly influenced by the operational requirement to minimise time spent on scene.

While following the theme of transport times, the interviewer asked "Can anyone remember an incident when you thought oh we're only 5 minutes away from the hospital I won't bother?" Paramedic: "Yeah, that's happened to me quite a lot actually, quite a lot. I work in an area right next to the hospital and there's been quite a few jobs literary just down the street, like 200-300 metres away. Doing a case like small trauma or large trauma whether it's a knock or something and it is, like logistically and everything, a lot quicker for me to give Penthrane and allow me to move them onto the stretcher and get them to hospital. The only problem I've found with that is, then, and I actually wish I hadn't done in a couple in of cases, is where there has been a delay at triage and on the way to hospital I've given them Penthrane and 20 minutes has past. Penthrane is used [depleted] and I've thought oh I wish I had of got a line in [intravenous access] because the morphine would still be having an effect on them" (Group 2.1).

Another paramedic in the same group shares their experience: "I've had the same experience as you that where we rolled up and we've given methoxyflurane to this

guy and it held him pretty well, and it ran out. And then we got him on the bed at hospital and he's writhing in agony and nobody's giving him pain relief at that point and it really made me regret that we hadn't given him morphine" (Group 2.1).

Paramedics generally acknowledged that the time to hospital was not synonymous with time to analgesia. Given the significant overcrowding at some hospitals in the study setting, paramedics may find themselves continuing to provide care for their patient while they wait on the ambulance stretcher for a bed in the emergency department. In such cases paramedic care for the patient may continues for some significant time in the ED: "... delays at hospital have been so great that when I've arrived if I've already got IV access I've gone I am going to give you more morphine now because I know you're going to be standing with me, or sitting on the stretcher with me for the next hour and half" (Group 2.1).

A change in attitude and practice is reflected in the following comment: "Now I treat as though – like forget about the distance to the hospital – it used to be a factor for me, but I don't think it is anymore. I've sort of beaten that out of myself. Forget about how far away the hospital is – treat them the way they are now. Anticipate them having a wait [in the ED] – and if it's short, well that's great, but if it's long, well then we've got extra treatments up our sleeve [treating the patient in the ED]" (Group 3.3).

Managing Pain in Children

Challenges in assessing and caring for children in pain was a theme arising from the analysis of transcripts. "I think the issue with children and pain relief is quite simple for us because we don't have a lot of options" (Group 2.1). This comment was given in support of a view that ALS paramedics are unable to administer morphine to children. While the administration of morphine to children requires the authorisation of the clinician [senior paramedic on duty in the communications centre], permission is usually forthcoming if the paramedic can provide a sound clinical rationale for the request, such as ineffectiveness of methoxyflurane or non-compliance with methoxyflurane. However, when the interviewer asked Group 2.2 participants whether it was common for paramedics to seek authority to administer morphine to

children, one paramedic responded "No, I've never done it and never seen anyone do it."

The misunderstanding of the practice guidelines or reluctance to seek approval to administer morphine to children was reflected by comments in several groups, including the most senior clinical groups: "We can't give morphine to children. But I find that children in pain, if you don't handle them too much will use the Penthrane really well" (Group 3.1). The possibility that the misunderstanding regarding the administration of morphine may have affected the quality of care provided to children in pain cannot be tested, as the study of paramedic pain management practice described in the first phase of this thesis excluded children (aged less than 15 years) from the study.

There is evidence that some ALS paramedics believe that they need to request a MICA crew to give morphine to children, as the age restriction for morphine administration does not apply to MICA paramedics: "Well, although I think sometimes with kids, because you have only got that one option [methoxyflurane/ Penthrane], or you call MICA who will be 20-30 minutes off then annoyed at you for doing it half the time..." (Group 2.1).

There was one reference to other pain management strategies such as distraction: "... we had a little girl and she'd cracked her head, so we gave her a teddy bear and tried to distract her with that, which sort of made her a bit happier. I guess we can take their focus away from the pain, usually with talking" (Group 1.2).

Factors Influencing the Effectiveness of Morphine and Methoxyflurane

At the time of this study, two analgesic agents were available for the management of pain: methoxyflurane administered by inhalation, and morphine administered by the intravenous or intramuscular routes.

There is evidence of paramedics beliefs that methoxyflurane is only suitable for short term analgesia: "I'm not a big fan of Penthrane. The only time I think it should be used, in my opinion, is for short term analgesia, cause it is a short term analgesic. If it's going to be long term analgesia it should be morphine... My personal opinion is I can't see the point in giving short term analgesia when it's going to be a long term pain problem. It's almost like, eventually you're going to give them long term

analgesia. So if you're going to do that you should do it straight off..." (Group 3.1). The view that methoxyflurane is a short term analgesia is supported by the drug data that lists a duration of action of approximately 30 minutes.[13 14]

Frustration that the existing analgesics available to paramedics may not always be effective are reflected in the following comment: "I think the hardest ones that I've had to manage ... was an exacerbation of chronic back pain because the morphine didn't really work at all because it was mainly the spasming part that was actually causing so much grief and there was nothing really we could offer him that was going to really work. We gave him morphine of course and we gave him Penthrane but we felt sorry for him because we were a reasonable distance away from the hospital so he had to endure a painful ride as well as that and we knew what would work and we weren't allowed to use it – midazolam" (Group 3.3).

The inter-patient variability of drug effect was acknowledged in the following comment: "I've had a couple patients with Penthrane that after literally a couple of puffs they're out to it and we've got, and guys, guys who you pump morphine in and it makes no change" (Group 2.2). The effectiveness of methoxyflurane depends on the patient's willingness to continuously inhale the vapour via an inhaler. Beliefs about the effectiveness of this drug linked to patient compliance are evident in the following comment: "Part of the problem pre ALS was Penthrane so it was being able to sell the way the patient uses it. So, often it would come down to how well they used it with the results you get. Whereas, with ALS it sort of comes back into our control a little bit" (Group 3.1). The reference to ALS facilitating control over analgesia refers to the introduction ALS that enabled paramedic administration of morphine.

There were several references to the need to "sell" methoxyflurane (Penthrane) to the patient in order to achieve effective analgesia: "Penthrane isn't as well sold as it could be" (Group 3.1). The effectiveness of the drug is believed to rely on the ability to coach the patient in the correct use of the inhaler. However, patient compliance is influenced by the patient's acceptance of the taste of the drug and their ability to understand instructions on correct use of the inhaler. Thus, compliance may be poor in young children, the cognitively impaired, or those with language difficulties.

The frustration of having only methoxyflurane available until the paramedics were qualified at ALS level is reflected in this comment: "I've come from a critical care nursing background and I was very strong on pain relief, particularly in intensive care setting. To come back into an ambulance service and all we could offer at our level [student] was basically a green stick of Penthrane until we actually qualified. And coming from a rural setting, hospital transfers weren't like 2 to 3 minutes, 5 minutes in the city, they could be anything up to an hour so giving of the green stick or Penthrane was totally inadequate for a lot of these patients unless we called for backup" (Group 3.1).

The belief that further analgesic options are needed to better manage some cases of pain is reflected in this case example:

"I consulted for Midazolam once [a sedative and anti-convulsant not currently approved for paramedic use as an analgesic in the study setting]. We had a guy who … he had cystic fibrosis and he used to get severe cramps, became dehydrated, and this guy, his whole body was just in cramp and spasm, like big arch off the bed, just in severe pain, so we did the Penthrane, we did the morphine, did nothing. So I consulted … Midazolam thinking that it would fix the cramps, we fixed the pain. And the clinician said "No, no chance" but then after we stopped speaking he contacted the hospital, he went "Yeah, good idea", so we actually gave him two doses of Midazolam – the cramps eased off and he was more comfortable. So, it can happen, but just with the morphine it was never going to work, so that's my opinion" (Group 3.3).

When asked about the doses of morphine used to achieve pain relief the participants in Group 2.1 related the following:

"I've never used more than about 7 and a half [milligrams] actually."

"I've only used 10 [milligrams] once."

"15 [milligrams] for me."

"I think 10 [milligrams] is the most I've even given."

These comments do not indicate whether the doses provided satisfactory pain relief. However, to administer no more than 7.5 milligrams of morphine after two years of

clinical practice when 50% of patients report pain is unusual, and may represent conservative and possibly ineffective dosing. However, one reason cited for these doses involved a perceived risk of drug side effects with larger doses.

Concerns about Drug Adverse Effects Including Addiction

Evaluation of the risk of adverse is assumed to be a component of the clinical decision making process that eventually determines treatment. In the following discussion, a Group 2.2 paramedic discusses concerns about drug adverse effects and the effect this has on pain management: "... people can be a bit stingy on their pain management because they're so worried about ... possible side effects ... and you get to hospital and you think in retrospect I probably could have given increments of five milligrams instead of two and a half and have that person a lot better managed than I did, because I was so worried [about adverse effects]."

When asked about their views on the safety of morphine, one paramedic related: "I think it's [morphine] quite safe given in the ALS setting. We have medications to deal with an overdose, if that's what happens and we've got devices to deal with the side-effects of it for the most part, so I believe that morphine, although it's held up as a "got to be really careful with this" I think that it's quite safe in my experience" (Group 3.3).

The discussion followed by asking group members for their experiences with adverse effects:

Interviewer: "How common are the nasty adverse effects – the hypotension, the bradycardia the respiratory depression … in your experience?"

Paramedic: "Very rare."

Paramedic: "Never had any."

Paramedic: "Rare." (Group 3.3)

However, some examples of serious drug reactions were cited by participants in other groups, and these experiences may influence subsequent clinical decisions to administer analgesics: "I've had 2 bad results out of morphine and it still makes me really nervous when I give it" (Group 3.1).

One example involved a "… bad tachy [abnormally fast heart rate] which is apparently insanely rare, for a cancer patient. It put her into a heart rate of 190 ... and I waited months and months and months and then I gave it again to a guy and just watched him plummet, from a blood pressure of about 200 to a blood pressure of 90 and a heart rate in the high nineties to a heart rate of 40. And that makes you very nervous" (Group 3.1).

One paramedic suggested that the reaction from ED staff might be a greater clinical risk than the actual effects of an opioid overdose: "Well if you're talking about opiates you've got to be really careful because you don't want to dose them right up and take them into the emergency room. They get upset for starters if you bring in an um, overly dosed patient. But um, also they can't be put in the waiting room if you've given them opiates, so that a consideration as well" (Group 2.1).

"Um, I had a case last week, where I went erring on the side of caution, I said to my partner, what do you think, …I was thinking Penthrane and he went oh, it's cardiac you really need to go morphine, and I only gave her a milligram of morphine and she dropped [blood pressure] twenty um, milligrams of mercury at twenty um, twenty beats a minute so she actually had a very dramatic response and we had a chat to the doctors and they said, if you'd given her any more she probably would have arrested [died]. So that made me re-think my strategy with morphine and chest pain, is to probably now, instead of going straight the 2.5 you would be just starting, you know, on either the um, one milligram or even trying Penthrane to start with" (Group 2.2).

Paramedics are taught that morphine is a drug of addiction, and the drug data sheet in their clinical practice guidelines lists addiction as an adverse effect of the drug. This knowledge is reflected in the following comment: "... if someone's in chronic pain and it's not an exacerbation of their chronic pain, nothing new or whatever, then I would, I would do my best to not give them narcotics um, because I want to start them down the path of 'that was great, I got an excellent pain relief from that' and send them down the path of um, addiction to narcotics, um, so I give them Penthrane, but I probably would actually just transport them to hospital for um, a review of their medication..." (Group 2.2).

Following this line of discussion, the interviewer asks "I'm interested in um, [name deleted] comment about how, if you give someone morphine and it works then

there's a risk that they'll become more attracted to the morphine in the future and then will become addicted to it."

Paramedic: "I think it's, it's like a social, like um, starting a process for them of obtaining, like you're re-enforcing um, a behaviour of this person …" (Group 2.2).

This fear of addiction is evident in students with limited clinical experience. When the paramedic students were asked "how big a problem is addiction with drugs like morphine?" one responded: "Yeah, I think it's, it's a big issue, I think um, well the, the legislation, government, whatever does what they can through you know, restriction of access which I guess is, and prescriptions and so on, so it's highly regulated, I guess that's the best they can do" (Group 1.1).

Some of these beliefs may be based on personal experience involving people with chronic pain: "... I've got a family member who broke her back um, a few years ago and she had a, after her, she was on morphine for a long time and actually found it very, very hard going off that and moving into other forms of um, medication and, and um, getting back into movement and things after that, and she, it was almost like withdrawing from a, an addiction for her and she hadn't, I hadn't thought she'd been abusing it, but just it was really, really hard ..." (Group 1.1).

Apart from personal experiences of adverse events, paramedics believed that their education influenced their perception of risk: "Part of that is probably due to the training we were given through MAS, which really emphasises the potential negatives and doesn't emphasise the positives of it; it's very much based on risk minimisation as opposed to patient outcomes" (Group 3.2).

Documenting Care

There was general support among participants for a need to measure pain severity, perhaps because this is an organisational requirement. However, the difficulty in reconciling the patient's report of pain with the paramedic's impression of the pain, and the organisation's expectations regarding clinical standards for pain relief is highlighted by the following exchange:

Paramedic: "I mean if they're saying it's a ten and if you want to go through the paperwork as the paperwork reads with the understanding that pain's a subjective

thing, then you're obliged to put down ten and then so then that's reality then if you're putting that down, the argument could then flow that you're obliged to treat them with narcotics."

Interviewer: "Do you accept that argument?"

Paramedic: "No, not necessarily, because probably before we said you know, if a person's sitting there quite calm and quite relaxed and they're saying their pain is ten out of ten you could be led to believe that there is something else going on. Not that you're disbelieving that person, but if there's no significant injuries, if this is a long term thing and they're in ten out of ten pain then it's something that's very hard to diagnose and to treat in the back of an ambulance when you've got them for a fairly short time. I don't know what the answers are" (Group 3.3). The concluding sentence suggests that the speaker is divided between believing a patient whose report of pain is inconsistent with the paramedic's assessment, and suspending disbelief in order to meet employer and possibly professional expectations that a report of severe pain be managed to reduce the pain. Solutions to this conundrum may lead to an ethical or at least a professional dilemma – to disregard the report of pain and document a lower score to avoid scrutiny following a clinical audit, or to commit to treat a patient whose testimony is seen to be unreliable. Hence the comment "I don't know what the answers are".

Discussion of the documentation of assessment findings occurred in 5 of the 7 focus groups, with 20 coded references to this topic. One question involved a scenario where the patient's reported level of pain severity didn't match the paramedic's assessment. In this situation – where the patient reported a pain score of 10 – paramedics were asked how they would document this discrepancy: "I'd rate it as 10, but I'd put a comment on the case sheet [PCR] describing my interpretation of their relative pain rating" (Group 3.1). This may included a notation of behaviours and other clinical cues that appeared to be inconsistent with the patient's report of pain. While one paramedic stated that "Whatever they tell me is what I write down," (Group 3.1) others volunteered a different strategy: "I've recorded "unable to rate pain" on VACIS [the electronic PCR] where the pain scales … well, my perception of the person's pain rating doesn't gel. Whether that's alright … I'm sure it's not right…" (Group 3.3).

One paramedic stated that "... you document next to it um, [a note next to the pain score on the PCR] patient's still five out of ten pain, however, patient's talking on the phone, they're laughing, they're doing this or doing that …" which was followed by another speaker "Yeah, and I've done that and they've still come back [the clinical auditor has asked for an explanation] because they seem to look at the number." The speaker continues by providing an example of a strategy that aims to reduce the possibility of a clinical audit where a high pain sore is documented in the absence of analgesia:

Paramedic: "You make up your own number at the end of the day."

Interviewer: "Do you?"

Paramedic: "Occasionally, yes" (Group 3.2).

When the question "Is there ever, ever a time where the patient' self report of pain might differ from what's documented on the PCR?" was put to Group 2.2 participants, several agreed. When asked for examples, one volunteered "... like the patient's said I've got five out of ten … and then, and then on the PCR that you see that whoever you've been working with has put down two or whatever." A question that sought to identify reasons for falsifying the PCR led to one response that suggested that this was an attempt to avoid scrutiny in situations where the patient may have reported a high pain score, yet the paramedic did not elect to treat the pain due to concerns about the veracity of the patient's report: "... there was this big push about how much, how many points of pain relief did you achieve or any patient who you didn't relieve more than a certain number of pain points would be an audit..." (Group 2.2). When asked by the interviewer "So does that influence your practice if you think that someone might audit your PCR?" one paramedic replied "Not your practice; maybe your documentation" (Group 2.2).

The following recounts an experience where the organisational pressure to achieve a benchmark reduction in pain leads to consideration of falsifying the pain score where the paramedic is unable to achieve an organisationally expected reduction in pain:

"… patient had a, I think it was a broken ankle, and basically said it was 10/10 pain and it got to the point where I've essentially almost narcotised them. Pin point pupils, respiratory depression. They still had a level of consciousness, but ... like you had to

wake them up to actually... it's difficult, you feel that there is pressure on you. Whether it's by management, or by the service itself to actually deliver a patient with a reduced level of pain. And whilst you have done everything you can with the tools you have to try and reduce this patient's pain it's almost like, I suppose, the patient's sort of not helping you by not reducing the pain. It's almost like feel like there's pressure there to fudge numbers, in some ways" (Group 2.1).

Further elaboration of the reasons behind the falsification of the patient care record follows:

Paramedic: "... the patient was clearly not in agonising, writhing pain that would be indicative of a nine out of ten pain, they were walking, talking, joking, forgot where the pain was momentarily. I'd marked it down as a two.

Interviewer: "As a two?"

Another paramedic: "Because the kick in is two [the benchmark for the reduction of pain is 2/10 or less]."

Paramedic: "… yeah, so that they got some [score recorded], but then because if it had been higher, it would have been 'why didn't you, why didn't you get backup, why didn't you get someone to cannulate, why didn't you get the morphine on board …'" (Group 2.2).

Although the benchmark reduction in pain has been established by this ambulance service is an attempt to achieve clinically significant reductions in pain, paramedics see other motives for setting this benchmark: "... but it's also political too, because part of the ambulance service's funding is based on pain management, one of the key performance indicators that they get all their funding from, as long as people's pain is less than two, they get funding" (Group 3.2). One paramedic posits the belief that the organisational requirement to reduce pain to 2/10 or less may result in the documentation of a large percentage of patients achieving this benchmark: "I suspect the number 2 gets probably a fairly high representation [on the PCR] just because in our CPGs it says "pain less than 2…" (Group 3.3). When data from the quantitative study reported in Chapter 3 were analysed to answer this question there was an abnormal distribution of final pain score, with a significant number of patients having a final pain score of 2/10 (Figure 3-4).

Placebo Effect

The effect of placebo has been well documented in the literature. However, there is little place for the substitution of a drug for a placebo outside clinical trials that involve individuals who have consented to their involvement in the trial knowing that they may receive either an active drug or placebo. Analysis of the focus group transcripts found evidence that the placebo effect had been observed unintentionally. When asked by the interviewer whether anyone had sought to elicit a placebo effect, one paramedic replied: "I've inadvertently administered some normal saline which had a wonderful effect on the pain. We were in the process of putting the line in; 'we're just going to put a line in and then give you something for the pain' and I guess the assumption being that the saline flush was something for the pain; near instantaneously relief from pain, and um, at the time, well the first time It happened I thought well I've just been had with someone else, you know, seeking and they've thought they've got what they wanted, but you know, looked at it a bit further, well it's quite possible that this just had an actual placebo effect..." (Group 3.2).

While this may have been unintentional, there were other examples cited where the paramedic appeared to deceive the patient due to an unwillingness to believe their report of pain: "One of the things too with the Penthrane stick too is it's quite often a good dummy to give a baby ... you put the dummy in their mouth and they'll generally shut up. And then you know that there're not genuine" (Group 3.1). Subsequent discussion revealed that the paramedic was referring to examples where the methoxyflurane inhaler was handed to the patient without the addition of the drug.

Chronic Pain

The challenges confronting the paramedic when managing a patient with chronic pain – who may not have a medical diagnosis or obvious pathology responsible for the pain – is reflected in the following comment: "A difficult variable I think is when they're in chronic pain, when they've got say eight out of ten back pain and 'How long have you had it?' 'I've had it for 20 years'" (Group 3.3).

The first stage of this study demonstrated a significant decrease in the administration of analgesia as the duration of pain increased, so that pain that was recorded as

having an onset of more than 24 hours was associated with fewer analgesic interventions than pain occurring within 24 hours. These included cases of chronic pain, and the assessment of chronic pain was identified as a theme in several focus group discussions. The management of chronic pain may be considered to be beyond the remit of paramedics, who may be better equipped to deal with acute health emergencies rather than chronic health problems. A lack of knowledge regarding the management of chronic pain may be reflected in the following quote, as the paramedic believes that provision of analgesia to patients with chronic pain may have a negative impact on their long term care: "... often the benefits of, of you know, giving narcotic analgesic to the person with a chronic um, pain issue, like whether it be back pain or something else, you know, you might provide them with slight relief for a short period of time in the bigger picture, but really overall you're not helping them at all, you might be delaying their you know, sort of, um, progress" (Group 3.2). The suggestion is that patients with chronic pain need to be weaned off analgesics, and that paramedic administration of analgesics to this population of patients may interfere with this process.

This is further elaborated as a belief that patients with chronic pain need to personally manage their pain – which implies that they are responsible for their pain – and that these patients are on a journey to recovery – or normality – that will be impeded by the administration of analgesia: " I don't necessarily think that in every condition you need to have zero pain score as your overall objective, because if you've got a chronic condition which quite clearly the patient needs to manage, and they need to manage their pain, then giving them something to get their pain to zero, with an aim to get their pain to zero for the next you know, five to fifteen minutes or whatever it may be, doesn't really assist them in their, you know, journey um, and their management of their, of their underlying condition" (Group 3.2).

It is acknowledged that chronic pain can be a challenge to manage, particularly when paramedics are more focussed on the management of acute health emergencies. Management of the patient with chronic pain may be complicated by inadequate knowledge of the disease and therapeutic strategies to manage chronic pain as opposed to acute pain. In addition, the paramedic may carry concerns about addiction, or be concerned that their interventions may interfere with management plans developed by the patient's doctor or pain specialist. Patients on long term

opioid therapy may be opioid tolerant, and there may be questions about the efficacy of opioid doses that paramedics are authorised to administer in cases where patients are already receiving large doses of opioids.

The belief that paramedics are not equipped to deal with chronic health problems may be embedded in the following comment: "I think a lot of ambos have a lot less patience with people who have had a chronic condition for a number of weeks and it hasn't exacerbated at all but they've decided to call us at 4 o'clock in the morning. It really gets some peoples goats and they won't, they won't treat them for that reason" (Group 2.1). However, this may reflect a belief that paramedics should not be disturbed from their sleep unless the call involves what the paramedic deems to be a genuine health emergency.

The potential effect of chronicity on paramedic pain management practice is highlighted by one participant: "I know a paramedic who has a written rule he just doesn't give pain relief to back pain. And I don't understand why. His excuse 'Oh well, all back pain's chronic and therefore they don't need pain relief'" (Group 3.3). In another group one reason for withholding analgesia where the patient has chronic pain is stated as a concern about potential misuse of the ambulance service by patients with chronic pain who may have been denied analgesia by other health professionals but who learn that calling an ambulance will result in easy access to analgesia: "I've had ambos say to me don't treat chronic pain. They've said to me don't treat it because, and I've questioned it, and I've treated it anyway because I didn't think it was the right thing to do not to treat chronic pain. They've said this person had this back condition for three years." When asked to elaborate reasons for not treating the pain the participant continued: "Their argument was that you'll set up a precedent and then they would regularly call an ambulance, and they'll become a seeker" (Group 2.1).

This is elaborated by another participant: "with chronic pain often they'll be on chronic pain medication, they'll be under a regime. They'll be under a treatment plan, a management regime and at times, you know, I've had the view put to me we, yeah, don't treat chronic pain because it will encourage them or it will reward them for inappropriate service usage or, they shouldn't of called an ambulance they should of rung their doctor" (Group 2.1). This view highlights two issues; that chronic pain

may be associated with drug seeking behaviour or inappropriate use of medical resources, and that paramedic can help to break this cycle by not "rewarding" patients for inappropriate use of an ambulance. There may also be a belief that, as some may have existing management plans for their pain, there is little more a paramedic can do, to relieve their pain, and that the patient should be referred to a health professional who may be better equipped to deal with their pain. A belief that the administration of analgesia to patients with chronic pain will reward inappropriate behaviour [calling an ambulance] is revealed in the comment made by a Group 2.2 participant that a patient with chronic pain where "... it's not worse today than it was yesterday, it's not worse today than it was three weeks ago, but I've called the ambulance … to see what will happen, because I'm frustrated, okay, by me giving them ten [milligrams] of morphine to take their pain away, am I actually going to be doing them a longer term disservice because now I'm saying well you can call us and we can do it [give morphine]."

The potential for inappropriate ambulance utilisation by patients with chronic pain is also highlighted by a participant who sees chronic pain patients as a distinct subgroup of callers who are likely to abuse the service: "... often chronic pain people um, it's a frustration thing, you know, they've run out of all their meds, it's Friday, or it's Saturday night and the chemist's not open on Sunday, they're feeling a little bit strung out, they're feeling a little bit stressed and then they are not in their mind able to cope so they call an ambulance for that relief" (Group 2.2). It is not known whether this belief applies to all chronic pain patients, or whether there are exceptions. For example, a patient with pain from cancer living at home may have a management plan that includes the use of transdermal fentanyl patches. If the patient experiences an exacerbation of pain at a time when their doctor or specialist is unavailable they may call an ambulance as the ambulance service may be seen to be the only available health resource in the situation. Given the beliefs expressed by focus group participants it is conceivable that the paramedic assessing this patient may be concerned about their ability to manage the pain due to inadequate knowledge of cancer-related pain or the drugs prescribed to treat this problem. In addition, they may be concerned about a risk of addiction associated with the administration of morphine, or the possibility of adverse effects due to a possible synergistic effect with fentanyl. The assessments of risk and benefit may result in a

decision to withhold analgesia. However, the decision must be rational, and the rationality of the clinical decision may be affected by bias and poor knowledge on which to base a decision.

Concerns that chronic pain patients may be at risk of developing an addiction to opioids is reflected in the comment that "... when people have chronic pain or chronic complaint or conditions, people are um, quite wary about giving them strong analgesia because they don't want to set them down a path of drug seeking or addiction or something like that, so they want to get them, their pain controlled in a proper environment, but at the same time, if they have an acute exacerbation or if they have something that is new, people are generally happy to give them pain relief for that" (Group 2.2). This comment also reinforces the belief that the prehospital environment is not the "proper" environment for the management of chronic pain, while indicating a willingness to manage an exacerbation, or acute-on-chronic problem as this is a more familiar scenario to the paramedic.

Although the dominant theme regarding the management of chronic pain was the appropriateness of paramedic management for this condition, which was linked to beliefs about potential for drug abuse and abuse of the ambulance service, at one point a participant provided some insight that the management of chronic pain may be associated with a sense of frustration regarding the inability to help the patient rather than frustrations regarding inappropriate use of services. However, this insight was provided by a participant with limited clinical experience (Group 1.2) who was reflecting on her experiences while attending a clinical placement as part or her coursework: "My last call on placement was a woman who was suffering from some chronic pain – like from her neck down her left side and she'd just recently had an up in her pain medication and she called the ambulance because she was just feeling woozy and weird so we spent half an hour explaining that either you're going to feel weird and have no pain or you'll have pain and be clear-headed. But the issue was precisely that – she was only going to get worse and she said to us that 'the things I do now, because I'm losing physical function, all I have is I read and I do the crossword and if I can't do that because of my pain medication, then what can I do with myself?' And that was something – like we weren't really equipped to deal with that but that was her issue and that was why she'd called, essentially." In this report the complaint appears to be one of loss of independence or concerns about the side

effects of drugs used to treat her pain. Although the paramedics appeared willing to provide advice regarding the adverse drug effects, the comment reflects some insight into the limited ability of paramedics to manage this problem.

Although the extent of discussion regarding the management of chronic pain gives an impression that this is a frequent management challenge, the first stage of this thesis found that most patients who call an ambulance have pain that is of less than six hours duration (69%, 1215/1766). In contrast, only 3.2% of patients with a complaint of pain were reported to have had this symptom for more than one week (57/1766). Of these, just 0.8% (14/1766) were reported to have pain lasting greater than three months. However, this may be underreported and this sample did not include patients with chronic pain who called an ambulance but were not transported, either because they refused transport or the paramedic referred the patient to other care pathways.

A study published in 2001 describes a prevalence of chronic pain in the community of approximately 20%, with females more likely to report chronic pain than males.[15] Although the presence of chronic pain, particularly pain associated with functional disability, is associated with an increased utilisation of primary care services and emergency department presentations and hospital admissions in the Australian community,[16] the utilisation of ambulance services by patients with pain lasting more than one week was very low in this study.

Personal Factors: Fatigue

The influence that personal factors such as fatigue may have on clinical decisions and the quality of care received little mention. However, one paramedic provided the following comment: "Fatigue comes into it as well. Personally I'm lazy by nature. 3 o'clock on a night shift, 5 minutes from hospital, I'm not going to stuff round trying to put a line in and draw up morphine and give it. If I can get them to the hospital within 5 minutes, I'll wait for them to do it in there. I'll get back to bed" (Group 3.1).

However, this practice was condemned by another student in the group: "I'll be honest, but it annoys me a bit because when you say you're 5 minutes from hospital but you're not 5 minutes from pain relief. It's a big question – they might be another hour from pain relief. From the distance to hospital, I couldn't give a continental if I

was sitting on the back door step and I'll even take morphine in with me into the hospital" (Group 3.1).

Interpersonal Differences

Differences in pain management practice between paramedics were recognised by members of one group:

Interviewer: "How well do you think pain is managed in your work setting?"

Paramedic: "Depends on the person."

Paramedic: "Yeah."

Paramedic: "It's very operator dependent ..." (Group 3.2).

Part of the difference was explained by confidence or competence in gaining intravascular access to administer morphine: "... if people are competent putting IV access in they'll just whack a line in, get some morph on board, if they don't like, well not competent, or haven't put many IVs in, oh, they'll be right, we'll just give them some Penthrane or you know, we'll, we'll do it out in the car, so it's very operator dependant" (Group 3.2).

Some differences may be predicted to occur on the basis of clinical experience. However, it was revealed that in some regions of the state several paramedics with a long duration of employment had not been trained to ALS standard, and this limited their choice of analgesic. In these cases failure to upgrade to ALS was based on personal choice, as the employer appears unable to mandate this increased level of training for all staff employed before the decision to increase the base level of ability to ALS level.

The following comment also confirms the observation of inter-personal differences in practice. However, there is little attempt made to analyse the differences in order to explain the observations: "... different practitioners will be more generous with pain relief, and others will be happy to maybe let a patient tolerate some pain, depending on the setting and the context that it's in, but different people tend to do it differently in my experience" (Group 3.3).

Patient Acceptance of Analgesia

Some examples of patient's reluctance to accept analgesia were noted, and one explanation for this is a fear of addiction: "Some of them are scared that you'll give them morphine they're going to get addicted" (Group 3.1).

Examples of strategies used to encourage the patient to accept analgesia were provided: "I usually say 'I feel that you are in pain - I'm going to give you something for it.' And 9 times out of 10 they won't refuse it." One paramedic used his own distress as a lever to encourage acceptance of analgesia: "It's sort of like it'll make me feel better if I can just try to get rid of a little bit of discomfort for you; 'oh yeah, if you need to'. And then, once they realise it's not too bad and they're not seeing pixies they're happy with it" (Group 3.1).

Consequences of Disbelieving the Patient

Judgements about whether to accept or reject clinical evidence, which includes the patient's narrative, may be based on an assessment of risk. Administering analgesia to a patient reporting pain involves an assessment of not only the risk of adverse drug effects, but the possibility that drugs may be administered to an individual who doesn't have pain, but who is fabricating a complaint to obtain drugs to support an addiction.

Outcomes of the paramedic's decision making process in relation to analgesic administration may be represented as a four-way matrix (Table 5-1):

Table 5-1: Analgesic administration decision matrix

	Analgesic administered	
Clinical judgement	**Yes**	**No**
Has pain requiring analgesia	Correct decision	Incorrect decision
No pain	Incorrect decision	Correct decision

This matrix shows that the decision to administer analgesia is highly dependent on the paramedic's assessment of the likelihood of pain of sufficient severity to warrant analgesic intervention. A consequence of an incorrect decision is identified by a

paramedic: "I think when paramedics refuse to acknowledge that someone actually does have severe pain they don't administer pain relief the way they should because they think someone is faking it whereas they might actually have pain" (Group 3.1). This paramedic acknowledged that some paramedics may be reluctant to administer analgesia if they don't believe the patient's report of pain. It is not known whether this phenomenon extends to acceptance or rejection of other symptoms that are difficult to objectively measure, such as dyspnoea, nausea or lethargy.

In an effort to identify examples of cases where an incorrect decision may have been with a failure to accept that the patient's report of pain, the interviewer posed the following question:

Interviewer: "Have you ever had the experience where you have decided that someone's pain isn't genuine and not treated them maybe as fully as you would otherwise do and then decided later or discovered later that in fact they did have authentic pain?"

Paramedic: "Earlier on in the career, and that was being judgemental and prejudicial and a bit harsh and wanting to maybe pretend I was more mature in the job then I really was and was probably being too hard on a couple of patients."

Interviewer: "Can you give me just one example?"

Paramedic: "Umm, bit hard to remember now but I can remember the feeling afterwards. I can't remember what was physically wrong with the patient, we are talking about 7-8, 10 years ago now, but that feeling afterwards in A&E [the hospital emergency department]; I should of treated that pain or should of treated it more vigorously. It was someone who fit the scruffy sort of demographic you'd seen before as a psych patient or whatever, but this time it was real- soft tissue injury, joint pain, fractures, that sort of stuff" (Group 3.1).

Summary

Analysis of the focus group transcripts using Grounded Theory methodology identified four higher order categories: expressing pain, assessing the patient, believing the patient, and caring for the patient with pain. These categories have interconnecting links, so that the expression of pain affected the assessment of pain,

and the assessment was logically connected to management of the patient. One of the major categories related to believing the patients report of pain, which is linked to management.

Assessment of the patient with a complaint of pain relies on the collection and evaluation of data that informs clinical judgements and eventual management decisions. A major theme that emerged from the constant comparative process of data analysis involved believing the patient's narrative. Discussion of this and the other categories forms the basis for the next chapter, as this chapter draws together the concepts and categories developed during the data analysis in order to develop hypotheses to better explain how paramedics arrive at a clinical judgement in cases involving a complaint of pain.

List of References

1. Delbridge A *et al*, Eds. The Macquarie dictionary. 3rd edition. North Ryde, NSW: Macquarie Library, 2001.

2. Merkel SI, Voepel-Lewis T, Shayevitz JR, Malviya S. The FLACC: a behavioral scale for scoring postoperative pain in young children. Pediatr Nurs 1997; 23(3):293-7.

3. Kelly AM, Powell CV, Williams A. Parent visual analogue scale ratings of children's pain do not reliably reflect pain reported by child. Pediatr Emerg Care 2002; 18(3):159-62.

4. Paqueron X, Lumbroso A, Mergoni P *et al*. Is morphine-induced sedation synonymous with analgesia during intravenous morphine titration? Br. J. Anaesth. 2002; 89(5):697-701.

5. Lentschener C, Tostivint P, White PF, Gentili ME, Ozier Y. Opioid-induced sedation in the postanesthesia care unit does not insure adequate pain relief: a case-control study. Anesth Analg 2007; 105(4):1143-7.

6. Macintyre PE, Schug SA. Acute pain management: a practical guide. 3rd edition. Philadelphia: Saunders Elsevier, 2007.

7. Feldt KS. The checklist of nonverbal pain indicators (CNPI). Pain Mgmt Nurs 2000; 1(1):13-21.

8. Abbey J, Piller N, De Bellis A *et al*. The Abbey pain scale: a 1-minute numerical indicator for people with end-stage dementia. Int J Palliat Nurs 2004; 10(1):6-13.

9. Warden V, Hurley AC, Volicer L. Development and psychometric evaluation of the Pain Assessment in Advanced Dementia (PAINAD) scale. J Am Med Dir Assoc 2003; 4(1):9-15.

10. Shega JW, Rudy T, Keefe FJ, Perri LC, Mengin OT, Weiner DK. Validity of pain behaviors in persons with mild to moderate cognitive impairment. J Am Geriatr Soc 2008; 56(9):1631-7.

11. Sullivan M. Exaggerated pain behavior: by what standard? Clin J Pain 2004; 20(6):433-39.

12. Weissman DE. Haddox JD. Opioid pseudoaddiction-an iatrogenic syndrome. Pain 1989; 36(3):363-6.

13. The MIMS annual. Crows Nest, NSW: Intercontinental Medical Statistics (Australasia), 2008.

14. Victorian Ambulance Services. Clinical practice guidelines: CPGD019 Methoxyflurane "Penthrane". Melbourne, Victoria: Victorian Ambulance Services, 2005.

15. Blyth FM, March LM, Brnabic AJM, Jorm LR, Williamson M, Cousins MJ . Chronic pain in Australia: a prevalence study. Pain 2001; 89(2-3):127-34.

16. Blyth FM, March LM, Brnabic AJM, Cousins MJ. Chronic pain and frequent use of health care. Pain 2004; 111(1-2):51-8.

Chapter 6: Discussion

Introduction

Pain is a frequently documented complaint in the paramedic practice setting as evidenced by the data presented in Chapter 3. The humanitarian basis for early and effective relief from pain is well established, as presented in the background chapter (Chapter 1) and the literature review (Chapter 2). Furthermore, unrelieved or poorly managed pain is associated with significant impairment of health, as pain may be associated with significant morbidity that includes the development of chronic pain syndromes.[1] The importance of effective pain management in this study setting is reflected in the use of clinical benchmarks for pain reduction, and the reporting of changes in patient pain scores assessed against performance indicators for pain relief set by Ambulance Victoria, [2] [3] and is reflected in international interest in this area, reflected in the publication presented as Appendices E, F, G and H. Despite the emphasis on pain reduction as an important clinical outcome in this ambulance service, the research presented has identified significant differences in paramedic-initiated analgesia associated with cause of pain, pain location, duration of pain, patient age and gender. In addition, a significant number of patients with pain scores in the severe pain category continued to have moderate to severe pain at the final point of paramedic assessment.

The qualitative research described in previous chapters enabled the identification of potential causes of these disparities in pain management practice. Analysis of the focus group transcripts identified factors relating to pain management practice that were broadly classified as having an organisational or personal basis. The analysis identified individual beliefs and attitudes that have the potential to affect pain management practice. There were significant interpersonal differences in beliefs and attitudes expressed by focus group members. This chapter presents theories that aim to explain variations in pain management practice identified through both the quantitative and qualitative data collected for this thesis.

The research comprising the second qualitative stage of this thesis sought to answer the following questions:

- What are paramedics' and student paramedics' beliefs, attitudes and experiences regarding pain and the assessment and management of patients reporting pain in a community health setting?
- How might these beliefs and attitudes influence paramedics' clinical judgements in cases involving a patient report of pain?

This chapter addresses these questions and proposes a theory of paramedic clinical decision making in cases involving pain. Decision making in situations of uncertainty is the theory that will be elaborated in this chapter. When a patient reports pain, this symptom cannot be easily confirmed by the paramedic and this may establish a situation where treatment decisions must be made without the ability to validate the patient's report of pain.

The concept map presented and described in Chapter 5 was constructed from an analysis of focus group transcripts, which identified four interrelated constructs:

- Expressing pain;
- Assessing the patient;
- Believing the patient; and
- Caring for the patient with pain.

Expression of pain is influenced by interpersonal differences, with no direct correlation between an injury, the resulting pain perception and associated responses. This variability is associated with social, biophysical and psychological factors,[4] which frustrates an observer's ability predict an individual's pain-related responses to injury or disease. The uniquely personal experience of pain was well recognised by Beecher in his study of pain in injured soldiers, who found that the conscious processing of the individual's experience was "more potent than the noxious stimuli in determining the presence or absence of suffering".[5]

Assessment of pain is influenced by the paramedic's beliefs about pain and attitudes regarding the expression of pain and these beliefs may ultimately influence their acceptance of the patient's pain related complaints. Patient observations obtained at the point of assessment inevitably affect patient management decisions. A central

category arising from the transcript analysis involved paramedics' willingness to believe the patient reporting pain, particularly where the patient's behaviour was inconsistent with the paramedic's expectations of pain-related behaviour associated with a particular pain severity score. Evidence supporting this theory may also be seen in notations on patient care records that form the first stage of this thesis. In the table of patients with severe pain (VNRS 8 to 10) included as Appendix E that were not given analgesia, a lack of pain-related behaviours, behaviour that was seen as at odds with the patient's report of pain severity, or suspicion of drug or alcohol use were associated with non-administration of analgesia. For example, a case involving a 32 year old male reporting severe (10/10) abdominal pain (NRS = 10/10) was not given analgesia. The paramedic noted that the patient was "resting comfortably. Easily distracted, very chatty en-route. No signs of pain/ discomfort". There was also a history of heroin use noted on the PCR. The final pain score was recorded as 10/10 (StudyID 0437).

Although a diverse range of attitudes and beliefs associated with the central construct of pain were identified during the focus group analysis, this analysis also found significant links between the emergent themes and the central theme of "believing the patient". Paramedics linked patient motives for reporting pain to beliefs about drug seeking behaviour, particularly when the paramedic noted disparities between the patient's behaviours and their report of pain severity derived from tools such as the NRS. Patients who exhibit pain behaviours that are not consistent with the paramedic's prior beliefs regarding expected standards of behaviour may lead the paramedic to express the attitude that the patient's report of pain is not genuine.

Humans frequently evaluate many aspects of their environment, including other people they interact with. This evaluation has an affective component that results in positive or negative feelings towards an object, concept or individual. The resulting attitudes influence interactions with other people, and while this may determine whether relationships are established or maintained in a social setting, these same attitudes can adversely influence interactions and communication with patients in clinical settings. In situations involving uncertainty about the patient's symptoms, personal beliefs and attitudes may lead to irrational clinical decisions unless paramedics consciously control for this effect during the assessment of the patient.

Beliefs and attitudes are developed through educational experiences, through observations of the individual's social and cultural environment and from interactions with others in society. Attitudes may be learned through the processes of operant or classical conditioning. Operant conditioning is a form of learning where behaviours are formed through reinforcement, so that individuals learn to avoid behaviours that result in negative consequences, and to repeat behaviour that has positive consequences.[6] In the case of a paramedic student, negative comments from their supervision regarding their assessment and treatment of a patient reporting pain may cause the student to avoid repeating the performance in the future if they perceive that the criticism will be repeated or escalated. An associated type of learning that enables attitude development is the observation of the behaviour of others, which influences the development of similar behaviours in the observer. This type of learning is known as modelling, and the beliefs and actions of a person holding a position of power – such as the student's supervisor – can have a strong influence on the student's learning.

Paramedic practice is not a purely technical endeavour guided by treatment scripts, but is highly dependent on the individual's ability to critically analyse clinical data in order to guide appropriate treatment decisions. The process of arriving at a clinical judgement will be influenced by an individual's knowledge, beliefs and attitudes. These attributes are shaped by interactions with peers and by features of the organisation the individual works within. The latter includes formal organisational policies and procedures. However, less tangible influences include organisational norms, expectations and values, and these can have a powerful influence on the individual's behaviour within the organisation. This chapter will discuss the influence that personal and organisational attributes have on clinical decision making in cases involving pain, and will investigate the change in an individual's attitudes and beliefs over time in a clinical environment. Given the influence that individual decision making has on the quality of care, an analysis of paramedic judgements regarding the assessment, measurement, evaluation and management of pain will be grounded on a conceptual model of clinical decision making that is described in the following section.

Paramedic Clinical Reasoning and Clinical Decision Making

Paramedic care of individuals suffering illness or injury in the community involves a process of reasoning that leads to judgements regarding the likely cause of the patient's health problems and the appropriate prehospital management of these problems. Although clinical practice may be informed by treatment protocols or practice guidelines, the clinician must identify the nature of the problem in order to choose the most appropriate management pathway. The decision process encompasses evaluation of risk and benefit in order to identify safe yet effective interventions that are designed to manage health problems prior to definitive care. Clinical judgements follow from a paramedic's assessment, measurement and evaluation of pain, and these judgements result in clinical decisions involving the management of the patient's health problems. This process may involve decisions to administer or withhold analgesia.

Pain is a commonly encountered complaint that may be an isolated symptom or a component of a syndrome associated with pathology representing a serious threat to an individual's health. Acute pain associated with trauma may be predictable and self-limiting, whereas chronic pain that has no identifiable cause may be considered a disease in its own right.[7] The evaluation of a complaint of pain is an important component of the overall patient assessment process, and as this symptom cannot be objectively validated, the assessment depends on the establishment of a conversation with the patient to enable an analysis of the patient's complaints and associated clinical cues. However, imprecise information associated with inaccessible or incomplete health history, and competing priorities, such as operational needs to limit assessment and transport times can pose challenges for paramedics making clinical judgements in this environment. The patient and their medical history may not be known to the paramedic and this unfamiliarity may lead to uncertainties regarding the patient's motives for a report of pain, particularly when a likely cause is not obvious. Other factors may influence the clinical decision making process, and these may be broadly classified as personal, contextual and organisational. Personal influences may include knowledge of pain assessment, the pathophysiology of pain and the action of drugs used to treat pain. Contextual influences include the cues noted during the assessment process. These may include behavioural cues, the history provided by the patient, as well as salient features of the environment in

which the clinical encounter takes place. Finally, organisational factors include policy, procedures and guidelines that inform practice, as well as organisational norms, expectations, and peer influence.

Given the influence that decision making has on all aspects of patient care, and specifically the assessment and management of pain, this chapter describes models of clinical reasoning identified in the health professions literature and examines the basis of cognitive errors that have the potential to influence clinical decisions and patient outcomes.

Although there is extensive evidence of research investigating clinical decision making in medicine, nursing and allied health disciplines, there is limited research describing empirical studies of paramedic decision making. Studies that describe aspects of decision making in the paramedic practice setting have reported outcomes such as the paramedics' ability to confirm death,[8] and to predict the need for hospital admission,[9] and trauma team activation.[10] However, these studies reported decision outcomes rather than the cognitive processes involved in arriving at these decisions. Proposals to include specific learning objectives and strategies for teaching critical thinking skills in paramedic curricula have been reported,[11 12] and one experimental study compared learning outcomes where instructional design aimed to improve paramedic problem solving skills.[13] One study was found to describe decision making and error theory in a paramedic practice context,[14] and one literature review identified theories of clinical judgment and decision-making and critiqued the relevance of these theories in a paramedic practice context.[15] Both of these papers noted a paucity of evidence describing paramedic decision making and reasoning processes.

In the absence of empirical evidence of clinical reasoning styles employed by paramedics in the prehospital setting, evidence arising from allied health disciplines was used to explore possible models of reasoning and decision making in paramedic practice as a means of developing a model of decision making in cases involving pain.

Applications of Clinical Reasoning

Clinical reasoning involves context-dependant thinking that guides clinical decisions, and has been defined as "the sum of the thinking and decision-making processes associated with clinical practice."[16] Core skills involved in effective decision making include the use of appropriate domain-specific knowledge – both propositional knowledge derived from theory and research and non-propositional derived from professional and personal experience – as well as reasoning skills and an ability to reflect on the individual's cognitive processes in order to evaluate the appropriateness of decisions and to identify biases that may adversely affect decisions.

The importance of positioning clinical reasoning skills as a keystone of professional practice is illustrated by Higgs and Jones:[17]

> *"In the absence of sound clinical reasoning, clinical practice becomes a technical operation requiring direction from a decision maker. It is the role of professional health care practitioners to practise in a manner which demonstrates professional autonomy, competence and accountability, to engage in lifelong learning and to contribute to the development of the knowledge base of their discipline. In order to achieve these outcomes health professionals need to be able to reason effectively, to make sound and defensible clinical decisions and to learn through their clinical experience and other avenues in order to continually develop their knowledge as the basis for making effective clinical decisions and useful contributions to the knowledge of the field".*

Clinical decisions span operational, logistical, procedural and diagnostic situations. Operational and logistical examples include decisions regarding safe and effective access to patients located in difficult terrain, the assessment of need for further resources, including rescue and helicopter retrieval options, and choice of hospital based on availability of specialist resources such as trauma services. Procedural decisions encompass the choice of interventions such as spinal immobilisation, airway maintenance devices, fluid administration, or analgesia, which require assessment of the risks and benefits of the implementation of the procedure. Central to the safe and effective care for patients is the ability to form a clinical impression or judgement about the patient's health status in order to guide therapeutic interventions.

The quality of the individual's clinical reasoning skills depends on the ability to consciously monitor and critically reflect on the way that clinical information is gathered, interpreted and acted upon. Although the process of "reflective self-awareness"[16], or metacognition, has been described as an essential component of clinical reasoning in nursing, medicine, and allied health disciplines,[18] there is scant reference to this skill in the paramedic literature.

Metacognition involves higher order critical thinking skills that are a proposed prerequisite for the development of safe and appropriate clinical decisions.[18] In common use the adjective *critical* is associated with finding fault. However, other uses, particularly in education and psychology, symbolise skilful judgement as to the accuracy, merit or truth of questions that confront the individual. Ennis describes critical thinking as "reasonable, reflective thinking that is focused on deciding what to believe or do".[19] The difference between spontaneous actions and behaviours arising from a conscious process of critical thinking is shown by the ability to:

- define a problem;
- select pertinent information for the solution of a problem;
- recognise stated and un-stated assumptions;
- formulate and select relevant and promising hypotheses; and
- draw conclusions validly and to judge the validity of inferences.[20]

Although critical thinking is commonly associated with problem solving its use is much broader, encompassing processes such as personal judgement, generating inferences, making deductions and forming opinions, as well as planning and forecasting. As such, critical thinking is used to enable the safe and effective management of clinical problems as well as other operational problems or needs. In this chapter, the term "clinical reasoning" will be used to explore the decision making processes involved in formulating and implementing clinical decisions, which encapsulates the concept of critical thought.

All health professionals involved in the assessment and care of patients must make judgements about the patient's complaints and the relevance of the cues discovered during the assessment process. In the domain of paramedic practice, these health

problems encompass a continuum that spans minor health problems to life threatening medical emergencies or injuries and complex chronic health problems. Initiation of the clinical reasoning process begins prior to the patient encounter, as the paramedic analyses preliminary information about the case that is transmitted to a mobile data terminal in the ambulance. This information includes the location of the event, nature of the call and age and gender of the patient. Triage of a telephone call for assistance assigns an event category such as back pain or abdominal pain, and this information may be used by the paramedic to begin the formation of a clinical impression. Additional data is obtained once contact is made with the patient and the clinical examination and history taking commences. The clinical approach to identifying and managing health problems involves stages that have been described in other health field: assessment, judgement, planning, implementation, and evaluation, which is proposed to be a cyclical process whereby each stage of the process is evaluated to ensure consistency and congruency of the data, the appropriateness of decisions, and the effectiveness of any interventions.[21]

In this study setting paramedic students are taught that the first stage of the clinical approach involves the collection of data to form an impression of the seriousness of the problem, so that threats to life such as airway obstruction may be immediately managed. Once life threats are managed, data are typically sought from several sources, which include witnesses, friends or relatives and from the environment in which the patient is situated. Data is also obtained from the patient in the form of health history, events leading up to the event, and symptoms that may include a chief complaint. As data is collected it is often subconsciously analysed for relevance and interpreted in light of other findings in order to make a judgement about the nature of the patient's health status.

Objective data in the form of health history, events leading up to the current problem, medications, vital signs, and results of tests such as pulse oximetry and glucometry may add to the clinical picture, and inferences must be made about the significant of other clinical cues such as patient behaviour. When assessing a patient with a complaint of non-traumatic chest pain the paramedic may elicit information about the onset, provoking factors, quality and region of the pain, radiation and severity to form an impression of the nature of the pain and the interventions required to manage this complaint. The data analysis may lead to a judgement that the pain is cardiac in

nature. To test this hypothesis the paramedic may seek additional information regarding the patient's medical history and current medications, and perform a more focussed examination in order to accept or reject the hypothesis. When deciding on therapeutic interventions the risk of ruling out the worst possible scenario (pain of cardiac origin) is considered along with the risk of interventions such as adverse drug effects and the risks of non-action, and these risks are critically appraised to inform the eventual treatment decisions.

Central to the clinical decision making process is the identification of the nature of the patient's complaint or presentation. The process of defining the problem may be termed a judgement or preliminary diagnosis, which in the paramedic practice setting denotes the formulation of a problem statement rather than a medical diagnosis. As such, a paramedic problem statement may be formulated as "acute epigastric pain radiating to the back with upper right quadrant tenderness associated with a history of gallstones". In contrast, a diagnosis arising from a physician assessment may be biliary colic and cholelithiasis. The former describes the alteration in health, whereas the medical diagnosis labels the disease. As paramedics do not label the disease, the diagnosis sits at the level of a syndrome or symptom.

Contingency planning is also an outcome of clinical reasoning. These plans allow adverse effects of interventions to be anticipated and managed effectively and for alternative hypothesis to be selected that seek to explain atypical responses to treatment. As patient safety, or the principle of non-maleficence, is a factor that guides the decision making process, paramedics are expected to undertake a risk-benefit analysis that weights the consequences with providing a particular plan of care against another, which may involve no intervention. In the case of a patient reporting pain, the paramedic must decide how to manage the cause of the pain, if this is possible. This may involve actions to limit tissue injury associated with pain or the use of an analgesic based on an assessment of harm versus benefit. When using an analgesic such as morphine, the risks include adverse effects such as hypotension and respiratory depression, which may be more common when associated with extremes of age or concurrent disease processes such as heart failure or chronic obstructive pulmonary disease. Contingency planning involves pre-empting these risks.

Factors that differentiate the cognitive demands occurring during the patient encounter include the complexity of the task, experience and ability of the individual, and the level of decision making autonomy or delegated responsibility for the task. Decisions associated with a significant level of risk demand a high level of reasoning and problem solving, rather than a rule-based application of treatment protocols. Given the possible consequences of flawed or inadequate thinking and reasoning processes in the prehospital environment, sound clinical reasoning is required to provide safe and effective care for patients.

Cognitive Strategies Involved in Clinical Reasoning

Although no published studies have been identified that describe outcomes of studies of paramedic reasoning and decision making, an examination of studies of these skills in other health domains may be used to inform discussion of decision making in the paramedic practice setting. Clinical problem solving strategies described in the emergency medicine and broader health literature include hypothesis testing, inductive reasoning, pattern recognition, and the use of schematics based on prototypes or "illness scripts" that are based on textbook descriptions of disease or on known features of a particular disease.[22 23] The nursing literature describes similar strategies and also includes intuition as an important and legitimate model of decision making, although this strategy encompasses features that resemble pattern recognition.[24]

The study of reasoning and decision making processes in the health professions has evolved over the last 30 years, with early models of decision making based on studies of inductive reasoning – where experts use the available data to reason inductively towards a conclusion – and hypothesis testing.[25 26] One model, known as the hypothetico-deductive model of decision making, has been described in medical and nursing settings.[27-29] This process involves the generation of one or more hypotheses that follow the detection and interpretation of clinical cues in the early stages of the patient encounter. These hypotheses are then tested or evaluated through a deductive process to confirm or eliminate hypotheses in an attempt to arrive at a diagnosis. Formulation of hypotheses that aim to explain the clinical presentation are believed to commence during the earliest stages of the patient encounter, with deductive validation of the hypotheses likely to occur "long before

the case is in full view".[30] If hypothesis formation is also a feature of paramedic decision making, hypothesis generation is likely to commence from the moment of receipt of case information from the dispatcher, with the hypothesis continuing to develop prior to the patient encounter on the basis of information obtained from scene findings.

A hypothetico-deductive pattern of decision making has been described in a medical education program that uses a problem-based approach to learning, whereas students in a conventional medical program tended to use an inductive or "forward reasoning" approach to problem solving.[31] However, analysis and confirmation of the decision making process is complicated by the validity and reliability of methods used to study this phenomena.[32] Although the hypothetico-deductive process appears to reflect logical scientific reasoning, the success rate of other decision making strategies such as pattern recognition and schemas has shown improved odds of diagnostic success.[33] In 1990 Norman and colleagues established that medical expertise was less dependant on reasoning skills or knowledge of pathophysiological principles as it is by the acquisition of mental representations of prototypical clinical presentations that are referred to as "illness scripts".[34] This form of diagnostic reasoning does not involve hypothesis testing using a hypothetico-deductive approach, but rather the activation of mental schemas based on a recognition of the pattern of clinical cues elicited during the patient encounter, where patterns are compared with a prototype or example of a typical illness based on previous experience. The presentation triggers recall of previously encountered patterns that were associated with a known disease process, such as the typical presentation and clinical findings associated with angina. It is only during difficult or atypical cases that experts may revert to a more structured hypothetico-deductive process of decision making.

Competing theories of clinical decision making has led to ongoing debate about the models that are typically used in clinical settings, although there is emerging consensus that the cognitive processes involved in dealing with clinical decisions or in formulating a diagnosis vary depending on the nature and complexity of the task.[35] In addition, the strategy is likely to depend on knowledge of prior examples of the construct or problem. A view that decision making alternates between intuitive and analytical styles depending on the task, context and complexity of the problem has

been elaborated as dual process theory, also known as System 1 and System 2 models of reasoning.[36 37] System 1 has been described as intuitive decision making, where rapid decisions arise from associating a pattern of cues with prior exemplars developed through experience.[38] This style of thinking represents a mental short cut to a decision or plan of action that reduces cognitive load. With experience, actions become automatic and a more conscious and analytical form of thinking and problem solving (System 2) is only engaged when complex, novel or atypical situations are encountered. System 1 has been described as a "form of universal cognition shared between humans and animals",[39] and this form of innate subconscious thinking is evident in many forms of daily activity.

Clinical reasoning in medicine, particularly among experts, has been shown to involve a System 1 process of pattern recognition that leads to a rapid generation of a hypothesis or definition of the problem in cases with familiar presentations, particularly those involving clear visual cues. This ability to rapidly develop a hypothesis with limited information or conscious engagement in analytical reasoning is believed to arise from an ability to categorise cases based on prior knowledge and experience. Categorisation has been described as an ability to "apply knowledge about a limited set of objects to a potentially infinite class of new, previously unseen, objects"[40] leading Norman and colleagues to claim that this process is "precisely the role of the diagnosis in medical practice".[32] The field of emergency medicine operates in an environment where delays in diagnosis and treatment may adversely affect patient outcomes and where decisions may be made on the basis of limited information about the patient and their medical history. In this setting a "recognition primed" model of decision making has been described,[41] which has many similarities to the System 1 model of pattern matching based on known illness scripts, enabling the rapid development of hypotheses using limited information. When a patient presentation fails to activate an "illness script" due to unusual or atypical clinical findings, a more analytical pathway of clinical decision making is likely to be employed.[41]

Although cognitive processes associated with clinical decision making in paramedic practice have not yet been the subject of empirical study, a System 1 style of reasoning may underpin decisions made by experts in this field who have developed a repository of familiar cues known to be associated with certain signs or complaints.

This is evidenced by observation of differences in the way that novice and expert paramedics solve problems. A simple example is the analysis of a cardiac electrocardiogram (ECG) showing abnormal electrical activity. Given an ECG showing atrial fibrillation, experts may be able to quickly classify the dysrhythmia without the need for extensive analysis. This is largely a function of exposure to many prior examples so that the distinctive pattern of irregular R-R intervals and lack of regular P wave activity is recognised automatically. In contrast, novices with knowledge of cardiac electrophysiology but without access to heuristics needed to quickly classify the dysrhythmia may rely on a more analytical dissection of waveform morphology to form a hypothesis that is confirmed or refuted through repeated searches for relevant cues. The tendency of novices to focus on parts of a problem rather than recognise patterns has been described in medical specialisations that include pathology and radiology.[42]

Problem solving strategies employed by experienced paramedics may involve intuitive judgements (System 1) based on a recognised pattern of clinical cues. For example a call to an elderly patient complaining of shortness of breath in the early hours of the morning may initiate a process of pattern recognition: The information obtained by the call taker – such as the patient's age and cardiac history – begins to elicit a picture of the presentation, as does the location and time of day. A provisional diagnosis of dyspnoea and hypoxia associated with acute pulmonary oedema may be made during the early moments of the patient encounter, and this may be partly based on the patient's appearance as well as audible cues associated with increased respiratory effort and gross oedema in the airways. Evidence of orthopnoea may be suggested by the patient's posture and the finding that they sleep propped up on several pillows. Confirmation of diagnosis, which is required before committing to specific treatment, may occur following auscultation of the patient's chest, observation of associated signs of jugular venous distension and peripheral oedema, and evidence of prior medical history and current medications. However, where the initial assessment clearly fits a pattern of acute cardiogenic pulmonary oedema, this additional information only serves to confirm the initial hypothesis.

This ability to undertake a "doorway diagnosis" has been described by Sandhu and colleagues,[22] and is a function of pattern recognition involving cognitive retrieval of prior exemplars. This apparently automatic classification of the problem is likely to

be a function of both discipline-specific knowledge and extensive experience in assessing other cases involving acute dyspnoea leading to subsequent categorisation of cases involving repeated use of a more analytical and conscious process of decision making (System 2). However, while System 1 thinking and decision making may be fast and efficient – a desirable requisite in time-critical settings – this style of thinking may also be associated with errors such as "premature closure" (or anchoring bias), a form of biased decision making that occurs when a diagnosis is finalised before atypical cues are recognised.[38] Patient safety may be compromised by premature closure that fails to rule out other possible causes of the patient's condition.

The research presented in Chapter 3 identified disparities in pain management practice associated with subgroups of patients. Clinical decision making skills underpin actions that aim to alleviate pain. Rather than using scripts to direct practice, paramedics must undertake often complex decision making to provide appropriate care for patients in the community. Errors in clinical decision making may lead to inadequate or unsafe practice.

Errors in Clinical Decision Making

Whenever a clinical decision is made that involves the implementation of a care plan or the withholding of care the reasoning underpinning the decisions must be logically sound, defensible and appropriate. Ethical principles of beneficence and non maleficence guide clinical decisions through an assessment of the risks and benefits of treatment. However, the clinician's decision making process may be structurally flawed, affected by bias, or based on incomplete, incorrect or inappropriate data leading to flawed clinical judgements.

To illustrate the effect of inductive reasoning based on arguments containing structural flaws a simple syllogism is used. A syllogism is an argument with two premises and a conclusion, and represents a cognitive strategy that may be used when reasoning by deduction. When the structure of the argument is logically correct the premises inevitably lead to the conclusion. If there is agreement with the major premise there must also be agreement with the conclusion. As an example consider the following argument:

People suffering pain are entitled to relief from pain [major premise]. The patient is reporting pain [minor premise]; therefore the patient should be offered relief from the pain [conclusion].

This can be restated as an *"if-then"* statement: If the patient is reporting pain (x), then they should be offered relief from the pain (y), or more simply:

$x \Rightarrow y$
x
$\Rightarrow y$

This form of argument is known as *affirming the antecedent*, with x being the antecedent and y the consequent. Although the structure is coherent, implementing the conclusion may not be straightforward, as the cues used to confirm the premise may be ambiguous or unclear. In addition, a paramedic's beliefs regarding the truth of the major premise or their ability to verify the minor premise may affect their conclusion. If the logical conclusion is accepted the paramedic may engage in a risk-benefit analysis before committing to treat, and the final clinical decision will also be influenced by the patient's acceptance of the decision, or consent. In addition, the paramedic may arrive at a logical and correct conclusion, but their actions may be at odds with their personal beliefs if organisation influences such as peer pressure or fear of sanctions have a greater influence over behaviour.

While the former argument is structurally valid, other arguments may be invalid due to flaws in the structure of the argument, even though at face value the argument may appear logical. The following is an example of an invalid form of argument:

"Alcohol intoxication (x) is associated with vomiting (y). A person collapsed outside a hotel is vomiting (y), therefore the person is vomiting due to alcohol intoxication (x)". This argument can be represented thus:

Alcohol intoxication (x) $\Rightarrow$ vomiting (y)
y
$\Rightarrow x$

Experienced clinicians should recognise the error in this argument. However, some may accept this as a valid conclusion without recognising this as an example of a logical fallacy known as *affirming the consequent*. A further example follows:

"Drug dependence (x) is associated with drug-seeking behaviour (y). A person is seeking a drug (y), therefore the person is addicted to a drug of dependence (x).

Similarly, an argument that denies the antecedent is also logically flawed:

Tissue injury (x) is associated with pain (y). The patient does not have tissue injury (- x), therefore he does not have pain (- y).

Another example follows:

Behavioural cues such as facial grimacing (x) are associated with severe pain (y). The patient does not show any facial grimacing (- x), therefore, she does not have severe pain (- y).

There is evidence that willingness to confirm the conclusion of a syllogism is influenced by prior beliefs.[37] As such a paramedic's individual beliefs may lead to the acceptance of the conclusion even when the structure of the argument renders the conclusion invalid.

Arguments may also be invalid when the premises do not actually support the conclusion. A popular argument dealing with societal values is sometimes reported in the following form: "If we legalise heroin then before long all our children will be heroin addicts". This is known as the *Slippery Slope* fallacy.[43] This could be restated as "if people know that paramedics are giving morphine for pain relief, every patient will demand morphine".

When a paramedic responds to a call involving a health emergency, the experience of the paramedic and the complexity of the task affect the process of determining the nature of the emergency and the intervention strategies that are considered necessary to maintain health during the prehospital phase of care. While pattern recognition may be activated when the paramedic observes clinical cues that are characteristic of a known health problem, an unfamiliar presentation may force the paramedic to revert to a more systematic and analytical form of decision making (System 2). Rational decision making and sound clinical judgements are an expected outcome. However, irrational thinking and poor decisions may be associated errors such as overconfidence.[44] A case involving a patient reporting a sudden onset of abdominal pain may trigger a System 2 approach to assessment and decision making,

particularly where there is no overt cause of the pain or where the patient's presentation - including their behaviour - is inconsistent with prior exemplars of severe abdominal pain. Although there are no standards of pain-related behaviour that can be reliably used to estimate pain severity,[45] where the patient's behaviour does not conform to the paramedic's expectations or beliefs about behaviour normally associated with severe abdominal pain, judgements about the veracity of the patient's complaint may influence decisions to offer analgesia. This may be more likely if the paramedic has developed a model of pain-related behaviour associated with a history of malingering and drug abuse that has similarities with the current case, with evidence from transcript analysis that the patient's age, ethnicity, gender and social situation may influence decision making through the generation of stereotypes associated with these features. Hence, if the patient does not conform to prior exemplars of a "normal" response to acute pain the diagnosis and management may be compromised by premature closure of the diagnosis that results from judgements regarding the patient's motives for reporting pain.

Apart from overconfidence bias, cognitive failures associated with decision making have been associated with failures in perception, and errors in the mental representation or categorisation of the concept, and these have been collectively referred to as "cognitive dispositions to respond" (CDR).[46] In addition, the influence of affect or emotions on decision making has been classified as "affective dispositions to respond".[47] Croskerry has described the ED as a perfect environment for the study of CDR due to the often imperfect information and time limitations that physicians have to work with.[46] In some respects this is also a feature of the paramedic practice environment where decisions are made under organisational requirements to minimise prehospital delay to definitive care, and where health emergencies may require rapid assessment and interventions to stabilise the patient.

Bias may influence decision making by causing a tendency to respond to the patient in a way that is influenced by the paramedic's beliefs and values, and this affect may occur at a subconscious level. As the word bias may have a negative connotation, alternative terminology has been proposed in the form of "cognitive disposition to respond"[48]. A disposition that results in an adverse outcome can be considered a cognitive error, and several types of bias or cognitive disposition to respond have been described in the literature relating to medical decision making.[48] Although

dispositions to respond have not been reported in the paramedic research literature, biases reported in other health settings have relevance in the paramedic practice setting. Several common biases affecting clinical decision making are described as follows:

- Confirmation bias results from the selection of clinical cues that support a favoured hypothesis. For example, if a patient with a report of abdominal pain is believed to be malingering, evidence of behavioural cues such exaggerated pain-related behaviour thought to be associated with deception associated with attempts to obtain opioids to support an addiction may result in early closure of the assessment and decision making process, and ultimately confirmation of an incorrect hypothesis. Data collection in this instance tends to be directed by a desire to confirm, rather than refute, the hypothesis.

- A similar type of bias is also associated with "anchoring", the tendency to attend to specific clinical cues early in the patient encounter and to prematurely form an impression of the problem on the basis of limited data. This is popularly described as "jumping to conclusions". An example is a complaint of sudden onset headache that is considered to be migraine when the patient has a history of this condition. Failure to consider alternative causes of the headache may have devastating consequences if the paramedic decides not to refer the patient to medical care.

- Gender bias and stereotyping can affect clinical decision making when unproved attributes, such as a belief that women are more stoic in the face of severe pain or that certain ethnic groups overstate pain severity, are allowed to influence the assessment and decision making process. Disparities in health care associated with ethnicity are well documented.[49] Attributing pain-related behaviour to the patient's culture or ethnicity is unhelpful as pain responses are not culturally specific, with significant intra-ethnic variations in pain responses reported in the literature.[50] If these biases are not recognised and controlled, these beliefs may lead to inappropriate pain management practice.

- Visceral bias can affect the quality of clinical decision making when positive or negative feelings about the patient distort the clinical picture. A "difficult" patient may cause early closure of the diagnostic process. This may occur when a patient demands analgesia prior to the paramedic reaching a judgement about the

aetiology of the pain, or in situations where the patient appears uncooperative and fails to provide an account of their medical history. Rather than adapt the communication process to establish rapport with the patient, an alternative strategy may be to retreat and modify the management plan to minimise any further interaction until the patient can be discharged from care. Such a strategy may fail to identify possible causes of the patient's behaviour and appropriate care may therefore be withheld or not considered. Errors associated with biased decision making may be mitigated through awareness of the influence that these biases can have on diagnostic accuracy, and through cognisant evaluation of the adequacy of the individual's data gathering, analysis and decision making processes.

When an individual classifies others as belonging to a unique class or group of people that are believed to possess and display specific traits associated with group membership, this form of classification is known as stereotyping. Examples from the focus group discissions include a belief that Italians tend to be very expressive when in pain, but that Asians are stoic in the face of pain and are unlikely to complain about their pain. Stereotypes may be activated when paramedics and other health professionals interact with patients, and as the activation is often beyond the level of conscious awareness the paramedic's assessment of the patient's report of pain may be affected by this bias unless the potential effect of stereotyping on clinical decisions can be consciously monitored. Prejudice is a related term that refers to pre judgement of an individual on the basis of gender, ethnicity, socioeconomic status, occupation or other group membership. The term differs from bias as the individual's beliefs are more overt and resistant to change. Although no evidence of the effect of paramedics' stereotyping or prejudice on patient assessment, clinical decision making or patient treatment has previously existed, these effects have been described in medicine.[51]

Although some stereotyping may occur at a subconscious level, there is evidence that "goal modified" stereotyping may occur in situations requiring the comprehension of a clinical problem but where the problem is complex or ambiguous.[51] In this situation stereotyping based on a perception of the patient's membership of a social group may be used to fill in missing data to enable a diagnosis or clinical judgement. If a stereotype involves a belief that young males from a particular socioeconomic or

demographic group are likely to be drug dependent, judgements regarding their motives in reporting pain and seeking care from a paramedic may influence the assessment process where this information is used to substitute ambiguous clinical findings or missing data such as a lack of obvious source of the pain. Patients who are considered to be demanding or difficult to manage may activate stereotypes, and these could include patients who are considered to be seeking analgesia due to addiction to a drug of dependence. Clinical experience in caring for patients belonging to certain social subgroups may be responsible for the development of stereotypes, and these beliefs may actually support decision making in areas such as the paramedic's assessment of their safety. However, failure to ascertain whether characteristics associate with a stereotype actually apply to an individual may compromise the quality of care.

Assessment of a complaint of pain in the absence of obvious pathology relies almost entirely on the patient's report of their symptoms and medical history. In this setting beliefs about the patient's membership of a specific group may influence the paramedic's perception of the patient. This may affect the paramedic's interpretation of clinical data such as previous medical history or pain score derived from a pain scale, so that data used to form a clinical impression is interpreted through a lens of individual beliefs, which has the potential to distort clinical judgements.

As there is evidence that race and gender affects the management of patients with pain,[52-55] clinical audit processes within ambulance services must monitor for disparities in care that may be associated with gender or ethnicity. The potential for differences in care based on patient stereotypes must be addressed in education for paramedics and should be evaluated by in-field educators and clinical supervisors who have the ability to identify the potential for bias in clinical decisions made by paramedics they work with.

Health emergencies that occur in the community are located along a continuum from mild symptoms and minor alterations in physiology to life threatening injury or pathology that requires urgent interventions to reduce mortality and morbidity. Paramedic decision making in this context will be challenged by the complexity of the problem, which may include multiple injuries and/or multiple patients. However, less overt presentations may also represent diagnostic challenges. For example, while

a 40 year old male patient with sudden onset of severe flank pain radiating to the groin may raise a suspicion of renal colic caused by uroliths, this cannot be readily confirmed in the prehospital setting. In this situation the paramedic needs to be alert for other potentially life threatening pathology such as abdominal aortic aneurism. The ability to do this may be inhibited by an anchoring bias, or the tendency to "lock onto the salient features in the patient's initial presentation too early in the diagnostic process"[46] Confirmation bias may also compromise decision making if the paramedic looks for evidence to support a diagnosis of renal colic rather than evidence associated with other causes of pain. Inadequate knowledge of the disease and its typical presentation further complicate the process. For example, the paramedic who expects haematuria to be a cardinal feature of renal colic due to uroliths may rule out this diagnosis if the patient fails to reveal the presence of this sign, even though there is a poor correlation between the presence of hematuria and degree of urinary tract obstruction.[56]

The influence that emotions and beliefs have on decision making cannot be underestimated in the clinical setting. Prejudice towards minority groups and negative stereotyping – also known as fundamental attribution errors – can influence clinical decisions when the patient's social situation or culture is attributed to their health problem.[57] Ethnicity has been associated with differences in analgesic practice, with non-white patients having reduced odds of receiving analgesia. Patients with a mental health problem or history of drug or alcohol use may be blamed for their illness, and this can adversely affect the assessment and subsequent management if the paramedic does not recognise the bias and control for its effect by forcing a search for clinical cues through an objective and analytical (System 2) approach to decision making.

Errors in judgement are more likely when pattern recognition (System 1) is used to arrive at a clinical decision point as the thinking is predominately automatic and occurs at a subconscious level, restricting awareness of the influence of bias and prejudice on clinical judgements. Pattern recognition reduces cognitive load and enables the performance of concurrent tasks. However, thinking that occurs at a level beyond conscious awareness is more susceptible to error.[58] Judgements based on first impressions may inappropriately attribute specific qualities to the patient, and the emotional state of the paramedic may lead to irrational and incorrect assumptions

unless the paramedic consciously controls for this influence. However, the ability to monitor ones own thinking – also known as metacognition – may be associated with individual differences in intellect, emotional state and "vulnerability to self deception".[58]

A significant number of variables have to potential to adversely influence clinical decisions as evidenced by the taxonomy of affective dispositions to respond developed by Croskerry.[59] These include situational factors such as the work environment as well as endogenous disorders such as clinician mood or anxiety disorders. The former includes time pressures, sleep deprivation and stress caused by extremes of weather or workload, but also includes less tangible variables such as organisations norms and expectations. Although some clinical errors are a result of cognitive failures rather than system errors, the patient's role in the generation of errors also needs to be considered as some are poor historians due to the effect of "errors in comprehension, recall, evaluation and expression."[60]

Reducing Cognitive Error

Despite continuing debate about the optimal educational strategies required to develop clinical reasoning abilities, there is support for educational design that aims to reduce clinical errors arising from flawed diagnostic reasoning and decision making.[61] One strategy used to help individual learn how to monitor their thinking strategies involves the development of self-diagnosis of thinking to enable identification and remediation of thinking errors. Reflection on thinking refers to the conscious assessment of the individual's thinking process; or rather it represents *thinking about thinking*, a skill that has a significant impact on the generation of knowledge, particularly knowledge that arises from practise in the clinical domain. Reflection offers the novice the opportunity to be aware of their thinking processes, to understand the effect that cognition has on clinical judgements, and to accelerate the transition from novice to expert.[62] Although there is a considerable body of literature that describes reflective practice in nursing, there is little extant evidence of this concept in the paramedic literature.

When developing the abilities of reflection and reflective practice the value of these skills must be evident to the individual, particularly in paramedic practice where

technical skills are highly valued by both novices and experts. Students can be taught about reflection, but its value must be manifest and explicit before students are likely to embrace this skill. Titchen and Higgs highlight the importance of reflective practice, and relate the belief that experience alone does not ensure expertise: "Reflection (or conscious review) upon experience is a key element in helping learners to make sense of learning experiences and construct their own realities. Learning experiences in themselves do not guarantee learning. Instead it is reflection, or the processing of experiences and the search for meaning within them, which promotes learning".[63]

Specific strategies to reduce errors in clinical decision making have focussed on the need to develop awareness of ones thinking and the biases that can affect judgement. Croskerry believes that the development of metacognitive skills can help clinicians to develop strategies for minimising or avoiding cognitive error, thus "inoculating" the clinician against error.[64] Prerequisites for effective inoculation are:

- An understanding of error theory, common clinical errors and cognitive de-biasing techniques involving metacognition;
- Development of a "forcing strategy" to prevent common cognitive errors such as anchoring or early diagnostic closure through the use of scenarios or case studies where this error is likely to occur;
- Demonstration of a cognitive forcing strategy that is appropriate to the context in order to avoid error.[64]

Although there is limited evidence of the effectiveness of cognitive de-biasing strategies, the development of strategies that help the clinician to evaluate their thinking in order to consider alternative explanations for the patient's presentation and to check for the potential influence of emotions or bias on decision making has the potential to reduce clinical errors. Given that the inability to objectively validate and quantify pain in others may lead to errors in judgement – including errors in judging the patient's motives for reporting pain that has no obvious pathological basis – cognitive strategies that reduce the risk of error may reduce the risk of inadequate pain management.

Clinical Decision Making in Cases Involving Pain

The first stage of this thesis identified an incidence of pain of 52% among adult patients during the study period, and significant variation in pain management practice was noted among this study population. Variations in practice and in patient outcomes are linked to clinical decisions that depend on domain-specific knowledge and experience of previous clinical cases to support the collection and evaluation of clinical data, and the synthesis of information to guide patient management decisions. In contrast to health care centred within a large institution where decisions can be supported by expert opinion, access to medical records, advanced diagnostic tests and extensive reference sources, paramedic practice may require time-critical decision making in an environment where similar support is unavailable or incomplete. In addition, the inability to reliably validate the presence of pain in the absence of obvious pathology represents "a classic case of decision-making in uncertainty."[65]

Pain in the prehospital setting may represent one symptom in a spectrum of signs and symptoms or may be the sole complaint. In each case the paramedic will need to decide the most appropriate means of managing the pain. In this respect, paramedics have to evaluate the severity and quality of the pain, as this information guides treatment decisions. In contrast with a symptom of shortness of breath – which may be accompanied by evidence of increased respiratory effort and related physiological changes – pain may be associated with subtle cues and significant interpersonal variations in presentation. Vital sign changes are not a reliable predictor of pain severity (see Appendix G), and behavioural responses to pain are influenced by age, culture, context, prior pain experience and coping styles. These variations in pattern of presentation confound attempts to generate schema representing "typical" presentations of pain.

Some cases of pain require little correlation with other findings. Even if a patient's self-report is unavailable due to impairment of communication the presence of pain may be uncontested where obvious injury is present. However, in the absence of an obvious source of pain the paramedic's assessment may be challenged by a lack of clinical findings other than the patient's self-report that can be used to confirm the diagnosis of pain. For the paramedic employing a pattern recognition (System 1)

style of thinking and decision making the diagnosis may be affected by inconsistencies between the patient's presentation and the paramedic's schema, which involves comparison of available data with expectations of patient pain behaviour and vital sign changes. Any of the previously discussed biases or affective dispositions to respond can potentially influence the assessment and diagnosis, which may ultimately affect treatment decisions.

Interpersonal variations in paramedic decision making may be associated with inadequate knowledge of pain physiology and pharmacology of analgesics, which may result in an overestimation of the risks involved in administering analgesics. The clinical environment may also affect judgement, particularly where the paramedic relies on cues from the patient's social situation to form an impression of the problem. In addition, disruption to circadian rhythm and sleep deprivation associated with shift work that is a typical feature of paramedic practice has been shown to impair cognitive performance.[66 67]

Although clinical decisions are expected to result from objective, dispassionate assessment of the available information arising from the patient encounter, first impressions have a powerful and durable effect on our interactions with patients, and this is particularly relevant in a health setting where the patient may be unknown to the clinician. Unless the emotional component of clinical decision making is recognised and mediated through a conscious process of reflection and action to control the effect, it is possible that an individual's attitudes and beliefs may adversely influence patient interaction, diagnosis and treatment decisions.

Judgements made about the "seriousness" of the pain invariably influence management decisions. A male in his 50s with a sudden onset of unprovoked central chest pain radiating to the neck and jaw that is described as "crushing" is likely to trigger a particular schema in experienced paramedics, with the treatment and urgency of decision making and transport decisions directed to reducing myocardial injury and potential for sudden death. In contrast, a young female with a mental health history and severe pain arising from self-inflicted wounds to her forearms may trigger a different judgement. In the former example the "illness script" based on the patient's report of pain leads to an association of a pattern of signs, symptoms and history with a threat to life. In the latter example the patient presents with pain that is

self-inflicted, self limiting, and which has a low probability of immediate threat to life.

Clinical reasoning involves the analysis of data to determine the strength of the evidence and to examine relevance, which in turn affects the validity and reliability of the conclusion of decisions arising from this process. This involves awareness of unreliable or inconsistent data that may arise when the patient is a poor historian or where communication with the patient is affected by language barriers or cognitive impairment. However, a perceived risk of deception may also threaten the reliability of the data, and this may be particularly important where decisions involve the administration of a drug associated with risk of addiction. A patient with pain associated with a diagnosis of cancer may be considered to have a legitimate complaint by virtue of the medical confirmation of the aetiology of the pain. In contrast, a patient with a vague diagnosis of chronic lower back pain may be seen as having a less genuine complaint if the pain is seen as means or obtaining opioids to support an addiction. Cues in the clinical presentation that are inconsistent with the paramedic's expectations may raise concerns about drug seeking behaviour, leading to an early diagnostic closure centred on the belief that the patient is a malingerer, when further analysis may have redirected the decision making towards behaviour resulting from poorly managed pain or exacerbation of known disease, rather than addictive behaviour. This concept is elaborated in the section describing "drug seeking behaviour".

The first stage of this thesis identified significant variations in analgesic interventions associated with type of pain (cardiac versus trauma), duration and location of pain, as well as gender differences. Possible explanations for these differences will be explored in the following sections, and the focus of this discussion will be the effect that organisational and personal factors have on paramedic pain management. While some cases of pain may be considered inevitable but self-limiting, there is a standard of care that should be maintained so that the effect of gender, culture, social situation and patient behaviour does not influence the odds of a patient receiving care.

The Australian and New Zealand College of Anaesthetists has published a statement on patients' rights to pain management that requires that all patients with a complaint of pain be "respected and taken seriously" and that these individuals have a right to

be cared for by "health professionals who have training and experience in assessment and management of pain".[68] Although the statement reads as a consumer right to demand analgesia, the statement adds the caveat that these rights do not extend to the patient's right to analgesia on demand. Furthermore, the statement adds that the professional response to a patient reporting pain will be "reasonable and proportionate to the level and character of the pain experience and that the assessment and management of a patient's pain be appropriate to that patient." This policy statement makes it clear that patients and their families or carers should be active participants in the development of their pain management plans, a concept that is not often considered in the provision of care in an emergency health setting.

Effective management of pain requires organisational support in the form of evidence based practice guidelines and pharmacological interventions appropriate to the type and severity of the pain, which includes strategies to deal with pain that is refractory to a particular class of analgesic. In addition, the patient needs to be involved in the development of pain management plans wherever possible, even if these are short term plans designed to deal with the management of the complaint while in the care of the paramedic. Patient education is an important consideration, as a fear of drug side effects or addiction may inhibit a patient's acceptance of analgesia. Finally, paramedics need specific knowledge of contemporary pain management practice as well as experience in the care of patients experiencing pain in order to provide expected standards of care.

Errors in the structure of the paramedic's internal and often subconscious argument that centres on the cause and effect of the complaint can lead to errors in judgement. Although procedural errors are highly visible and recognisable by those performing the procedure, cognitive errors are less amenable to direct observation and may be less familiar to the decision maker. Lack of awareness of the root causes of flawed clinical decisions inhibits the development of strategies to control for the endogenous variables that influence decisions. Nevertheless, strategies for reducing the risk of cognitive error have been described in the literature, and these appear to have the potential for implementation in the prehospital setting to raise an awareness of the factors that may lead to errors in judgement and to improve the quality of care for patients suffering pain.

Summary

There is limited evidence describing clinical reasoning and decision making processes employed by paramedics. As such, evidence from other disciplines has been described in an attempt to understand the reasoning processes that may be implicated in decisions made by paramedics. It is clear that there is no one model of reasoning underpinning clinical practice, as cognitive processes employed to make clinical decisions are likely to depend on the context, nature and complexity of the problem, and experience of the clinician. Clinical decisions are prone to error, and these errors arise from errors in knowledge, procedure, cognition, or combinations of these. The accuracy of clinical decisions is a function of complexity of task, clinical experience, availability of discipline specific knowledge, and the cognitive processes used to evaluate information in order to reach a conclusion, and awareness of the influence of personal bias and prejudice on the reasoning process. Conclusions may not be sound if they are affected by bias, incorporate incorrect or inappropriate data, or are structurally flawed.

Pain may be considered as either an independent paramedic diagnosis, or a symptom of a more complex clinical presentation. In either case, the influence of unrecognised bias, affect and prejudice can lead to a failure to adequately manage this complaint. The following sections examine the effect that specific paramedic attitudes, beliefs and values have on the assessment and management of patients with pain, as well as the effect that organisational influences have on practice. In particular, the fear of "drug seeking" as an explanation for a report of pain will be explored. This is followed by an analysis of the role of pain scales in supporting clinical decisions, as the focus group study results demonstrated significant misunderstanding of the purpose of pain scales associated with beliefs that the scales used by paramedics are unreliable tools. The final part of this chapter presents the synthesis of a model of paramedic decision making in cases involving pain that is based on the outcomes of this research.

Clinical Judgements Regarding the Individual's Motive for Reporting Pain: The Diagnosis of "Drug Seeking" Behaviour

Drug addiction and an association between this construct and the patient's motives for reporting pain during assessment by paramedics were frequently cited themes arising from the analysis of focus group transcripts, with this concept generating the greatest number of coded references. A belief that some patients may be dishonestly reporting symptoms of pain to improperly gain access to analgesics appears to be a factor influencing paramedics' pain management decisions. Knowledge of the actual prevalence of drug seeking behaviour associated with ambulance attendance may mediate these beliefs. However, reliable evidence is scant. As incorrect assumptions regarding the prevalence of drug-seeking behaviour have the potential to impair the paramedic's judgement and subsequent management decisions it is important to describe the likelihood of encountering this behaviour so that paramedics are able to rationally appraise the odds of encountering this scenario.

Paramedics must be able to undertake appropriate assessment that requires a conscious awareness of the effect of bias and stereotyping on decision making in order to identify cases where analgesia may be reasonably withheld due to concerns regarding the patient's motives. This must be done in the knowledge that it may be difficult to discriminate between cases of behaviour associated with illegitimate attempts to obtain an analgesic and cases involving a genuine complaint of pain, and paramedics must therefore understand the consequences of inappropriately labelling patients as "drug seekers". This section aims to define "drug seeking" behaviour, identify data that describes the prevalence of this problem, and discuss difficulties in diagnosing this problem in the prehospital setting.

Definition

Despite the frequent use of the term "drug seeking" in health settings and in the literature, [69] [70] the definition of the term is inconsistent. One definition chosen to reflect the phenomenon identified in this thesis describes drug seeking as "the presentation of people falsely reporting symptoms in order to obtain a prescription or requesting a drug in order to maintain dependence."[71] Dependence in this context refers to drug addiction, rather than a need to obtain a drug to manage symptoms such as pain. The American Academy of Pain Medicine (AAPM), the American Pain

Society (APS), and the American Society of Addiction Medicine (ASAM) have published a joint consensus definition of addiction: "Addiction is a primary, chronic, neurobiologic disease, with genetic, psychosocial, and environmental factors influencing its development and manifestations. It is characterized by behaviors that include one or more of the following: impaired control over drug use, compulsive use, continued use despite harm, and craving".[72] When the drug being sought is an analgesic it is important to differentiate behaviour associated with a diagnosis of addiction with that associated with poorly controlled pain, as failure to recognise this difference has the potential to compromise the care of individuals with a genuine complaint of pain. Heit believes that patients are often labelled as drug seekers when they ask for analgesia during a medical consultation, whereas the request for pain relief may actually represent a response associated with under treatment of a legitimate pain syndrome.[73] Where a patient seeks analgesia to manage poorly controlled pain the behaviour has been described as "pseudoaddiction".[74] In a situation where pseudo addiction is confused with addiction, poor pain management decisions may result from "... false accusations against pain patients of deceptive drug-seeking behavior when uncontrolled pain, not aberrant drug seeking, drives the behavior".[75]

Drug Addiction in the Community

Drug addiction and the associated misuse of pharmaceuticals has been recognised as a serious health problem.[76] In Australia it is estimated that in 2004, 384,800 persons aged over 13 had used opioids for non-medical purposes – including methadone, heroin and other opioids - in their lifetime.[77] A study that aimed to calculate the prevalence of daily or dependent heroin use in Australia in the year 1997-1998 produced a median estimate of 74,000. This produced a population prevalence of 6.9 per 1000 adults (aged 15-54 years), which is similar to estimates of heroin dependence in Britain and other European communities.[78] To further highlight the extent of the illicit drug use problem, in the year 1999-2000 there were approximately 37,000,000 needles and syringes distributed to injecting drug users in Australia through needle and syringe programs introduced by state governments.[79]

Of those using heroin, methadone or other opioids in the 12 months prior to a national survey, 45% used the drugs weekly or more frequently. When heroin is

unavailable, almost 20% substitute opioid analgesics for heroin. [77] In 2007 the proportion of Australian injecting drug users who reported that morphine was the most recent drug they had self administered increased from 7% in 2002 to 11% in 2007, with intravenous morphine the third most commonly used drug after heroin.[80] A national study of the misuse of pharmaceuticals in Australia found opioids and benzodiazepines to be the most commonly misused prescription drugs,[76] but also highlighted the difficulties in discriminating between reasons for misuse, which include individuals with complex medical problems such as chronic pain.

Data describing the prevalence of drug addiction in the Australian community shows that a significant number of individuals with an addiction are engaging in "doctor shopping" to obtain prescription drugs such as benzodiazepines and opioids.[76 81] In 1997 there were estimated to be 1,270 "doctor shoppers" per 1,000 GPs in Australia. In Victoria the number was estimated to be 1,447 per 1,000. The prescriptions obtained by these individuals for the purpose of misuse included psychotropic drugs such as benzodiazepines, codeine compounds, and narcotic analgesics. Morphine and pethidine were most commonly prescribed to "doctor shoppers", with a significant proportion of these drugs appearing on the streets to supply the illicit drug trade.[81 82]

Evidence of illicit drug use is reflected in ambulance attendance data for cases involving drug overdose. Over the 12 months 2001-2002 the Ambulance Service of NSW responded to 1,730 calls involving non-fatal opioid overdoses, and average of 4.7 cases per day.[83] In the nine months May 2004 to March 2005 the Metropolitan Ambulance Service in Melbourne attended 1,434 cases that were deemed to be heroin related, a daily caseload of 5.2.[84] While data from Metropolitan Ambulance Service relating to drug-related attendances may be interpreted as evidence of a significant number of cases involving heroin,[81] this data describes cases where treatment has been provided by paramedics following drug overdose and as such this is not synonymous with attendances associated with "drug seeking" behaviour.

Evidence of Drug Seeking Behaviour in Health Settings

While there is substantial body of evidence relating to the prevalence of illicit drug use in Australia, evidence of the true extent of drug-seeking behaviour in community-based medical settings is scant. A literature search was undertaken in

order to identify the frequency of ambulance attendances that were associated with a paramedic diagnosis of drug seeking behaviour associated with opioid addiction, but this failed to identify any data. An expanded literature search was undertaken to include other community health settings such as general practice and hospital emergency departments, but this strategy found just one relevant published report of a prospective study of patients presenting to the emergency department (ED) of the Princess Alexandra Hospital in Brisbane. In this study, emergency department doctors were asked to voluntarily identify patients they suspected were seeking addictive drugs for personal abuse or profit according to criteria previously published. Over a three month period in 1999 there were 37 presentations involving 31 patients from 10,958 emergency department attendances that were identified as exhibiting drug-seeking behaviour. This represents an incidence of 0.34% of ED attendances over this period. An analysis of the patients' medical records found reference to requests for a specific drug on previous visits, with narcotics most frequently requested in 81% of cases.[85]

However, just 6/37 (16%) of these cases had a final diagnosis of drug-seeking behaviour, which was made after each of the six patients absconded from the hospital when narcotic analgesia was ceased. This represents a diagnosis of drug-seeking behaviour for personal abuse or profit of 6/10,958 (0.05%). Although each of the 37 presentations had initially been classified as drug seeking behaviour, a later chart review found that 8/31 (26%) of the patients were subsequently found to have a new organic pathology responsible for their pain, which included perforated duodenal ulcer, fractured ankle and migraine.[85] Furthermore, 19 presentations resulted in a discharge diagnosis of drug-seeking behaviour associated with chronic pain syndromes, which may represent behaviour associated with poorly managed pain rather than behaviour due to addiction. It should be noted that methodological limitations are likely to have underreported the actual prevalence of drug seeking behaviour in this setting.

In the state of Victoria legislation requires general practitioners and nurse practitioners to notify the Department of Human Services (DHS) if they believe that a drug dependent patient is seeking a drug of dependence. Where drug dependence is suspected the practitioner must obtain a permit through the DHS before prescribing any opioids.[86] Although the DHS records approximately 3000 notifications per year

– representing 3000 individuals – the prevalence is believed to be higher due to underreporting. (Personal communication, Chris Boag Manager, Pharmacotherapy Development, Drugs Policy and Services, Department of Human Services). Paramedic practice is not within the scope of this legislation, and as such there are no formal reporting processes for paramedics who have concerns about patients who are believed to be drug dependant.

Evidence of Drug Seeking Behaviour in the Study Setting

Beliefs about the prevalence of drug seeking behaviour linked to addiction may influence paramedics' clinical judgements and treatment decisions. A belief that the base rate of "drug seeking" cases is higher than the actual rate may induce a tendency to suspect more frequent encounters. This may lead to high levels of vigilance for drug seeking behaviour but may also introduce bias that affects the clinical decision making process. In order to identify the incidence of cases flagged by paramedics as "drug-seeking" behaviour in this study setting the dataset of 1766 cases involving pain described in the first stage of this thesis was reviewed to identify notations made by paramedics that describe this behaviour. This was enabled through the transcription of paramedic notes on the patient care record that identified a belief that the patient was inappropriately seeking analgesia. This information was recorded in the comments section of the study database used to record the patient data, which enabled searching for key words or phrases associated with the terms drug seeking, illicit drug use or addiction. There were three cases (0.17%) that involved notations indicating a paramedic judgement of drug seeking behaviour. These cases are described as follows:

- The first case involved a 32 year old male reporting a 2 day history of melena and 10/10 abdominal pain. No analgesia was given. The paramedic documented "Pt known to crew, transported for chest pain last week." In addition the paramedic recorded that "Pt admits to heroin use … Pt states 10/10 abdo discomfort but is resting comfortable. Easily distracted, very chatty en-route. No signs of pain/discomfort." The final assessment was recorded as "? abdo pain, ? seeking analgesia" (StudyID 0437).

- The second case involved a 25 year old female reporting 8/10 abdominal pain associated with nausea and vomiting. The patient reported abdominal tenderness to palpation but the patient was noted to have "nil grimace" associated with the palpation. Analgesia was not provided, with the paramedic noting "Known analgesia seeker … analgesia not offered because of serial abuse" (StudyID 0481).

- The third case involved a 30 year old male reporting 8/10 abdominal pain. The patient's medical history was noted to include anxiety, stress and "? psych history". In addition, the patient was noted to be a "frequent flyer." Analgesia was not provided and the paramedic reported "? Penthrane seeker, asked for it on numerous occasions by name" (StudyID 0486).

While these results suggest a low incidence (3/1766) of reported drug seeking behaviour, the data must be interpreted cautiously, as individuals who call an ambulance with a report of pain but who refuse transport after being denied analgesics were not included in this study, as the study only included patients transported to hospital where a report of pain was noted. It is possible that some patients reported symptoms other than pain in an attempt to illicitly obtain drugs such as benzodiazepines, and as these cases did not involve pain they were excluded from the dataset. In addition, paramedics may have been unwilling to record a judgement of "drug seeking" or may have failed to recognise behaviour that was later found to be associated with an addiction following assessment of the patient in the emergency department. Nevertheless, the frequency of documented concerns regarding drug seeking behaviour associated with a report of pain are at odds with the frequency of references to this construct identified in the focus group transcripts. This mismatch between the perceived importance of the problem – as indicated by the frequency of coding – and the recorded incidence is vexing. If the consequences of making a wrong decision (to give analgesia where it was later proved to be unwarranted) resulted in a catastrophic outcome, the level of awareness would be understandable. However, while it is generally acknowledged that administering an analgesic to an individual who is feigning illness to gain access to a drug to support an addiction may not be a clinically appropriate strategy, if this is done in good faith due to the clinician's inability to rule out the presence of pain, this outcome could hardly be viewed as a risk to the safety of the patient or a threat to the clinician. Therefore, if

the clinical consequence of a wrong decision is minimal in terms of patient safety, there is a need to identify other factors that cause paramedics to develop a heightened vigilance for drug seeking behaviour and an associated belief that screening for the potential for drug seeking behaviour is a clinical priority.

A Theory Supporting Judgements of "Drug Seeking Behaviour"

Analysis of the focus group transcripts has enabled the development of a theory that is grounded in the data: that some paramedics fear being tricked by individuals who falsely report symptoms in order to deceive the paramedic into administering an analgesic, and that this fear is the primary basis for a heightened suspicion of this behaviour. This belief is evident in comments regarding the impact that this deceit has on one's professional reputation. In addition, there is evidence that paramedics fear other consequences that include peer criticism of their decision making competence. This criticism may also arise from other health professionals when a paramedic transfers care of the patient to Emergency Department staff who know that patient's history. These powerful influences on the individual's sense of professional competence are likely to result in a heightened awareness of the risk of acceding to patient requests for analgesia. In this situation the risk is not directly related to patient safety, but is instead perceived to be a threat to the integrity of the paramedic's professional persona or a risk of criticism of their decisions. While this may be a legitimate human response to a situation where care is provided in good faith but where the patient's report is believed but is later proved (or assumed) to be false, when paramedics are unable or unwilling to reflect on the influence that this belief may have on the assessment of all patients reporting pain the belief may compromise the care of patients whose report of pain is disbelieved, but who have a genuine complaint of pain.

Although the inherent difficulties of identifying and managing patients who are suspected of drug seeking behaviour was frequently cited by focus group participants, there were notable interpersonal differences in paramedics' willingness to accept this phenomenon as a major problem. This may be partly explained by the frequency of exposure to cases where drug seeking is suspected, which may be a function of workload or the area where paramedic works. When asked to comment on how frequently paramedics encounter this clinical situation, some reported no

experience while others with a similar length of employment reported some experience but admitted that "It's one out of every couple of hundred [patients] … It's not a common event" (Group 2.1). Although the focus group analysis provided clear evidence that some paramedics fear a loss of face if they fail to identify a patient's deceptive behaviour, other paramedics appear to have reconciled the possibility that they may provide treatment to a patient who is later found to have sought analgesics to support an addiction. When a decision to provide analgesia is made in good faith after assessment of all available evidence, some paramedics expressed a view that their professional integrity was not damaged as their decisions and resulting care had been reasonable in the circumstances. In addition some recognised the risks incorrectly labelling the patient as a drug seeker: "… the cost of that is that you don't give pain relief to someone who actually really needed it, then that's an unacceptable cost" (Group 3.3).

The genesis of beliefs that drug seeking behaviour among patients reporting pain is a considerable problem that warrants further investigation. It is possible that these beliefs may have resulted from direct clinical experience, have been inculcated by clinical educators or peers, or have formed following exposure to education that addresses the management of pain. Training notes provided for ambulance officers in Queensland highlight the need for vigilance for drug-seeking behaviour in patients reporting pain,[87] and in Victoria the ambulance service drug data sheets for morphine lists "addiction" as a precaution,[88] with paramedic training notes stating that morphine may "accentuate an addiction problem".[89] Paramedics are also reminded that opioids are a drug of addiction on a daily basis as they sign 'Schedule 8' drugs out of a drug safe within the ambulance station. In Victoria this action is mandated by Acts and Regulations controlling the storage of drugs of addiction, which include opioids used for pain management in the prehospital setting.[90] The legislative restrictions to access may contribute to a belief that paramedics have a role as gatekeepers of the analgesics, resulting in an expectation that patients have to "prove to me you're in pain" (Group 2.1) to facilitate access to these drugs.

Beliefs associated with the assessment and management of pain may develop during formal paramedic training in an institutional setting and through workplace instruction, where these beliefs may be established when a novice works with a Clinical Instructor who has strong opinions regarding this phenomenon. This view is

elaborated by a focus group participant: "I think your clinical instructor has a large – or your senior figures in ambulance – have a large bearing on how you treat every patient, not just pain" (Group 3.3).

The majority of Group 2 and 3 participants undertook the same paramedic training course. Course lectures are often delivered by experienced paramedics employed as educators on a sessional basis, and it is possible that the lecturer's belief systems influenced the development of beliefs now held by some of the focus group participants. This hypothesis is supported by one focus group participant and is elaborated in the analysis section (Chapter 5).

One indicator that clinical experience may influence the development of these beliefs may be found when contrasting the beliefs of focus group participants with limited clinical experience with those of currently employed paramedics. The analysis showed that Group 1 participants were less likely to label a patient as a drug seeker, and were more likely to believe the patient's report of their symptoms.

Clinical Reasoning and the Development of a "Diagnosis"

While paramedics will at times encounter individuals who are reporting pain to obtain drugs to support an addiction, overestimation of the extent of drug-seeking behaviour may prejudice the quality of the care of patients reporting pain if clinicians develop unwarranted suspicions regarding the patient's motives in seeking analgesics. When dealing with patients whose demeanour or physical presentation generate negative feelings towards the patient – perhaps because of a suspicion of drug abuse – these feelings may lead to an erroneous judgements regarding the patient's motives, and this error affecting clinical decision making has been described as a form of visceral bias.[47]

During clinical encounters involving a report of pain the paramedic must rely on the information the patient provides regarding their medical history and current problems. This entails the development of a dialogue with the patient that is based on an expectation that the patient will provide true information in order to guide the paramedic's assessment and subsequent diagnostic and intervention decisions. The use of pain severity tools such as the VNRS is designed to enable a dialogue with the patients regarding their pain experience. Paramedics must also be truthful when

providing information to patients and this includes the basis for decisions to provide or withhold treatment. This obligation to be truthful is encapsulated in the ethical principal of veracity and this expectation is bi-directional, as the patient must presume that the paramedic will believe their report in order to make a clinical judgement free of bias in order to provide appropriate and effective care. This clinical relationship may be compromised when either party decides to withdraw their confidence or trust in the other. This is particularly relevant in a case involving a report of pain where no obvious injury or pathology is noted, such as the patient who presents with a sudden onset severe flank pain. In the prehospital setting the paramedic diagnosis is limited by clinical expertise and knowledge, lack of diagnostic tools and limited or non-existent medical history. As such paramedics may use other evidence such as vital signs and behaviours to validate the patient's report of pain. While behaviour may be an important cue in patients with communication difficulties, there are substantial interpersonal variations in pain related behaviours that have been elaborated elsewhere in this thesis. In addition, vital sign changes have been found to be an unreliable surrogate for a patient report of pain severity (presented as a publication in Appendix G). Without any ability to objectively validate the presence or severity of pain, the paramedic may question the veracity of the patient's complaint, particularly when the pattern of clinical cues does not match the paramedic's expected findings. However, where the paramedic decides to withhold analgesia due to concerns about the veracity of the patients report, this principle of veracity requires the paramedic to honestly inform the patient of the grounds for withholding treatment.

Identifying Individuals who are Suspected of Drug Seeking Behaviour

Although there have been calls for education programs for health professionals to enable screening for aberrant drug seeking behaviours,[76] and guidelines have been developed to assist drug prescribers[71] and general practitioners[91] in identifying drug seeking behaviour, the reliability of these guidelines is limited by the difficulties in ruling out a genuine complaint of pain. As true drug-seeking behaviour is difficult to confirm "the default assumption for any patient should be that he or she is not fraudulently seeking drugs".[92]

Where actors have been used in studies to determine whether doctors can recognise a case of deception the evidence suggests that doctors perform poorly at detecting false reports of pain.[93] These limitations may also exist in the prehospital setting where paramedics may lack the resources, skills and prior information about the patient needed to screen for deceptive behaviour. While lists of individuals suspected of drug seeking behaviour are compiled by some emergency departments in order to raise an awareness of the potential for repeat visits on the pretence of obtaining analgesia for pain,[94] similar data is not typically available to paramedics across Victoria, although this information may be held at a local level by staff who compile a similar file in the ambulance branch station "communication book" that serves to warn paramedics about individuals known to be a problem in the area served by the branch. When paramedics are dispatched to a case the dispatch database is able to warn about locations that may be of interest to attending crews for various reasons, including significant medical history (examples include disability, multiple daily seizures, haemophilia), scene safety issues or inappropriate ambulance users. However, this information is linked to street addresses, and as such this may not identify persons of interest calling from other locations. In addition, patients do not need to provide any form of identification such as a driving licence or health care card to qualify for treatment by a paramedic and as such strategies to identify individuals with a history of drug abuse are more limited in this setting.

It is recognised that behaviour that is labelled "drug seeking" could represent either legitimate or illegitimate attempts to obtain a medication. When assessing an individual with a complaint of pain the paramedic must balance their obligation to help the patient (beneficence) with the need to avoid harm (non-maleficence). Where every effort has been made to rule out the possibility that the patient is seeking analgesia to support a drug addiction and that their report of pain is fallacious, it is generally agreed that "it is morally superior to administer an analgesic agent to a person who does not actually need it rather than withhold or unreasonably delay treatment from a person who is suffering".[94] Paramedics must also understand that individuals who have taken opioids over a prolonged period may exhibit opioid-induced hyperalgesia which may result in lowered thresholds for pain perception, and increased sensitivity to pain.[95] [96] If this hyperalgesia is associated with pain-related behaviour that appears to be inconsistent with the degree of injury or other

clinical findings the paramedic may incorrectly assume that the behaviour is exaggerated in an attempt to deceive, particularly if the patient reveals a history of long term opioid use.

The difficulty in correctly diagnosing behaviour associated with illegitimate attempts to obtain drugs such as opioids needs to be recognised by paramedics who must attend to the potential for bias affecting the formulation of a clinical judgement. Reducing the influence of bias requires an understanding that there are wide interpersonal variations in response to pain, and that this constrains the ability to develop prototype presentations or "illness scripts"[97] that may be used to validate a report of pain. While some injuries may activate a system of reasoning based on pattern recognition (a System 1 response), the variation of presentations limit the development of patterns representing a "normal" presentation where pain is a chief symptom. For example, a survey of nurses revealed that drug seeking behaviour is believed to be associated with inconsistencies between the patient's report of pain severity and their observed behaviour.[69] For example, a patient who reports 10/10 pain may be judged to have less pain than this based on an absence of expected pain related behaviours.

It is acknowledged that System 1 reasoning is often intuitive, subconscious and fast, but these features also makes it prone to error.[58] Where an "atypical" presentation of pain activates a System 1 decision making pathway there is potential for irrational judgements, particularly where affective influences such as the effect of the patient's social setting or their demeanour inappropriately influence clinical judgements. In these situations the paramedic needs to control for these affective influences and consciously force a more analytical approach to their assessment and reasoning in order to avoid cognitive errors that may lead to inappropriate clinical decisions. In order to do this paramedics must understand the influences on decision making, particularly when confronted with atypical presentations that are a normal feature of patients reporting pain as a cardinal symptom.

Summary

Drug addiction is a considerable health problem in Australia and in many other countries. It is known that some individuals may falsely report symptoms to gain

access to pharmaceuticals for illegitimate purposes. However, it is difficult to discriminate between a patient's report that aims to obtain drugs to support an addiction, and symptoms that are associated with a legitimate complaint of pain. Where the paramedic is unable to identify obvious injury or pathology normally associated with pain, a suspicion of drug seeking may be generated, particularly where the patient's presentation does not match a pattern of "normal" behaviour associated with pain. The effect on paramedic clinical judgements may be at the subconscious level if a System 1 process of clinical reasoning is active, where biases and assumptions may influence the assessment and decision making process. One possible outcome is a decision to withhold analgesia where the patient has a legitimate complaint of pain. Paramedics need to be aware of the potential for patients to falsely report symptoms in an attempt to obtain analgesia to support an addiction, but must accept that recognition of these cases in the prehospital setting is difficult. Awareness of the potential to inappropriately label patients as "drug seekers" may require a conscious awareness of the potential for biased decision making, and the activation of a more analytical (System 2) approach to decision making in cases involving ill-defined features. However, this awareness of the individual's decision making may not prevent behaviour that is inconsistent with personal beliefs, particularly where organisational influences have a greater influence on behaviour. The effect of organisational influences on decision making and behaviour will be described in the following sections.

The principles of beneficence and non maleficence should guide clinical decisions rather than the need to avoid embarrassment perceived to be associated with failure to recognise a deceptive patient. An ethical imperative is that pain is relieved where it is safe to do so, even if this occasionally results in medications provided in good faith to individuals who have a substance abuse problem.

Pain scales used to gather data about the patient's pain experience as these tools enable the level of unpleasantness of the pain experience to be quantified. However, if the resulting data is not believed to be reliable, paramedics may discard or discount the data if this appears to be inconsistent with other pain-related cues. As the focus group analysis revealed significant attitudes relating to the validity and reliability of pain scales, the next section explores the use of these tools in the development of clinical judgements regarding a patient's report of pain.

The Role of Pain Scales in Believing the Patient

Analysis of focus group transcripts revealed that some paramedics believe that commonly used pain severity scales are unreliable. The use of pain scales was the third most frequently coded concept arising from the focus group transcripts. Distrust of pain scales or poor understanding of the function of the tools used to measure pain severity appear to influence paramedics' willingness to believe the patient's report of pain. Believing the patient was a central theme in this study, and while a tendency to disbelieve if multifactorial, the validity and reliability of tools used to rate pain severity is a central variable as the tool acts as a conduit for the patient to communicate an important characteristic of their pain experience to the paramedic.

Why is Pain Measurement Important?

The rationale for incorporating a pain measurement tool as a routine component of the patient assessment process is to identify the presence of pain and to open a dialogue with the patient that enables the individual to quantify their pain experience, which is a necessary prerequisite to decisions regarding the likely cause and management of the pain.[98] There is evidence that regular assessment of pain leads to improvements in the recognition and management of pain,[99] and in an ED setting, the introduction of mandatory assessment of pain severity has led to increased frequency of analgesic administration and reductions in delays to analgesia.[100] [101] In some settings the use of scales has been mandated by health agencies as a means of auditing clinical practice to confirm the achievement of prescribed standards of care.[98] However, the implementation of standards of care that include formal measurement of pain severity have produced limited changes in pain management practice in some other health settings.[102] [103]

In this study, paramedics believed that the measurement of pain helped to identify the presence of pain and enabled the evaluation of treatment through the documentation of trends in pain severity scores, but several participants also believed that the VNRS provided data that could be highly inaccurate. Although the first stage of this thesis revealed a high frequency of pain scoring or attempts to describe pain severity noted on patient care records, the focus group transcript analysis revealed

significant inter-personal variations in paramedics' willingness to accept pain scores as an accurate reflection of the patient's pain experience.

Measuring the Dimension of Pain Severity

The 17th century French philosopher René Descartes described a "pain pathway" based on a purely mechanistic construct of pain perception.[104] Descartes proposed that a pain stimulus travelled along a pathway to ring a warning bell in the brain. If this is true, it would be easy to measure the strength of the pain signal, in a similar way that the noise made by a bell clapper striking the bell can be measured in decibels. In reality, the multidimensional qualities of pain and the range of variables that affect its expression make the assessment, measurement and evaluation of pain a more complex task than it may otherwise appear. This is well illustrated by Beecher, who noted that "It seems paradoxical to speak …of measuring something which cannot be satisfactorily defined, and if this were true it would be paradox or nonsense or both".[5]

Assessment of a patient's complaint or condition requires the collection of relevant data to guide clinical decisions regarding the management of health problems. Like other health professionals, paramedics may use data from several sources to inform their clinical judgements. Some of this data will be subjective, in the form of information related by patients, relatives or bystanders. Paramedics also seek objective evidence to form a clinical impression. This evidence includes data from scales designed to measure blood pressure, temperature, blood sugar level and blood oxygen saturation to name a few. This data obtained from these ratio or interval scales are usually valid, reliable and repeatable, with good levels of inter-rater reliability. However, symptoms are temporal perceptions that are accessible to the individual but which cannot be externally validated by scientific means. The sensation of pain is an example of a symptom that cannot be confirmed by tests for specific biochemical markers or by other objective means. While actual injury or pain-related behaviour may be used to estimate the degree of pain a patient may be suffering, pathologies associated with pain are not always evident, and overt behavioural cues may be poorly correlated with pain severity. As such, the patient's self-report is considered the gold standard for establishing presence of pain and pain severity.[105 106]

Although self-report has been acknowledged as the most appropriate means of evaluating a patient's pain experience, this relies on higher level cognitive and communication skills that may be lacking in young children and those with cognitive impairment or language difficulties. Even in the absence of these factors, patients may have difficulty in reducing a complex personal phenomenon to a simple metric. Furthermore, the report of pain is influenced by the reporting context, assessment methods used, reasons for eliciting information about pain, and the individual's perception of the consequences of reporting or not reporting pain. For example, a patient with agonising pain who is asked for a numerical rating of severity may discount the reported number if they believe that the clinician may be more willing to accept a lower rating than they might otherwise provide.[107] A tendency of patients to avoid the maximum endpoint of the scale has been identified in another study that found one-third of patients would not use the upper end-point of the VNRS to report their pain severity due to concerns that use of the scale's upper limit may be perceived as exaggeration.[108]

The early and effective management of pain is considered an important component of patient care, and as such some means of gathering data about the patient's experience is needed to guide management decisions and to evaluate the effectiveness of therapeutic interventions. After obtaining information about the report of pain, which includes the measurement of pain severity, paramedics evaluate the data and this leads to the formation of a clinical judgement. Errors can occur at several stages of this process: the patient may fail to understand instructions regarding the use of the tool used to measure pain severity, and the paramedic may disregard or discount the reported outcome if they believe that the tool lacks validity or reliability, or that the patients is fabricating the report.

Although the quantification of pain severity may be assumed to be a simple process of assigning a number to the pain experienced, the complexity of pain perception can make this a difficult process, as the outcome represents indirect measurement of an individual's experience rather than an observable biological parameter. By its nature paramedic practice tends to be influenced by a biomedical model of disease that focuses on the pathophysiological basis of injury and illness. This predominately scientific model of enquiry values objective quantitative measures, which may result in these measures being assigned more weight than qualitative information related by

the patient. In the absence of tangible objective data confirming the presence and severity of pain, paramedics may seek other clinical cues to validate or give weight to the patient's self-report. An expression of pain severity that conflicts with or contradicts the paramedic's own observations may produce ambivalence; a conflict of beliefs where the paramedic outwardly accepts the patient's self-report while at the same time doubting its veracity.

A Theoretical Basis for a Tendency to Distrust Pain Scales

The themes and categories generated through analysis of the focus group transcripts enabled an examination of the interrelationships between the assessment of pain and resulting paramedic judgements about the veracity of the patient's report. This analysis revealed that cognitive dissonance may arise when paramedics perceive a mismatch between the patient's reported pain score and other clinical cues that are believed to be related to a report of pain, particularly when severe pain is reported. Conflict may arise from differences in the way that patients express pain, which are partly due to the environment in which the painful stimulus occurs, cultural norms, age, gender, past pain experience, coping styles, duration of the pain and the cause of the nociception. These factors can produce considerable inter-patient variability in pain-related behaviours, so that two adult patients with identical numerical reports of pain severity may present with markedly different emotional and behavioural responses to their pain. In addition, patients with identical injuries – such as an isolated extremity fracture – may report widely different pain severity scores. As evidence indicates that individuals are able to use pain scales consistently to report pain of varying aetiologies, interpersonal variations in reporting pain severity for similar injuries or pathologies is believed to be due to individual differences in peripheral nociception, central pain regulating mechanisms, and cognitive processes involved in pain perception.[109]

Paramedics who misunderstand the intent of pain scoring and who fail to acknowledge interpersonal differences in response to pain may disbelieve a patient's report of pain severity if the score provided conflicts with their pain-related observations, particularly when a paramedic observes what they believe to be an atypical pattern of cues associated with pain. While atypical clinical findings associated with a report of pain may trigger a more analytical (System 2) approach to

assessment and clinical decision making in order to arrive at a clinical decision, personal beliefs and bias may constrain the analysis leading to early closure of the diagnostic process and a conclusion that the patient cannot be believed. Misunderstandings about the purpose of pain scales, their intended use, and the nature of the data that results from the use of these tools may contribute to the development of beliefs that increase the risk that the pain severity score will be rejected during "atypical" presentations. For example, doubts about the veracity of the self-report may occur where the reported pain severity score exceeds the scale's ceiling, for example when a patient rates their pain as 12 out of 10 as a means of illustrating the severity of the pain. Analysis of the focus group transcripts revealed several misconceptions relating to the use of pain scales, and these were described in Chapter 5. One belief that is central to distrust of the scales involved an expectation that a point on the scale can be compared with a standardised prototype, in the same way that the reference point for the unit of mass (kilogram) can be compared with a prototype held at the International Bureau of Weights and Measures in Paris.

The confusion arising from inter-patient variations in behaviour associated with a specific numerical score of pain may be avoided by ensuring that paramedics develop a better understanding of the properties of measurement scales and the rationale for measuring pain severity. Although paramedics may believe that patients need to refer to a previous pain experience as a benchmark to compare their current pain, there is no normative data to benchmark against a patient's current report of pain severity. Assigning a score to a symptom of pain is a means of enabling expression of the patient's level of distress to guide treatment decisions and to document trends in the patient's pain experience. The same method may be applied to the measurement of symptoms that include nausea, depression or breathlessness.[110] Inter-patient comparisons do not add to the care process, and may be counter productive if the patient's behaviour and self-report of pain severity conflicts with the paramedic's beliefs regarding a "normal" presentation. Whether paramedics would believe the VNRS to be unreliable when used to measure the severity of non-pain symptoms such as breathlessness or nausea is unknown, as this is not common practice. However, one significant difference between measuring symptoms such as nausea or pain lies in the fact that therapy designed to relieve pain may require the use of a class of pharmaceutical that is known to be a drug of

addiction. This knowledge has the potential generate questions about the patient's motives in reporting pain. Whether paramedics would be more likely to believe the patient's report of severity if asked to score non-pain symptoms needs to be tested.

While normative data exists for a range of physiological parameters – for example body temperature – there is no normative data available to diagnose pain. Misconceptions about the properties of data obtained from a patient self-report of pain quality and severity may lead to questions about the validity of this data. Doubts about the validity of the data may also occur if the paramedic assumes that a pain score is a universally consistent construct where the patient's score is compared against a known standard. Evidence of this flaw in understanding the intent of a pain severity scale is evident in the following comment from a paramedic focus group participant: "in theory, someone couldn't have ten out of ten pain …because they've never experienced that" (Group 2.2). The paramedic appears to be trying to apply a scientific rationalist approach to measuring a subjective and highly personal experience. Issues of distrust in pain scales have also been reported in the medical and nursing literature, [111] [112] [113] due partly to inconsistencies between the patient's behaviour and the clinician's expectations regarding normal pain behaviour.

Using Pain Severity Scores to Assess the Efficacy of Analgesia

In order to evaluate and report the efficacy of pain management interventions paramedics must trust that the tools they use to measure pain will produce reliable and valid data. Organisations that measure relief of pain as an indicator of the quality of health care must have confidence that clinical staff will report pain data truthfully so that the data accurately captures patient outcomes rather than organisational expectations.

Scores derived from tools such as the VNRS provide information on the change in severity score following therapeutic interventions designed to alleviate pain. While the minimum clinically significant change in score using a VNRS or VAS has been well researched,[114-117] the achievement of a predetermined benchmark reduction of pain severity score is not necessarily synonymous with pain relief. In addition, a focus on pain management that is driven by key performance indicators in the form of organisational benchmarks for pain reduction based on mean change in score may

inhibit communication between patient and carer if the raw pain score or difference between baseline pain and final pain score is used as a blunt tool to document the patient's pain experience. In a description of her personal experience as a patient with pain, Cynthia Chauhan – a member of a patient advocacy committee for cancer patients – describes how the use of the 0 to 10 scale as a sole measure of her own pain experience "undercut compassionate communication" and limited meaningful dialogue about her pain, including more subtle aspects of what the experience of pain meant to her.[118] Furthermore, Chauhan believed that the focus on numbers limited her ability to participate in a shared discussion about what the numbers mean to her, and this was believed to have limited her ability to participate in shared decision making regarding treatment options. In this example the VNRS acted as "inadequate frustrating block instead of a tool".[118]

In order to understand the patient's change in health status a process of communication is required to engage in a dialogue with the patient thereby enabling the individual to describe their feelings without limiting this to a simple number. Evaluation of the efficacy of interventions that aim to alleviate pain should involve an assessment of relief from their symptom as well as an assessment of the change in severity. However, from a health agency perspective that approach could pose difficulties in measuring and reporting pain management practice where patient outcomes cannot be expressed as numerators and denominators.

One method of assessing adequacy of interventions to alleviate pain may be to measure patient satisfaction.[119] However, studies that have attempted to use satisfaction as an indicator of the quality of care have revealed inconsistent results. Although a study of patient's expectations of analgesia in an emergency department showed that patients expected a significant reduction of their pain in the ED,[120] studies of patient satisfaction with their pain management in this setting have shown poor or no correlation between pain severity scores and patient satisfaction at discharge.[121] One ED study demonstrated a poor correlation between pain relief and patient satisfaction, with some patients rating the quality of care as "very good" despite having an increase in pain between the time of first and final assessment of severity using a VAS.[122] This finding has also been reported in the postoperative setting.[123] These results may reflect the patient's expectations, particularly where pain is considered to be an inevitable outcome of surgery or medical procedures.

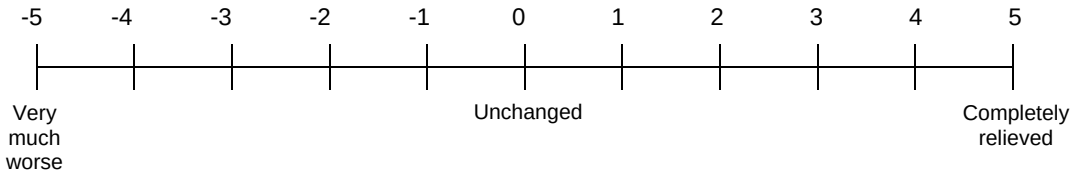
Another potential confounder that was not well reported in these studies was the possibility that patients were evaluating their "whole of care" experience rather than simply their satisfaction with pain management.

The difficulty in separating pain management from other aspects of care is reflected in a study that found low levels of patient satisfaction even when patients reported that their pain was relieved. This finding was observed when "providers appeared uncaring, were slow to respond, or lacked knowledge and skill."[124] Hence, the use of satisfaction as a proxy for pain relief requires the ability to control other variables that may influence satisfaction. As such, tools used to measure pain relief as a function of satisfaction must reliably target pain outcomes or control for the significant range of other variables that may affect patient satisfaction.

Further complicating the relationship between changes in numeric ratings of pain severity and adequacy of analgesia are results from a study that found that patient scores of acute pain severity using a VAS in an ED setting do not reliably identify desire for analgesia.[125] Using the VAS for this purpose may be invalid, as tools such as this are more appropriately employed in the measurement of changes in the self-report of pain over time rather than an instrument to detect the need for analgesic drugs. One obvious weakness in this study was the apparent lack of clinical advice to patients regarding the risks and benefits of analgesia. The patients were simply asked "do you need pain medication?" As such patients were unlikely to be able to make an informed decision regarding their need for analgesia. The possibility that the patient was providing a response to the match their perception of the clinician's expectation cannot be ruled out.

Other attempts to measure the effectiveness of pain management strategies have included patient surveys of their perception of the effectiveness of treatment,[126] though this work found that a large numbers of patients reported that that their pain treatment was effective despite reporting increasing pain following surgery.[126] Global Ratings of Change (GRC) scales have been used to measure improvement or deterioration in a patient's health status over time, including changes associated with chronic pain.[127] A scale for measuring change in pain over time is shown in Figure 6-1.

Figure 6-1: Global rating of change scale for measuring change in pain over time



Scales such as this may have utility in the paramedic practice setting for measuring efficacy of interventions designed to relieve pain.

Another approach to measuring relief of pain in a way that enables the reporting of meaningful outcomes is to report change in pain as a percentage reduction from the baseline level. Although the raw pain severity difference between the first and final pain score may enable judgements about trends in pain response to therapy and discriminate between the minimum clinically significant differences on pain severity, the change in pain score as a proportion has been found to provide more clinically relevant and consistent data.[128] In a study of acute postoperative pain patients a larger reduction on VNRS was required to achieve pain relief when the initial pain score was high, whereas patients with a lower initial pain score required a smaller change in pain score to report adequate pain relief.[116] When the outcome is reported as a proportion of change in pain a meaningful interpretation is enabled irrespective of the initial pain score. The formula for the calculation of the percentage change in pain intensity is;

[(baseline pain intensity [VNRS] – final pain intensity)/baseline pain intensity] x 100

These findings support the reporting of outcomes of therapeutic interventions to relieve pain as a percentage change, and this data should be available in paramedic practice settings.

Summary

Clinical judgements regarding the management of a patient's complaint of pain requires the assessment, measurement and evaluation of this symptom. Although scales have been developed to enable patients to express the severity of their pain experience in a way that highlights their degree of distress, the data resulting from the use of scales such as the VNRS may be misinterpreted as quantitative biological

data rather than a qualitative measure of the patient's pain experience. As a measure of quality of an individual's experience that cannot be directly shared with another person, the numeric outcome serves as a reference for the patient's experience at a particular point in time. Interpersonal comparisons are not helpful in validating the patient's experience, and in doing this paramedics appear to misunderstand the intent and purpose of pain scales. This may contribute to their anxiety about the patient's motives in reporting pain when the reported pain score does not match the paramedics' expectations regarding pain related behaviours, leading to a tendency to disbelieve the patient.

Paramedic education has traditionally treated pain as a symptom that aids in the identification of injury or disease. There is scant evidence of pain assessment content in paramedic education that the majority of the focus group participants completed prior to certification as a qualified paramedic. Where differences in beliefs between group members were identified these differences may be associated with previous education in other health disciplines, or an ability to reflect on their knowledge and practice that has enabled the development of contemporary standards of pain assessment and management practice. As pain represents a common complain in paramedic practice the extent of related education in current paramedic curricula warrants investigation with an aim to improve practice through education.

Organisational Factors Affecting Pain Management Practice

Explicit influences of pain management in this study setting include organisational policy, clinical practice guidelines, and performance indicators designed to measure the effectiveness of practice through reduction in pain severity score. In addition, clinical audit practices attempt to identify non-compliance with policy or guidelines, variations of benchmarks associated with performance indicators, and adverse events or risks to patient safety. Paramedics understand that their practice is audited through inspection of a sample of the PCR's they generate, and that any practice that is at odds with organisational expectations or that poses a risk to patient safety will lead to penalties that may include disciplinary proceedings. The use of discipline as a driver of behaviour is linked to the paramilitary history of Australian ambulance services and the use of strictly enforced protocols for clinical practice. Although it could be argued that features of a paramilitary organisation are no longer apparent in the

Victorian ambulance setting, comments made by focus group participants indicate that aspects of this model remain. While discussing the guidelines that inform practice, some participants elaborated a belief that the guidelines do not enable modification of practice to suit the specific clinical situation, and that any deviation from the guideline will be met with disciplinary action: "the guidelines are now black and white, that's what they are, that's what you do. Don't stray from them … step outside the guideline you'll get your arse kicked" (Group 3.1).

Paramedics employed by Ambulance Victoria are informed that the organisation has set pain reduction benchmarks for pain of a cardiac or traumatic origin, and that reduction in pain severity in these cases is measured as a mean reduction in pain score and reported within the organisation. Failure to achieve a reduction in pain that is consistent with organisational expectations may lead to a clinical breach. During the focus group discussions reported in Chapter 5 the facilitator replied to a statement made by a participant "… you're saying that clinical audit does play on your mind in terms of your pain management?" Several focus group participants agreed with this statement, with one stating "I think you're very naïve if you think it didn't" (Group 2.2).

Clinical audit associated with castigation and penalties may have a powerful influence on behaviour. Ambulance Victoria has set a minimum expected reduction in pain severity score, and the clinical practice guidelines that influence practice may be interpreted as indicating an endpoint of treatment of cardiac pain as a pain severity score of 0/10, and a score of 2/10 or less for other causes of pain. This understanding and its effect on the documentation of pain severity is reflected in a statement made by a focus group participant: "I suspect the number 2 gets probably a fairly high representation just because in our CPGs it says 'pain less than 2…'" (Group 3.3). This statement gives implicit support to practice that aims to avoid notice during clinical audit by providing a final pain score that is consistent with practice guidelines and organisational expectations, even if this is inconsistent with the patient's report of pain. This theory is supported by the abnormal distribution of final pain severity scores shown by Figure 3-4 in Chapter 3, which illustrates a significant increase in the frequency of final scores of 2/10.

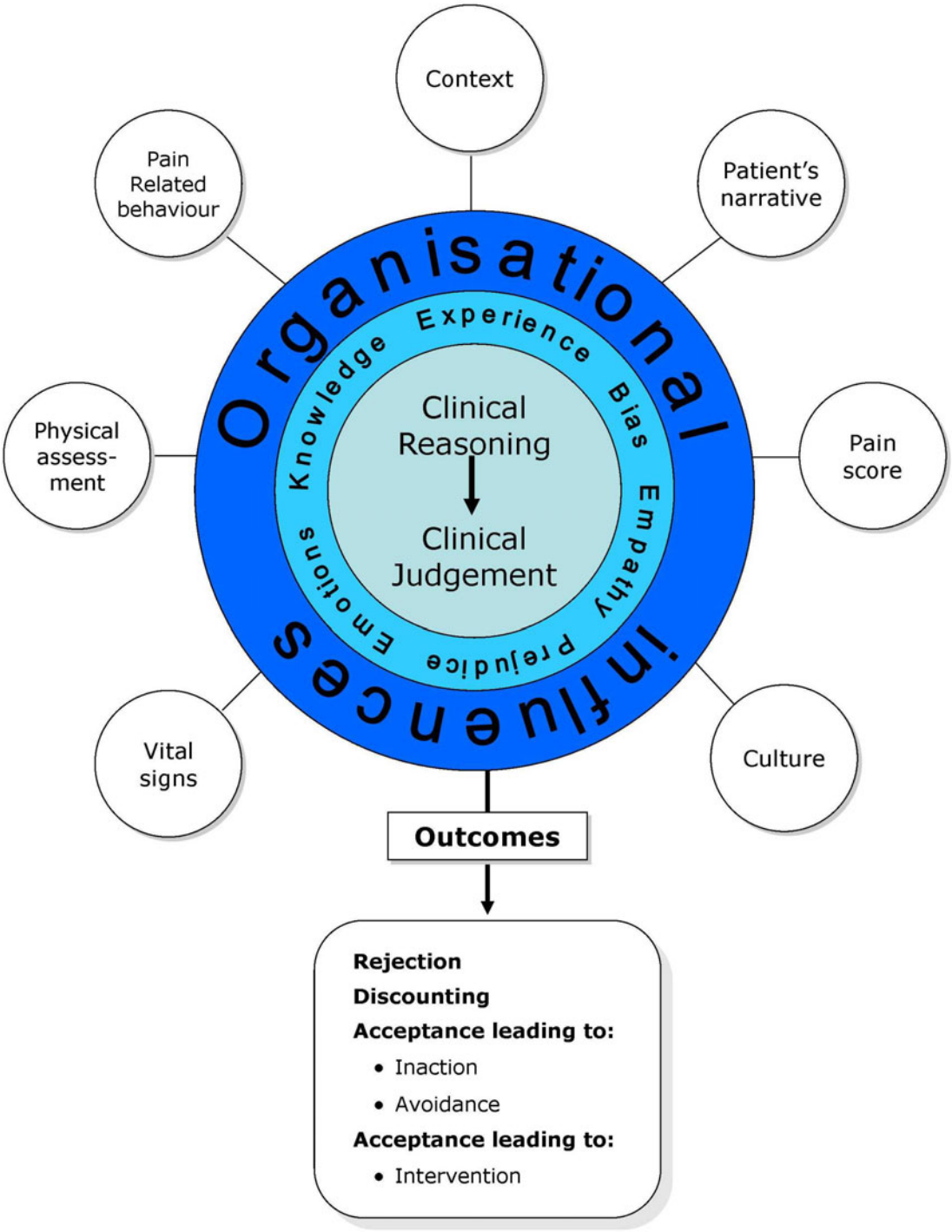
Australian ambulance services are adopting principles of quality improvement to achieve consistent standards of care that reflects contemporary practice.[129] Reduction of pain is one indicator associated with quality of health care. However, the outcome used to measure achievement of this indicator is a pain severity score that measures only one dimension of the patient's experience. As the outcome of care that aims to alleviate pain has qualitative dimensions, a quantitative approach to measuring the quality of care may be an adequate measurement of pain relief. Furthermore, a quality improvement process that relies entirely on the paramedic's documentation of a raw score as a measure of performance in an environment where prospective observation of practice is limited risks the generation of data that serves the needs of the paramedic in avoiding criticism and penalties associated with failure to meet the expected level of performance. While paramedics know that penalties may be associated with care that does not achieve key performance indicators, there is little evidence of reward for excellence in practice, including excellence in pain management practice. This may further inhibit the individual's willingness to modify practice.

Less tangible organisational influences on practice include informal organisational norms, peer group expectations and the influence of other health professionals on practice. These issues have been identified in the previous chapter, but the potential influence on the paramedic's pain management practice must be acknowledged.

A Model of Paramedic Decision Making in Cases Involving Pain

The Grounded Theory methodology used to analyse focus group transcripts has enabled the development of a theory of factors affecting paramedic clinical decision making in cases involving pain. Clinical judgements and decisions in cases involving pain has been found to involve input of data that is evaluated and modulated by external as well as internal variables before a judgement and clinical decision is made. The following model of paramedic decision making is grounded in the narratives generated by the focus groups. The model uses an input-process-outcome approach to propose a theory of paramedic decision making in cases involving pain.

Figure 6-2: A model of clinical decision making in cases involving pain



Elements of the Model

Input

Patient's narrative includes the patient's account of their symptoms, the events leading up to the onset of symptoms, previous medical history, quality of the pain, pain region and factors relieving or exacerbating the pain. Communication difficulties associated with cognitive ability or impairment, language difficulties or cultural preferences can impair the patient's ability or willingness to provide a pain narrative. Communication with the patient about their pain may also produce information about the patient's expectations regarding pain relief, and this may be associated with cues that lead the paramedic to question the patient's motive in reporting pain. Several factors may influence the patient's willingness to engage in conversation with the paramedic in order to establish a history and current complaints and to comply with a clinical examination designed to identify the nature of the pain.

Pain score is derived from pain severity scale, which produces a numerical value used to represent the one-dimensional construct of pain severity. The score provided by the patient represents an attempt to quantify their current level of pain in order to guide treatment decisions and to observe trends in severity that enables an evaluation of the efficacy of analgesic interventions. Acceptance of the score is dependant on the paramedic's understanding of the nature of the data derived from a pain scale and the function of the tools used to rate pain severity.

Culture affects the processing if clinical data where paramedics expect certain pain-related behaviours to be associated with the patient's culture or ethnicity. These beliefs may be based on prior clinical experiences and common stereotypes.

Vital signs include heart rate, respiratory rate and blood pressure, and these signs are routinely observed and recorded as part of the patient assessment process. A belief that severe acute pain is associated with reliable and predictable vital sign changes may lead the paramedic to question the patient's report of pain if the expected correlation is not observed.

Physical assessment of the patient is undertaken to identify the location of the pain and to establish whether palpation reveals tenderness or abnormalities associated

with the report of pain. In addition a visual inspection is undertaken to identify injury associated with the pain. Reports of pain that have no visual or tactile reference pose additional challenges to the paramedic who has to make a clinical judgement on the basis of other clinical data.

Pain related behaviour may add important information to the clinical reasoning process, particularly in cases where communication difficulties impair the patient's ability to report their symptoms. This is evidenced in pain assessment tools designed for infants and patients with cognitive impairment. However, in cases where patients are able to self-report, the use of behavioural cues to validate the patient's report of pain may lead the paramedic to question the veracity of the patient's report where the behaviour is inconsistent with the paramedic's expectations. These expectations may be based on prior experience and beliefs that are linked to personal beliefs about pain and the expression of pain.

Context refers to the setting in which the clinical encounter occurs. Focus group participants described the location of the event as a variable that has the potential to affect decision making. For example, the socioeconomic status of the patient as evidenced by their address or living conditions has the potential to activate beliefs about the motives of patients. In addition, information transcribed from patient care records show that evidence of drug use noted in the patient's environment during the assessment may influence the paramedic's judgements regarding the patient's motives for calling an ambulance. The context can also affect the patient's expression of pain. This was first described during war when a surgeon noted that many badly injured soldiers did not report pain, whereas the majority of civilians undergoing surgery reported significant postoperative pain despite having less tissue trauma than injured soldiers.[5]

Process: personal influences

The evidence arising from the patient encounter is evaluated and may be modified by cognitive processes that are unique to the individual paramedic. Thus, even objective data in the form of physical evidence of injury may be interpreted differently on the basis of individual differences in the paramedic's beliefs about the consequences of pain and by their prior experiences and expectations regarding the expression of pain.

Other variables that may affect the paramedic's interpretation of data obtained during the patient assessment process include:

Knowledge about pain, the consequences of unrelieved pain, and contemporary standards of care for patients with pain is a function of formal education and less formal instruction that occurs in the workplace. Pain management education is not typically a salient feature of Australian paramedic education or training programs, with pain tending to be discussed in relation to its diagnostic utility in identifying pathologies such as acute coronary syndrome. Paramedics who have limited education in pain management may augment their knowledge through additional reading and through dialogue with other health professionals, and the variation in knowledge demonstrated within the focus group narratives may be associated with differences in health education and clinical experience obtained prior to employment as a paramedic, or through a propensity to undertake self-directed learning and self-analysis of educational needs.

Experience encompasses both personal experience of pain and experience gained from caring for individuals with pain. These may include friends or family members as well as patients within the workplace clinical setting. Focus group analysis showed that experience may have an important impact on the development of beliefs and attitudes, with significant variations in belief evident across the groups, which were stratified by clinical experience. Experience is a function of the paramedic's own culture and socialisation, which may be associated with variations in beliefs.

Bias has been elaborated elsewhere in this thesis as a major influence on clinical reasoning and decision making. Although some types of bias are associated with prejudice and stereotyping, an extensive taxonomy of biases has been described that – when operating at a sub-conscious level – have the potential to compromise clinical decisions and clinical outcomes.

Empathy was identified as a concept within the focus group analysis. This construct refers to the ability to experience and understand another person's feelings and emotions. Although the value of carer empathy has been described in the pain management literature,[130] other work has proposed that as the experience of others in pain can produce personal distress and empathy that may interfere with the performance of the person responsible for the clinical care of an individual with pain,

health professionals learn to develop strategies to distance themselves from the suffering of others in order to function effectively. This may in turn reduce the empathetic response to an individual's pain experience in experienced clinicians.[131] Whether this is an advantage or disadvantage is currently unknown due to a lack of reliable evidence. Analysis of transcripts from the novice groups (Groups 1.1 and 1.2) showed empathy for people experiencing pain and a willingness to believe the patient's report of pain. Participants from groups currently employed as paramedics recounted experiences that suggest that empathy may decline following repeated exposure to patients with pain. One participant proposed a need for self-protection as an explanation for this finding.

Prejudice refers to explicit beliefs and values that may influence the judgement of the patient's complaint. In a medical setting the administration of analgesia has been described as having "less to do with the patient's discomfort than with the doctor's prejudiced consideration of the patient in pain".[132] It should be noted however, that prejudice can be linked to general beliefs regarding the importance of pain management or the safety and efficacy of opioids, rather than beliefs about whether the patient deserves analgesia.

Emotions describe the emotional state of the paramedic. This is a labile affect that may be influenced by fatigue or stressors in the work environment as well as life events outside the work environment. The effect that sleep deprivation has on the quality of clinical decisions has been previously described, and is reflected in a comment made by a focus group participant: "…3 o'clock on a night shift, 5 minutes from hospital, I'm not going to stuff round trying to put a line in and draw up morphine and give it. If I can get them to the hospital within 5 minutes, I'll wait for them to do it in there. I'll get back to bed" (Group 3.1).

Process: organisational influences

Peer pressure was identified as an important influence on the paramedic's decision making in cases involving pain, particularly when the paramedic was a student or was working with a more experienced paramedic. Peers can influence the development of clinical behaviours and beliefs if novices choose to model their practice on the examples set by others. This may lead to both appropriate and

inappropriate beliefs and actions due to the wide variety of interpersonal beliefs among experienced paramedics that were evident in the focus group narratives.

Organisational culture includes the influence that formal policies, procedures and clinical governance processes have on the assessment and management of pain. Organisations that openly value pain management as a clinical priority, and who provide the tools and pharmaceuticals needed to assess and manage pain may engender a greater awareness of the importance of pain management within the organisation. However, organisational culture also refers to the informal beliefs that are associated with group norms. It is possible that group norms may be at odds with organisational aims, and that this may influence practice throughout the organisation. As such this prospect requires further study.

The clinical reasoning possesses and clinical judgements that result from the interpretation of the input data are described in an earlier section of this thesis. The models described recognise the influence of external and internal variables that affect the decisions arising from the data analysis. While it might be expected that a patient would receive a defined standard of care when a complaint of pain triggers a call to an ambulance service, the resulting management of the complaint is likely to depend on the clinical decision making processes of the individual paramedic, so that variations in care result despite the existence of clear clinical practice guidelines and organisational benchmarks for pain management. The range of possible outcomes are elaborated as follows:

Outcomes

Rejection may follow a paramedic's assessment of the patient's complaints as unreliable, unsubstantiated, or intentionally misleading. In this case the paramedic may chose to reject the account of pain due to concerns about whether the patient can be believed. This outcome may also arise where a suspicion of drug seeking behaviour is activated.

Discounting occurs where the paramedic's assessment of the severity of the symptom is less than that stated by the patient. This may occur where the behavioural cues are perceived to be inconsistent with the patient's report of pain. This outcome is not unique to this practice setting; there are numerous examples in the literature that

report a tendency for health professionals to discount or underestimate the patient's report of pain.

Acceptance leading to inaction occurs when the paramedic accepts the report of pain, but decides against interventions due to a fear of peer criticism, or criticism from other health professionals that may be associated with a decision to treat. Inaction may also be due to erroneous concerns about risk, including risk of adverse drug effects that may include risk of addiction. Other reasons for inaction relate to beliefs about the paramedic's role in managing chronic pain, and factors such as time to destination which may result in the paramedic withholding analgesia if they are close to a hospital.

Acceptance leading to avoidance includes cases where paramedics make excuses for withholding treatment. These include strategies to legitimise an internal belief that analgesia is not warranted despite the lack of contraindications to analgesia. For example, a paramedic may try to convince a patient that the side effects of the analgesia are more distressing than the pain in an attempt to avoid the need to administer analgesia.

Acceptance leading to intervention results from an assessment of the clinical data that result in a logical decision to intervene based on a risk-benefit analysis. This may occur in a situation where the pathology responsible for the pain is obvious, where symptom certainty is high, and where no other contraindications to the administration of analgesics are present. However, this outcome can also be an outcome in situations of symptom uncertainty where a logical process of decision making is based on knowledge of pain and relevant interventions has been used to manage pain. In situations of uncertainty due to atypical data, the paramedic must be aware of the potential influences on the assessment and decision making process such as bias or stereotyping, which may be controlled through the use of a System 2 approach to decision making.

Summary

This chapter has described the variables affecting paramedics' clinical reasoning and decision making in case involving a patient complaint of pain. This analysis has revealed a complex network of factors that influence the paramedic's interpretation

of pain-related data, which will influence judgements about the patient's complaint. This process subsequently affects clinical management decisions.

Although the assessment of pain appears to be an uncomplicated component of the clinical examination process, this research has found that paramedics are concerned about their inability to scientifically validate the patient's symptom, and that this leads to questions regarding the patient's motives in reporting pain. The analysis of the paramedics' beliefs and attitudes has shown that the assessment and management of pain is more complex that it would outwardly appear.

The following chapter summarises the research findings and makes recommendations that may reduce the risk of clinical errors in cases involving pain.

List of References

1. Carr DB, Goudas LC. Acute pain. Lancet 1999; 353(9169):2051-9.

2. Victorian Ambulance Services. Clinical practice guidelines: chest pain/ discomfort of a cardiac nature (CPG:A0401) and pain relief - non cardiac (CPG:A0402). Melbourne, Victoria: Victorian Ambulance Services, 2006.

3. Metropolitan Ambulance Service. Metropolitan Ambulance Service 2006-2007 annual report. Doncaster, VIC: MAS, 2007.

4. Craig KD. The social communication model of pain. Canadian Psychology 2009; 50(1):22-32.

5. Beecher HK. The measurement of pain. Pharmacological Reviews 1957; 9(1):59-209.

6. Westen D. Psychology: Mind, Brain & Culture. 2nd edition. New York: Wiley, 1999.

7. Loeser JD. Pain: Disease or dis-ease? The John Bonica Lecture: Presented at the Third World Congress of World Institute of Pain, Barcelona 2004 . Pain Pract 2005; 5(2):77-84.

8. Jones T, Woollard M. Paramedic accuracy in using a decision support algorithm when recognising adult death: a prospective cohort study. Emerg Med J 2003; 20(5):473-5.

9. Levine SD, Colwell CB, Pons PT, Gravitz C, Haukoos JS, McVaney KE. How well do paramedics predict admission to the hospital? A prospective study. J Emerg Med 2006; 31(1):1-5.

10. Qazi K. Kempf JA. Christopher NC. Gerson LW. Paramedic judgment of the need for trauma team activation for pediatric patients. Acad Emerg Med 1998; 5(10):1002-7.

11. Janing J. Critical thinking: incorporation into the paramedic curriculum. Prehospital Disaster Med 1994; 9(4):238-42.

12. Dalton AL. Enhancing critical thinking in paramedic continuing education. Prehospital Disaster Med 1996; 11(4):246-53.

13. Janing J. Assessment of a scenario-based approach to facilitating critical thinking among paramedic students. Prehospital Disaster Med 1997; 12 (3):215-21.

14. Shaban R, Wyatt Smith CM, Cumming JJ. Uncertainty, error and risk in human clinical judgment: introductory theoretical frameworks in paramedic practice. JEPHC 2004; 2(1-2):Article Number: 990072.

15. Shaban R. Theories of clinical judgment and decision-making: a review of the theoretical literature. JEPHC 2005; 3(1-2):Article Number: 990114.

16. Higgs J, Jones MA. Clinical decision making and multiple problem spaces. In: Higgs J, Jones MA, Loftus S, Christensen N, Eds. Clinical reasoning in the health professions. 3rd edition. Edinburgh: Elsevier, 2008.

17. Higgs J, Jones M Eds . Clinical reasoning in the health professions. 2nd edition. Oxford: Butterworth-Heinemann, 2000.

18. Higgs J, Jones MA, Loftus S, Christensen N Eds. Clinical reasoning in the health professions. 3rd edition. Edinburgh: Elsevier, 2008.

19. Ennis R. Goals for a critical thinking curriculum. In: Costa AL. Developing minds: A resource book for teaching thinking. Alexandria, VA: Association for Supervision and Curriculum Development, 1985.

20. Watson G, Glasser EM. Critical thinking appraisal. New York: Harcourt, 1964.

21. Alfaro-LeFevre R. Critical thinking in nursing. A practical approach. Philadelphia: WB Saunders, 1995.

22. Sandhu H, Carpenter C, Freeman K, Nabors SG, Olson A. Clinical decision making: opening the black box of cognitive reasoning. Ann Emerg Med 2006; 48(6):713-9.

23. Elstein AS, Schwarz A. Clinical problem solving and diagnostic decision making: selective review of the cognitive literature. BMJ 2002; 324(7339):729-32.

24. Benner P, Tanner C. Clinical judgment: how expert nurses use intuition. Am J Nurs 1987; 87(1):23-31.

25. Patel VL, Groen GJ. Knowledge based solution strategies in medical reasoning. Cogn Sci 1986; 10(1):91-116.

26. Elstein AS, Shulman LS, Sprafka SA. Medical problem solving: an analysis of clinical reasoning. Cambridge, MA: Harvard University Press, 1978.

27. Joseph GM, Patel VL. Domain knowledge and hypothesis generation in diagnostic reasoning. Med Decis Making 1990; 10(1):31-44.

28. Twycross A, Powls L. How do children's nurses make clinical decisions? Two preliminary studies. J Clin Nurs 2006; 15(10):1324-35.

29. Manias E, Aitken R, Dunning T. Decision-making models used by 'graduate nurses' managing patients' medications. J Adv Nurs 2004; 47(3):270-8.

30. Norman GR. The epistemology of clinical reasoning: perspectives from philosophy, psychology, and neuroscience. Acad Med 2000; 75(10):S127-S136.

31. Patel VL, Groen GJ, Norman GR. Effects of conventional and problem-based medical curricula on problem solving. Acad Med 1991; 66(7):380-9.

32. Norman G, Young M, Brooks L. Non-analytical models of clinical reasoning: the role of experience. Med Educ 2007; 41(12):1140-5.

33. Coderre S, Mandin H, Harasym PH, Fick GH. Diagnostic reasoning strategies and diagnostic success. Med Educ 2003; 37(8):695-703.

34. Schmidt HG, Norman GR, Boshuizen HP. A cognitive perspective on medical expertise: theory and implication. Acad Med 1990; 65(10):611-21.

35. Elstein AS. Clinical problem solving and decision psychology. Acad Med 2000; 75(10):S134-36.

36. Alter AL, Oppenheimer DM, Epley N, Eyre RN. Overcoming intuition: metacognitive difficulty activates analytic reasoning. J Exp Psychol Gen 2007; 136(4):569-76.

37. Sloman SA. The empirical case for two systems of reasoning. Psychological Bulletin 1996; 119(1):3-22.

38. Croskerry P. Critical thinking and decision making: avoiding the perils of thin-slicing. Ann Emerg Med 2006; 48(6):720-2.

39. Evans JStBT. In two minds: dual-process accounts of reasoning. Trends Cogn Sci 2003; 7(10):454-9.

40. Murphy GL, Ross BH. Predictions from uncertain categorizations. Cognit Psychol 1994; 27(2):148-93.

41. Weingart SD. Critical decision making in chaotic environments. In: Croskerry P, Cosby KS, Schenkel SM, Wears RL, Eds. Patient safety in emergency medicine. Philadelphia: Wolters Kluwer Health/Lippincott Williams & Wilkins, 2009.

42. Heiberg Engel PJ. Tacit knowledge and visual expertise in medical diagnostic reasoning: Implications for medical education. Med Teach 2008; 30(7):e184-e188.

43. Bandman EL, Bandman B. Critical thinking in nursing. Connecticut: Appleton & Lange, 1988.

44. Croskerry P, Norman G. Overconfidence in clinical decision making. Am J Med 2008; 121(5 Suppl):S24-S29.

45. Sullivan M. Exaggerated pain behavior: by what standard? Clin J Pain 2004; 20(6):433-39.

46. Croskerry P. The importance of cognitive errors in diagnosis and strategies to minimize them. Acad. Med 2003; 78(8):775-80.

47. Croskerry P. Cognitive and affective dispositions to respond. In: Croskerry P, Cosby KS, Schenkel SM, Wears RL, Eds. Patient safety in emergency medicine. Philadelphia: Wolters Kluwer Health/Lippincott Williams & Wilkins, 2009.

48. Croskerry P. Achieving quality in clinical decision making: cognitive strategies and detection of bias. Acad Emerg Med 2002; 9(11):1184-204.

49. van Ryn M, Fu SS. Paved with good intentions: Do public health and human service providers contribute to racial/ethnic disparities in health? Am J Public Health 2003; 93(2):248-55.

50. Todd KH. Pain assessment and ethnicity. Ann Emerg Med 1996; 27(4):421-3.

51. Burgess DJ, van Ryn M, Crowley-Matoka M, Malat J. Understanding the provider contribution to race/ethnicity disparities in pain treatment: insights from dual process models of stereotyping. Pain Med (USA) 2006; 7(2):119-34.

52. Todd KH, Deaton C, D'Adamo AP, Goe L. Ethnicity and analgesic practice. Ann Emerg Med 2000; 35(1):11-6.

53. Pletcher MJ, Kertesz SG, Kohn MA, Gonzales R. Trends in Opioid Prescribing by Race/Ethnicity for Patients Seeking Care in US Emergency Departments. JAMA 2008; 299(1):70-8.

54. Cintron A, Morrison RS. Pain and ethnicity in the United States: a systematic review. J Palliat Med 2006; 9(6):1454-73.

55. Chen EH, Shofer FS, Dean AJ *et al*. Gender disparity in analgesic treatment of emergency department patients with acute abdominal pain. Acad Emerg Med 2008; 15(5):414-8.

56. Tintinalli JE, Kelen G, Stapczynski JS Eds. Emergency medicine: a comprehensive study guide. 6th edition. New York: McGraw-Hill, 2004.

57. Balsa AI, McGuire TG. Prejudice, clinical uncertainty and stereotyping as sources of health disparities. J Health Econ 2003; 22(1):89-116.

58. Croskerry P. Critical thinking and reasoning in emergency medicine. In: Croskerry P, Cosby KS, Schenkel SM, Wears RL, Eds. Patient safety in emergency medicine. Philadelphia: Wolters Kluwer Health/Lippincott Williams & Wilkins, 2009: 213-8.

59. Croskerry P. How doctors feel: affective issues in patients' safety. Lancet 2008; 372:1205-6.

60. Redelmeier DA, Tu JV, Schull MJ, Ferris LE, Hux JE. Problems for clinical judgement: 2. Obtaining a reliable past medical history. Can Med Assoc J 2001; 164(6):809-13.

61. Kuhn GJ. Diagnostic errors. Acad Emerg Med 2002; 9(7):740-50.

62. Benner P. From novice to expert. Am J Nurs 1982; 82(3):402-7.

63. Titchen A, Higgs J. Facilitating the acquisition of knowledge for reasoning. In: Higgs J, Jones M, editors. Clinical reasoning in the health professions. 2nd edition. Oxford: Butterworth-Heinemann, 2000.

64. Croskerry P. Cognitive forcing strategies in clinical decision making. Ann Emerg Med 2003; 41(1):110-20.

65. Prkachin KM, Solomon PE, Ross J. Underestimation of pain by health-care providers: towards a model of the process of inferring pain in others. CJNR 2007; 39(2):88-106.

66. Dula DJ, Dula NL, Hamrick C, Wood GC. The effect of working serial night shifts on the cognitive functioning of emergency physicians. Ann Emerg Med 2001; 38(2):152-5.

67. Harrison Y, Horne JA. The impact of sleep deprivation on decision making: a review. J Exp Psychol Appl 2000; 6(3):236-49.

68. Australian and New Zealand College of Anaesthetists. Statement on patients' rights to pain management and associated responsibilities: Professional Standard No. 45Australian and New Zealand College of Anaesthetists, 2008.

69. McCaffery M, Grimm MA, Pasero C, Ferrell B, Uman GC. On the meaning of "drug seeking". Pain Mgmt Nurs 2005; 6(4):122-36.

70. Hansen GR. The drug-seeking patient in the emergency room. Emerg Med Clin North Am 2005; 23(2):349-65.

71. White J, Taverner D. Drug-seeking behaviour. Aust Prescr 1997; 20(3):68-70.

72. Savage S, Covington EC, Heit HA, Hunt J, Joranson D, Schnoll SH. Consensus document. Definitions related to the use of opioids for the treatment of pain.

The American Academy of Pain Medicine, The American Pain Society, and the American Society of Addiction Medicine [Web Page]. 2001; Available at http://www.ampainsoc.org/advocacy/opioids2.htm. (Accessed 4 May 2009).

73. Heit HA. The truth about pain management: the difference between a pain patient and an addicted patient. Eur J Pain 2001; 5(Supplement 1):27-9.

74. Heit HA. Addiction, physical dependence, and tolerance: precise definitions to help clinicians evaluate and treat chronic pain patients. J Pain Pall Care Pharmacother 2003; 17(1):15-29.

75. Rich BA. Ethics of opioid analgesia for chronic noncancer pain. Pain: Clinical Updates 2007; XV(9):1-4.

76. Nielsen S, Bruno R, Carruthers S, Fischer J, Lintzeris N, Stoove M. Investigation of pharmaceutical misuse amongst drug treatment clients. Melbourne: Turning Point Alcohol and Drug Centre, 2008.

77. Australian Institute of Health and Welfare (AIHW). 2004 National Drug Strategy Household Survey: detailed findings. AIHW cat. no. PHE 66. Canberra: AIHW, 2005; Drug Statistics Series No.16.

78. Hall WD, Ross JE, Lynskey MT, Law MG, Degenhardt LJ. How many dependent heroin users are there in Australia? Med J Aust 2000; 173(10):528-31.

79. Commonwealth Department of Health and Ageing. Return on investment in needle and syringe programs in Australia. Canberra: Publications Production Unit (Public Affairs, Parliamentary and Access Branch), Commonwealth Department of Health and Ageing, 2002.

80. National Centre in HIV Epidemiology and Clinical Research. Australian NSP Survey National Data Report 2002-2006. Sydney, NSW: National Centre in HIV Epidemiology and Clinical Research, the University of New South Wales, 2007.

81. Drugs and Crime Prevention Committee, Parliament of Victoria. Inquiry into the Misuse/Abuse of Benzodiazepines and Other Forms of Pharmaceutical

Drugs in Victoria: Final Report. Melbourne, Victoria: Government Printer for the State of Victoria, 2007.

82. Nicholas R. The diversion of pharmaceutical drugs onto the illicit market. Marden SA: Australasian Centre for Policing Research, 2002.

83. Cook S, Indig D, Gray J, McGrath D. Opiate overdose and health treatment options for opiate users in New South Wales, 1999-2002. NSW Public Health Bull 2004; 15(7-8):125-31.

84. Victorian Government Department of Human Services. The Victorian drug statistics handbook 2006: patterns of drug use and related harm in Victoria. Melbourne: Victorian Government Publishing Service, 2006.

85. McNabb C, Foot C, Ting J, Breeze K, Stickley M. Profiling patients suspected of drug seeking in an adult emergency department. Emerg Med Australas 2006; 18(2):131-7.

86. Department of Human Services, Drugs and Poisons Regulation Group. Obtaining information and dealing with drug-seeking patients. Melbourne: DHS, 2009.

87. Queensland Ambulance Service. Pain management package. Brisbane: QAS, 2005.

88. Victorian Ambulance Services. Clinical practice guidelines. Melbourne, Victoria: Victorian Ambulance Services, 2006.

89. Monash University Centre for Ambulance and Paramedic Studies. Morphine in ambulance practice: Diploma of Ambulance Paramedic Studies (Stage 5 training notes). 2004:4.

90. Parliament of Victoria. Drugs, Poisons and Controlled Substances Act 1981. 9719 of 1981. 2007.

91. Sim MG, Hulse GK, Khong E. Acute pain and opioid seeking behaviour. Aust Fam Physician 33(12):961-1056.

92. Millard WB. Grounding frequent flyers, not abandoning them: drug seekers in the ED. Ann Emerg Med 2007; 49(4):481-6.

93. Jung B, Reidenberg MM. Physicians being deceived. Pain Med 2007; 8(5):433-7.

94. Geiderman JM. Keeping lists and naming names: Habitual patient files for suspected nontherapeutic drug-seeking patients. Ann Emerg Med 2003; 41(6):873-81.

95. Mitra S. Opioid-induced hyperalgesia: pathophysiology and clinical implications. J Opioid Manage 2008; 4(3):123-30.

96. Angst MS, Clark JD. Opioid-induced hyperalgesia: a qualitative systematic review. Anesthesiology 2006; 104(3):570-87.

97. Charlin B, Boshuizen HPA, Custers EJ, Feltovich PJ. Scripts and clinical reasoning. Med Educ 2007; 41:1178-84.

98. Joint Commission on Accreditation of Healthcare Organizations. Improving the quality of pain management through measurement and action. Oakbrook Terrace, IL: Joint Commission Resources, 2003.

99. Australian and New Zealand College of Anaesthetists and Faculty of Pain Medicine. Acute pain management: scientific evidence. 2nd edition. Melbourne: ANZCA, 2005.

100. Nelson BP, Cohen D, Lander O, Crawford N, Viccellio AW, Singer AJ. Mandated pain scales improve frequency of ED analgesic administration. Am J Emerg Med 2004; 22(7):582-5.

101. Silka PA, Roth MM, Moreno G, Merrill L, Geiderman JM. Pain scores improve analgesic administration patterns for trauma patients in the emergency department. Acad Emerg Med 2004; 11(3):264-70.

102. Narasimhaswamy S , Vedi C, Xavier Y, Tseng C, Shine D. Effect of implementing pain management standards. J Gen Intern Med 2006; 21(7):689-93.

103. Mularski RA, White-Chu F, Overbay D, Miller L, Asch SM, Ganzini L. Measuring pain as the 5th vital sign does not improve quality of pain management. J Gen Intern Med 2006; 21(6):607-12.

104. Benini A, DeLeo JA. René Descartes' physiology of pain. Spine 1999; 24(20):2115-19.

105. Melzack R, Katz J. Pain assessment in adult patients. In: McMahon SB, Koltzenburg M Eds. Textbook of pain. 5th edition. Philadelphia: Elsevier Churchill Livingstone, 2006: 291-304.

106. McMahon SB, Koltzenburg M eds. Wall and Melzack's textbook of pain. 5th edition. Philadelphia: Elsevier Churchill Livingstone, 2006: 1239.

107. Anand KJS, Craig KD. New perspectives on the definition of pain. Pain 1996; 67(1):3-6.

108. Williams AC de C , Davies HT, Chadury Y. Simple pain rating scales hide complex idiosyncratic meanings. Pain 2000; 85(3):457-63.

109. Nielsen CS, Staud R, Price DD. Individual differences in pain sensitivity: measurement, causation, and consequences. J Pain 2009; 10(3):231-7.

110. Bausewein C, Farquhar M, Booth S, Gysels M, Higginson IJ. Measurement of breathlessness in advanced disease: a systematic review. Respir Med 2007; 101(3):399-410.

111. Ducharme J. Whose pain is it anyway? Managing pain in the emergency department. Emerg Med (Fremantle) 2001; 13(3):271-3.

112. McCaffery M, Ferrell BR, Pasero C. Nurses' personal opinions about patients' pain and their effect on recording assessments and titration of opioid doses. Pain Mgmt Nurs 2000; 1(3):79-87.

113. Drayer RA, Henderson J, Reindenberg M. Barriers to better pain control in hospitalized patients. J Pain Symptom Manage 1999; 17(6):434-40.

114. Gallagher EJ, Liebman M, Bijur PE. Prospective validation of clinically important changes in pain severity measured on a visual analog scale . Ann Emerg Med 2001; 38(6):633-8.

115. Todd KH. Patient-oriented outcome measures: The promise of definition. Ann Emerg Med 2001; 38(6):672-4.

116. Cepeda MS, Africano JM, Polo R, Alcala R, Carr DB. What decline in pain intensity is meaningful to patients with acute pain? Pain 2003; 105:151-7.

117. Kendrick DB, Strout TD. The minimum clinically significant difference in patient-assigned numeric scores for pain. Am J Emerg Med 2005; 23:828-32.

118. Chauhan C. The perception of perception. J Clin Oncol 2007; 25(16):2329-30.

119. Burgess FW. Pain scores: are the numbers adding up to quality patient care and improved pain control? Pain Med 2006; 7(5):371-2.

120. Fosnocht DE, Heaps ND, Swanson ER. Patient expectations for pain relief in the ED. Am J Emerg Med 2004; 22(4):286-8.

121. Blank FSJ, Mader TJ, Wolfe J, Keyes M, Kirschner R, Provost D. Adequacy of pain assessment and pain relief and correlation of patient satisfaction in 68 ED fast-track patients. J Emerg Nurs 2001; 27(4):327-34.

122. Kelly AM. Patient satisfaction with pain management does not correlate with initial or discharge vas pain score, verbal pain rating at discharge, or change in vas score in the emergency department. J Emerg Med 2000; 19(2):113-6.

123. Carlson J, Youngblood R, Dalton JA, Blau W, Lindley C. Is patient satisfaction a legitimate outcome of pain management? J Pain Symptom Manage 2003; 25(3):264-75.

124. Sherwood G, Adams-McNeill J, Starck PL, Nieto B, Thompson CJ. Qualitative assessment of hospitalized patients' satisfaction with pain management. Res Nurs Health 2000; 23:486-95.

125. Blumstein HA, Moore D. Visual analog pain scores do not define desire for analgesia in patients with acute pain. Acad Emerg Med 2003; 10(3):211-4.

126. Mamie C, Morabia A, Bernstein M, Klopfenstein CE, Forster A. Treatment efficacy is not an index of pain intensity. Can J Anesth 2000; 47(12):1166-70.

127. Kamper SJ, Maher CG, Mackay G. Global Rating of Change Scales: a review of strengths and weaknesses and considerations for design. J Man Manip Ther 2009; 17(3):163–170.

128. Farrar JT, Polomano RC, Berlin JA, Strom BL. A comparison of change in the 0-10 numeric rating scale to a pain relief scale and global medication performance scale in a short-term clinical trial of breakthrough pain intensity. Anesthesiology 2010; 112(6):1464-72.

129. Linwood R, Day G, FitzGerald G, Oldenburg B. Quality improvement and paramedic care: What does the literature reveal for pre-hospital emergency care in Australia? Int J Health Care Qual Assur 2007; 20(5):405-15.

130. Tait RC. Empathy: necessary for effective pain management? Curr Pain Headache Rep 2008; 12(2):108-12.

131. Cheng Y, Lin CP, Liu HL *et al*. Expertise modulates the perception of pain in others. Curr Biol 2007; 17(19):1708-13.

132. Hackett TP. Pain and prejudice. Why do we doubt that the patient is in pain? Med Times 1971; 99(2):130-4.

Chapter 7: Conclusion and Future Directions

Introduction

This chapter brings this thesis to a close by summarising the findings of previous chapters and emphasising the contribution to knowledge made by this thesis. Implications for paramedic practice are described, and future directions explored. The chapter begins with a summary of the central research findings, describes the contribution these findings make to the knowledge base that ultimately informs and guides paramedic practice in the area of pain management, and identifies further research and interventions that will contribute to improvements in the care of individuals suffering from pain.

This project investigated paramedic pain management practice in an Australian EMS to establish the current state of practice and to compare this with contemporary standards of care of patients reporting pain. The specific aims were to identify and record the:

- Incidence of pain among patients treated and transported by paramedics;
- Estimated duration of pain prior to paramedic care;
- Classification of the pain, in terms of trauma, cardiac, or other origin;
- Methods of assessing pain severity and the frequency of the recording of pain severity scores;
- Changes in pain severity score before and after treatment by paramedics;
- Analgesics used; and
- Incidence and nature of any side effects of analgesic administration.

This research demonstrated that pain is frequently encountered in paramedic practice in this study setting. Despite the availability of clinical practice guidelines that aim to manage cases involving pain, a significant number of patients with pain did not receive interventions to alleviate their pain, or continued to have moderate or severe pain at the final point of paramedic assessment. Disparities in pain management were identified and these were associated with specific subgroups of patient.

In order to understand factors affecting pain management practice, a qualitative study of paramedics' attitudes and beliefs relating to pain and their assessment and management of pain was undertaken. The aims of this research were to:

- Identify factors influencing or inhibiting paramedic pain management practice, that may include individual, patient, organisational, educational or demographic factors affecting clinical decision making in cases involving patients reporting pain;
- Predict the likely impact of these factors on patient outcomes; and
- Recommend strategies that may promote effective pain management in the prehospital setting.

The results of this research have provided an insight into paramedics' beliefs and attitudes towards patients with pain, and this knowledge will inform the design of education programs for paramedics as well as the design of organisational systems for auditing clinical practice and promoting evidence-based practice.

Summary of Research Findings

This research revealed some disparities in pain management practice and findings that required further investigation. The major findings were that:

- Disparities in the paramedic treatment of pain are associated with the type of pain documented by the paramedic, with patients identified as having pain of a cardiac origin statistically more likely to receive analgesia than patients with pain associated with injury;
- Gender of the patient affects the frequency of morphine administration, with females statistically less likely to receive morphine for pain despite being more likely to have a higher initial pain severity score than males at the first point of paramedic assessment;
- The duration of an individual's pain influences the paramedic's initiation of analgesia, with decreasing odds of analgesia administration associated with lengthening duration of pain;

- The frequency of reported adverse effects associated with analgesic administration was very low;
- Pain severity does not influence triage category at the time the call for assistance is processed by the ambulance communications centre (Appendix F);
- The patient's pulse, blood pressure and respiratory rate are not correlated with the pain severity score, which limits the validity of these signs in the estimation of pain severity (Appendix G);
- Paramedics hold a range of beliefs and attitudes that affect their assessment, judgement and management of patients with pain. One central construct affecting paramedics' clinical decisions involves the notion of trust, with the belief that some patients are not truthful in reporting their pain emerging as a strong theme from the paramedic focus group analysis;
- Paramedics place significant weight on the patient's verbal and non-verbal behaviour when forming judgements about the patient's pain;
- The purpose of pain scales and the nature of the data obtained from pain scales are often misunderstood by paramedics. Misconceptions regarding the nature of the data appears to confound clinical judgements;
- Organisational factors influence pain management practice. Despite the existence of organisational policies and benchmarks for the reduction of pain, other tacit features of the organisation may contribute to inadequate pain management. These features include group norms and peer pressure;
- Errors in clinical decision making may compromise the quality of patient care. In some circumstances these errors can pose a risk to patient safety. Given the adverse health effects of unrelieved pain, failure to manage severe pain where there are no contraindications to pain relief should be seen as a risk to patient safety.

Contribution to New Knowledge

The knowledge base supporting paramedic practice is beginning to develop as this discipline begins the transition from a technical occupation to one requiring broader

professional attributes necessary to provide health care in a community setting. Research that adds to the discipline-specific knowledge base is an important part of this transition process. This thesis has contributed to this process through an analysis of the incidence of pain affecting patients in a major urban community setting, and the paramedic management of these individuals. In addition, qualitative methods of enquiry have identified paramedics' attitudes and beliefs as well as organisational factors that influence their pain management practice. The development of a model of paramedic clinical decision making in cases involving pain (Chapter 6) will inform quality improvement systems, paramedic education, and further research priorities. Diagnosis of errors in clinical judgement will also be supported by this model. The knowledge arising from this study represents the most comprehensive report of paramedic pain management practice that has been published to date, and the model developed and presented provides a vehicle for practice change, and may also be adapted to address other clinical practice issues requiring clinical assessment and educational reform.

This research has confirmed that pain is a complex phenomenon, and that the attribution of meaning to the patient's narrative of their experience, which includes their report of pain severity, is a complex process. A superficial examination of the process of scoring pain severity suggests that this should be a simple diagnostic test. However, a pain score is not the only information used to make a judgement about an individual's health status and the interventions needed to preserve health. Paramedics use several cues including behaviour, physical evidence of injury or disease, and vital sign changes along with the patient's medical history and the patient's account of their symptoms to form a judgement about the nature of the complaint. This judgement then informs decisions regarding the clinical management of the patient.

A clinical examination that focuses on the patient's pain score as the salient clinical feature may lead to a flawed clinical decision due to reliance on a minimal set of data to make a clinical decision. Nevertheless, an assessment of the presence and severity of pain is an important component of the clinical examination. However, this subjective report relies on the paramedic's ability to communicate with the patient to enable understanding of the objective of this abstract concept of applying a number to a symptom. In patients with cognitive impairment of language difficulties this may be a challenging task. Even when the patient is competent in understanding this task,

their report may be disbelieved when their behaviour is inconsistent with the paramedic's expectations.

It is known that patients may suppress or exaggerate their report of pain and pain-related behaviour. Individuals may report pain to gain attention, and this may be particularly relevant in cases involving children. Pain may also be exaggerated to obtain a benefit, either financial in cases involving insurance or compensation claims, or in the form of drugs to support an addiction. Patients may also modify their expression of pain based on their perception of what the health care professional expects to find. For example, stoicism may be demonstrated where this is believed to be a social norm. The expression of pain is also influenced by culture. However, stereotyping on the basis of culture or other social findings may lead to errors in the paramedic's decision making process.

A lack of trust in the patient's report of pain occurs when the paramedic suspects that the patient is reporting pain or exaggerating their behaviour in order to gain a benefit. This lack of trust has been documented in other health disciplines (Chapter 2), and has been clearly evidenced in this research. The belief that some patients may be falsely reporting symptoms to gain opioids for non-medical purposes was a strong theme arising from the data presented in Chapter 5. When these beliefs were deconstructed, the fear of professional "loss of face" on the part of the paramedic was a more dominant concern than was the fear of organisational sanctions for inappropriate treatment or safety issues associated with administration of an opioid where it was not indicated. These attitudes and beliefs represent a significant influence on the individual paramedic's clinical reasoning and subsequent decision making process. As inappropriate labelling of a patient as a "drug seeker" may affect the quality of the care, paramedic must be able to recognise the influence that inaccurate or biased judgements may have on the patient care process. However, the reasons for attributing ulterior motives for reporting pain are complex and as such simple solutions are unlikely. Explanations include the possibility that paramedics see themselves as the gatekeeper to drugs such as morphine, where use is restricted by legislation with penalties for misuse. In this role they may see themselves as a protector of societal norms or values in restricting the indiscriminate use of opioids. Concerns about adverse effects of analgesics also affected clinical decisions, particularly as opioids are known to be associated with adverse affects that may be a

threat to the patient's health. However, this characteristic of opioids may also be used as a strategy to avoid administration where the use of the drug is indicated.

Paramedics routinely give drugs for symptom relief, with one example being a complaint of shortness of breath. However, the difference in this instance is that the condition may be evidence of a threat to life, whereas pain may be seen as an innocuous – if unpleasant – symptom that may be associated with serious pathology, but is more often a diagnostic marker rather than a disease in its own right. In addition, the first line drugs used to treat shortness of breath due to disease such as asthma are considered safe, and include drugs that are available without prescription. In contrast, access to drugs used to treat pain, such as opioids, are tightly controlled by legislation, with serious sanctions for abuse or misuse. The portrayal of opioids as dangerous drugs that are subject to misuse has been enhanced by the popular press.

One of the distinctive aspects of the nature of paramedic practice is the brevity of the encounter with the patient. It is unusual to have previously encountered the same patient, and the patient's history is often unknown. In addition, paramedics have few opportunities to receive feedback on the accuracy of their clinical judgements. So, while a patient may be suspected of drug seeking behaviour, the final diagnosis may be unavailable to the paramedic if they are unable to follow up the case. While these circumstances may not be unique to paramedic practice, the inability to confirm the diagnosis may compromise the accuracy of clinical decisions in subsequent cases. Despite these limitations, paramedics must use the available data to make a clinical judgement. However, paramedics must be cognisant of the potential for errors in judgements regarding the assessment of a patient with pain, particularly where and must ensure that judgements are unbiased and made in the best interests of the patient. This does not mean that all patients reporting pain will receive analgesia, but when this is the decision reached, the paramedic must be able to defend the decision and must reveal the rationale for the decision not to treat the patient.

The Influence of These Findings on Further Research

Research that investigates specific aspects of pain management practice is warranted to identify causes for disparities of care identified in this thesis. For example, the question of gender differences has already been addressed by a study of the effect of paramedic gender on analgesic administration as one possible cause for this difference. This study is currently being undertaken by this author in collaboration with the Ambulance Research Institute, Ambulance Service of NSW (Monash ethics approval CF09/3658 - 2009001970: The influence of paramedic gender on pain management practice).

Paramedics have an important role in assessing, evaluating, and managing a patient's pain. However, assessment of pain is complicated by the complex interaction of physiological, psychosocial and environmental factors that affect the perception and expression of pain. The perception and expression of pain may be influenced by a range of variables that include language ability, culture, context, previous pain experience, personality, coping styles, and expectations of cure. The interpersonal variability associated with pain contributes to the complexity of the decoding of the experience that paramedics and other health professionals must perform to inform their management of the patient's complaint. The "decoding" of the patient's pain usually involves an attempt to quantify the symptom through the use of a pain scale such as the VNRS. However, this metric may provide limited or misleading information about the patient's pain experience. Further work is required to help paramedics understand the complex nature of pain, and to better understand the factors affecting the assessment and evaluation of pain. Further research may need to investigate other methods of measuring and evaluating pain that include dimensions that extend beyond the sensory domain.

Investigation of the other disparities in practice appears warranted. For example, patients with chronic pain are less likely to receive analgesia than patients with pain of recent onset. Research should investigate whether this finding is related to the paramedic's knowledge of chronic pain syndromes, or practice guidelines that do not enable paramedics to manage chronic pain. The possibility that patients with chronic pain are disadvantaged due to incorrect perceptions about their motive in seeking analgesia should be established to ensure that these patients receive appropriate care.

Although this research excluded children, there is an obvious need to study paramedic pain management practice among this vulnerable section of society. Evidence of inadequate analgesia and poor levels of documentation of pain in children have been reported in other studies, including the prehospital domain.[1-4] It is important to investigate the state of paediatric pain management practice in Australia to identify any deficiencies in practice.

Apart from clinical and epidemiological research, studies into education and curriculum design for paramedics should not be neglected. Research should inform educational design that develops appropriate attitudes and beliefs as well requisite knowledge of pain, the factors affecting the perception and expression of pain, and the management of pain. The model of clinical decision making presented in Chapter 6 should be used to inform learning objectives and design of paramedic curricula.

Strategies for Change

Given that this thesis has found that personal and organisational factors influence pain management practice, the achievement of improved patient outcomes will require a targeted strategy that addresses the source of the variations in practice. Deficiencies in the management of pain have been identified in other health settings (Chapter 2) and are a recurring theme in the literature. Change that has been associated with improvements in assessment and documentation of pain in a hospital setting have involved repeated educational interventions, changes in the documentation process, development of clinical leaders that mentor staff to achieve the required standards, and regular clinical audits involving timely feedback to staff.[5] However, these strategies may prove challenging to implement in an EMS setting where paramedics typically work without direct supervision, and observation of practice and mentoring are constrained by organisational resources and operational demands.

Apart from personal attributes such as knowledge about the pathophysiology of pain and therapeutic interventions to manage pain, the paramedic's judgements and decisions regarding a patient's complaint of pain are affected by several variables. These include the influence of organisational variables such as the prevailing culture regarding the importance of pain management. As the paramedic's clinical

judgements are central to the formation of clinical decisions involving pain, the model of clinical decision making elaborated in Chapter 6 will assist in diagnosing barriers to effective care, and will inform strategies that individuals, the profession and employers develop to enable and maintain effective evidence-based care for patients with pain.

For example, an analysis of the data presented in Chapter 3 show an abnormal distribution of final pain scores (Figure 3-4). The high frequency of final scores of 2/10 is consistent with the organisation's policy of reducing pain to 2/10 or less. While a worthy aim, paramedics who are unable to achieve this benchmark may falsify the patient care record to avoid sanctions resulting from a clinical audit of their practice. As such, the data in Figure 3-4 may represent "audit artefact" rather than a true indication of clinical outcome. Organisational quality improvement and critical incident reporting systems require openness and truthfulness in reporting. Given that this study found that some paramedics believe it appropriate to document care in a way that avoids clinical audit, the effectiveness of audit systems must be questioned. EMS that measure clinical outcomes such as reduction in pain score may be unaware of poor practice if outcomes are manipulated to avoid scrutiny during clinical audit. In this case the organisation needs to reassure paramedics that the inability to alleviate pain is an opportunity to investigate reasons and to develop strategies to improve patient outcomes.

Paramedics must be encouraged to document care accurately and truthfully. Education that prepares paramedics for practice must highlight the importance of recording what they observe, rather than what they think the organisation wants. The act of falsifying or altering a patient care record must be understood in relation to the professional, ethical and legal consequences. Although paramedics in Australia are not yet registered under the Australian Health Practitioner Regulation Agency, paramedics must understand the impact that the falsification of records may have on the registration status of other health professionals.

The analysis of focus group transcripts found that paramedics believed that while the organisation promoted effective pain management, in reality paramedics were receiving mixed messages from managers that may be in conflict with organisational policy. The falsification of data to avoid scrutiny and to achieve clinical benchmarks

was identified during focus group discussions with paramedics. This issue places significant limitations on the organisation's ability to monitor patient outcomes and to generate reliable clinical data to inform practice. Although the transferability of research into clinical audit from other settings to prehospital practice has been questioned,[6] research that investigates methods used by other health professions and health agencies to audit pain management may be applicable to paramedic practice. In addition, results presented within this thesis should be used to support the development of audit processes that are specific to EMS.

The Role of Education

Although this study did not directly investigate paramedics' knowledge of contemporary pain theories and management principles, the focus group analysis suggests that educational interventions may help to address knowledge gaps and misconceptions identified by this study. The importance of education as a means of improving and maintaining the quality of care of patients suffering pain has been identified by the National Pain Strategy, which recommends that pain management be designated as a "key competency in undergraduate and postgraduate education for health professionals".[7] The amount of time spent on the development of students' knowledge of pain is at odds with the time devoted to this topic in paramedic education programs, although a scant amount of pain-related content has also been found to be a feature of education programs for other health disciplines.[8] The current lack of emphasis on pain in curricula for medical, nursing and allied health students has been acknowledged by the International Association for the Study of Pain (IASP), and in an attempt to bridge gaps in education programs designed to prepare students for entry to their disciplines the IASP has published core curricula for health professional education based on recommendations from expert panels.[9] An examination of paramedic curricula and textbooks demonstrates limited pain-specific content.[10] Pain tends to be described as a marker for serious pathology such as acute coronary syndrome, and it is uncommon to find an extended discussion of pain that extends beyond the level of pain as a symptom of injury or disease. While the topic of pain inevitably arises in discussions or illness and injury, the Bachelor of Emergency Health (Paramedic) course offered by Monash University provides four

hours of student contact time for the teaching of the pathophysiology of pain and the assessment of pain in a course with over 1700 hours of contact time.

Education for paramedics must address the physiology of pain, assessment of pain, and methods of analgesia. However, transference of knowledge to the clinical setting requires appreciation of ethical, social, environmental and cultural influences in order to achieve appropriate standards of practice. The role of the paramedic as a patient advocate cannot be understated, as the paramedic has an important role in patient education, given that the patient's beliefs and values can themselves be barriers to effective analgesia. However, those with a responsibility for ensuring that clinical standards are achieved and maintained need to realise that information disseminated during a course of instruction may have a minimal effect on behaviour, particularly in situations where group norms and organisational tradition may reshape attitudes during the process of socialisation that occurs once students enter the workplace. These influences must also be managed in order to achieve appropriate standards of care and to overcome barriers to effective pain management practice.

Education is frequently cited as a panacea to solving evidence-practice gaps in clinical practice. However, research investigating the influence of education in changing pain management practice has shown mixed results. An educational intervention that aimed to improve paramedic pain management practice was able to document improved knowledge and increased frequency of paramedic documentation of pain, but failed to show any significant increase in pharmacological interventions following the educational program.[11] While this may reflect weakness in the educational design or research methods, it may also reflect systems issues such as the adequacy of treatment protocols or the influence of organisational culture that may inhibit effective pain management.

Design of educational interventions that aim to improve the care of patients with pain must address cognitive, psychomotor and affective outcomes, with the latter important in shaping behaviour so that students understand how to manage pain while acknowledging the often adverse effects their personal beliefs and values may have on their clinical decision making. The model elaborated in this thesis will help to design educational interventions that achieve learning outcomes encompassing the

knowledge, skills and attitudes required to develop appropriate and defendable clinical judgements.

Limitations

Although pain is a universal human experience, this research described the incidence of pain and the paramedics' management of and beliefs about pain in the context of one Australian state. The findings may not be relevant in settings that employ different models of community based emergency health care, for example in settings where physicians take on the role of the paramedic, or where legislation restricts the range of pharmacological agents available to paramedics for the management of pain.

As stated in Chapter 3, the data used to investigate the current state of pain management practice relied on a retrospective, observational study that used a convenience sample of patient care records. Errors associated with this method may have occurred, including the possibility of documentation errors or bias in recording patient observations and drug therapy as well as transcription errors.

Even though the focus groups generated some rich data with participants willing to share their impressions with other members of the group, the use of a peer group may have led to modification of attitudes in order to comply with group expectations. Despite this potential limitation, the major themes that were generated were consistently identified across the different groups of paramedic participants.

Within each group significant interpersonal variations in beliefs and the direction of beliefs were noted. Whether these differences are associated with the individual's ability to use a more analytical approach to clinical decision making that is cognisant with errors such as bias that may affect clinical judgements is unknown.

Summary

This thesis has added to the evidence base relating to paramedic assessment and care of patients experiencing pain. Evidence of the state of paramedic pain management practice has been analysed and described. Results identified inadequate pain relief for patients experiencing pain, attributable to paramedic beliefs and clinical judgement, which was also affected by organisational factors. Paramedics and

student paramedics who participated in the focus groups demonstrated diverse beliefs about the assessment and management of a patient complaint of pain. A major theme involved believing the patient, which includes a belief that some patients are "drug seekers". The possibility of deceit to obtain analgesics can result in a loss of trust in the patient but also a "loss of face" for the paramedic, and this was associated with concerns about loss of their professional integrity.

A model of clinical decision making in cases of pain was an important outcome of this research. The model will enable the assessment of clinical error and the development of strategies to improve clinical decision making in cases involving pain. The outcomes of this thesis can be used to ensure that equitable and effective care is provided by paramedics to alleviate pain and improve the patient's quality of life.

List of References

1. Swor R, McEachin CM, Seguin D, Grall KH. Prehospital pain management in children suffering traumatic injury. Prehosp Emerg Care 2005; 9(1):40-3.

2. Alexander J, Manno M. Underuse of analgesia in very young pediatric patients with isolated painful injuries. Ann Emerg Med 2003; 41(5):617-22.

3. Mader TJ, Letourneau P. Pain medication administration in pediatric trauma patients with long bone fractures before emergency department arrival: ACEP Research Forum. Ann Emerg Med 2004; 44(Supplement 1):S104.

4. Izsak E, Moore JL, Stringfellow K, Oswanski MF, Lindstrom DA, Stombaugh HA. Prehospital pain assessment in pediatric trauma. Prehosp Emerg Care 2008; 12(2):182-6.

5. Gordon DB, Rees SM, McCausland MR *et al*. Improving reassessment and documentation of pain management. Jt Comm J Qual Patient Saf 2008; 34(9):509-17.

6. Linwood R, Day G, FitzGerald G, Oldenburg B. Quality improvement and paramedic care: What does the literature reveal for pre-hospital emergency care in Australia? Int J Health Care Qual Assur 2007; 20(5):405-15.

7. Australian and New Zealand College of Anaesthetists, Faculty of Pain Medicine. National Pain Summit: Draft national pain strategy. Melbourne: ANZCA, 2010.

8. British Pain Society. Survey of undergraduate pain curricula for healthcare professionals in the United Kingdom. London: The Pain Education Special Interest Group of the British Pain Society, 2009.

9. Charlton JE ed. Core curriculum for professional education in pain. 3rd edition. Seattle: IASP Press, 2005.

10. Lord B. Book review: Paramedic practice today: above and beyond. J Emerg Prim Health Care 2009; 7(1):Article Number: 990350.

11. French SC, Salama NP, Baqai S, Raslavicus S, Ramaker J, Chan SB. Effects of an educational intervention on prehospital pain management. Prehosp Emerg Care 2006; 10(1):71-6.

Appendices

Appendix A: Measurement of pain in the prehospital setting

Lord BA, Parsell B. Measurement of pain in the prehospital setting using a visual analogue scale. Prehospital Disaster Med 2003; 18(4):353-8.

ORIGINAL RESEARCH

Measurement of Pain in the Prehospital Setting Using a Visual Analogue Scale

Bill A. Lord, MEd;[1] Brian Parsell, GDipHSM[2]

1. Senior Lecturer, Monash University Centre for Ambulance and Paramedic Studies, Frankston VIC, Australia
2. Acting Assistant Operations Manager—Southwestern Sydney Area Ambulance Service of New South Wales, Sydney, Australia

Correspondence:
Bill Lord, MEd
Monash University Centre for Ambulance and Paramedic Studies
PO Box 527
Frankston VIC 3199 Australia
E-mail: Bill.lord@med.monash.edu.au

Keywords: benchmarking; emergency medical services; emergency medical technicians; pain measurement; prehospital; visual analogue scale

Abbreviations:
ASNSW = Ambulance Service of New South Wales
CI = Confidence Interval
EMS = Emergency Medical Services
PRF = patient report form
Tend = hospital of destination
T0 = initial patient assessment process
VAS = visual analogue scale
VNRS = verbal numeric rating scale

Received: 23 May 2003
Accepted: 03 July 2003
Revised: 08 July 2003
Web publication:

Abstract

Introduction: The aim of this study was to use a visual analogue scale (VAS) to measure the adequacy of prehospital pain management. Patients reported pain severity at two points in time during treatment and transport by ambulance paramedics. The change in pain score was compared with a benchmark reduction of 20 mm that has been shown to correspond with the minimum clinically significant change in pain perception reported by patients.

Methods: This prospective, observational study used a VAS to record pain severity among patients reporting pain who were transported to a hospital by paramedics. Patients used a VAS to score pain severity during the initial patient assessment process (T0), and again at the hospital of destination (Tend). This study reports the mean changes in the scores, and the percentage of cases for whom the difference between T0 and Tend in the study population achieved or exceeded the 20 mm benchmark. A survey also was administered to paramedics who participated in this study in order to identify attitudes, values, and beliefs relating to the measurement of pain.

Results: A total of 262 patients were enrolled in this study. The mean value for the reduction in VAS (T0-Tend) was 18.2±23.9 mm [±SD] (Median = 14.0mm, 95% confidence interval (CI) = 15.3–21.1 mm). One hundred and thirty-four patients (51.1%) did not receive analgesia (either morphine sulfate or methoxyflurane). The mean initial (T0) pain score for the no-analgesia group was 54.5 ±24.7 mm [±SD], with the mean value for the change in VAS (T0-Tend) = 10.6 mm (median = 5 mm, 95% CI = 6.4-14.8 mm). Forty-six patients (17.6%) recorded some deterioration in their pain score at Tend (T0-Tend<0 mm). Survey results identified attitudes that may affect paramedics' pain management practice.

Conclusion: The results suggest that inadequate analgesia is an issue in this study setting. Effective analgesia requires formal protocols or guidelines supported by effective analgesic therapies along with education that addresses attitudes that may inhibit pain assessment or management by paramedics. Regular audits form part of clinical quality assurance programs that assess analgesic practice. However, such audits must have access to data obtained from patient self-reporting of pain using a valid and reliable pain measurement tool.

Lord B, Parsell B: Measurement of pain in the prehospital setting using a visual analogue scale. *Prehosp Disast Med* **2003;18(4):353–358.**

Introduction

Pain management is a vital, yet sometimes neglected or inadequately managed, component of the patient-care process. Much of the evidence that confirms this belief arises from the study of analgesia in the hospital

emergency department, postoperative, and palliative care settings.[1–3] Although evidence of the efficacy of pain management practice in the prehospital environment is scant, the available studies suggest that inadequate analgesia also is a problem in this setting.[4–7]

In an effort to develop a foundation and framework for out-of-hospital research, Maio and colleagues undertook a study to determine priority emergency medical services (EMS) research conditions. This identified "discomfort"—which includes pain—as a priority condition for prehospital outcomes research.[8]

Despite the fact that effective pain management relies on the formal assessment of the nature and severity of the patient's pain, several studies have recognized problems associated with accurately assessing pain, and have described cases of inadequate pain relief resulting from difficulties in assessment. Such studies recognize that pain management decisions are affected by difficulties in quantifying and qualifying pain, and by individual beliefs, values and attitudes relating to the use of analgesics.[1]

While it may be difficult to quantify the pain that a patient may be experiencing, an attempt should be made to objectively assess the severity and quality of a patient's pain. It also must be recognized that the patient is best placed to report the severity and quality of the pain they experience.[9] This assessment can examine several dimensions including quality and severity. While some of these multi-dimensional scales may be impractical for use in the prehospital setting, use of a simple, uni-dimensional assessment of severity may provide useful information that may guide treatment decisions. Lee relates evidence suggesting that "formal pain measurement reveals unrecognized or under-treated pain", with the consequence that improved recognition of pain can lead to improved pain management practice.[10]

Australian State and Territory ambulance services, with the exception of the Ambulance Service of New South Wales (ASNSW), include a section for recording pain severity on the patient report form (PRF). This usually is recorded using the verbal, numeric rating scale (VNRS), which requires the paramedic to ask the patient to describe the severity of their pain on a scale from zero to 10, with 10 being most severe and zero representing no pain. The term "paramedic" in this context is used to describe all clinical levels of qualified ambulance officers.

However, the ASNSW does not require paramedics to record pain scores on the PRF. Therefore, the actual use of pain scores by paramedics employed by the ASNSW is unknown. The efficacy of interventions that aim to manage pain instead are reduced to a dichotomous response in the "observations and treatment" section of the PRF, where the response is recorded under the heading "Effective (Y or N)". This evidence of efficacy tends to be based on the paramedics' judgment rather than on patient self-reporting.

While the VNRS is a valid and reliable tool, other types of scoring systems are available that may confer additional benefits in the measurement of pain.[11] Studies that have used a visual analogue scale (VAS) to identify the minimum reduction in pain score needed to achieve a clinically significant change in pain perception have reported differing results. Lee *et al* found that a mean value for pain reduction using a VAS of 29 mm corresponds with patients' perception of adequate pain relief.[12] Research conducted by Todd and Funk indicated that the minimal, clinically important reduction in VAS pain score to be 18 mm.[13] Kelly reported the results of a prospective study of pain measurement in the emergency department, and identified that "a difference in visual analogue scale pain score of less than about 20 mm is unlikely to be clinically meaningful," and recommended that future pain management studies adopt this 20 mm change as the benchmark.[14]

Analgesic	n	(%)
Morphine sulfate	15	5.7
Methoxyflurane	112	42.7
Midazolam	1	0.4
Nil	134	51.1
Total	262	100

Table 1—Drugs administered (n = number)

In order to measure the actual change in pain severity reported by patients in the prehospital setting, this study used a VAS to assess the pain reported by patients at two points in time during treatment and transport by paramedics employed by the ASNSW. The change in pain score was compared with a benchmark reduction of pain severity of 20 mm.

Methods

This prospective, observational study involved the use of a VAS to record pain severity among patients requiring ambulance transport, in which the patients reported pain and the case was classified as an "emergency" or "urgent" call. Ethics approval for this study was granted by the Ethics in Human Research Committee of Charles Sturt University on 08 April 2002 (protocol number 02/029), and by the Central Sydney Area Health Service Ethics Review Committee on 22 April 2002 (protocol number X02-0085).

The study setting was the Sydney region, comprising a population of approximately 3.7 million persons. Prehospital care was provided by the ASNSW. There are 46 ambulance stations servicing this region; however, a convenience sample using four stations was chosen for this study.

Paramedics working from four ambulance stations in the central, northern, western and southwestern areas of Sydney were asked to seek patient consent to record pain severity using a VAS during the initial patient assessment process. This required the treating paramedic to ask the patient to rate the severity of his/her pain by using a simple device that involved the movement of a slider to a point that represented their pain. One end of the scale was marked "no pain" and was associated with a representation of a "happy face". The opposite end of the scale was marked "worst pain ever", and was represented by a "sad face".

The reverse consisted of a 10 cm scale marked in 1 mm increments. After the patient moved the slider, the position of the slider to the nearest millimeter was recorded on the PRF, and the time of first assessment recorded (T0). The

patient was asked to repeat the process again on arrival at the hospital of destination, with the slider returned to zero before the second assessment was conducted. The position of the slider to the nearest millimeter was again recorded on the patient report form. The time of the second assessment was recorded, and the assessment is reported as Tend. Differences in VAS scores were calculated by subtracting the VAS at Tend from the VAS at T0.

Analgesics available for the management of pain were morphine sulfate and methoxyflurane. However, only a relatively small cohort of Advanced Life Support (ALS) or Intensive Care Paramedic officers are authorized to administer morphine sulfate. Intensive Care Paramedic officers may use midazolam to augment morphine sulfate in the treatment of orthopedic injuries.

Any patient aged ≥10 years, where the patient reported pain during the clinical assessment, was eligible for inclusion in this study. Pain scores were to be recorded in all cases where the patient reported pain, even when no analgesic was administered.

Patients were excluded if they met any of the following criteria: (1) Age less than 10 years; (2) An altered level of consciousness that was likely to affect the reliability of the assessment of pain; (3) Known or suspected psychiatric illness that was likely to affect the reliability of the assessment of pain; (4) Language difficulties that may affect the reliability of the assessment of pain; or (5) Patients requiring ventilation or those too breathless to provide an accurate indication of pain severity.

Mean and median values for the differences between T0 and Tend for the cohort are reported. Given that a benchmark VAS reduction of 20 mm has been identified as the minimum clinically significant reduction in pain severity, this study reports the percentage of cases for which the difference between T0 and Tend in the study population achieves or exceeds the benchmark 20 mm reduction in score.

A survey also was administered to each paramedic participating in this study to identify attitudes, values, and beliefs that may influence their measurement of pain. This survey used a five-point Likert scale to record responses to 25 statements.

Results

A total of 262 patients were enrolled in this study during the period of June to November 2002. The mean of the ages of the participants was 52 ±22.7 years (±1 standard deviation), and 49% were male.

Changes in Level of Pain

The mean value of the time differences between T0 and Tend was 16.6 ±0.01minutes. The mean value for pain severity at T0 was 66.0 ±25.2 mm and for Tend was 47.8 ±26.1 mm. The mean value for T0-Tend was 18.2 ±23.9 mm with the median at 14.0 mm, and a 95% confidence interval (CI) of 15.3–21.1 mm.

The benchmark for pain reduction was ≥20 mm. There were 112 patients (42.7%) that recorded a change of ≥20 mm at Tend. One hundred, thirty-four patients (51.1%) did not receive any analgesia. The mean of the initial (T0) values for pain score for the no-analgesia group was 54.5 ±24.7 mm, with the mean value for the changes in VAS (T0-Tend) = 10.6 ±22.0 mm (median = 5 mm, CI = 6.4–14.8 mm). Figure 1 illustrates the frequency and distribution of VAS scores (T0-Tend) for all patients (n = 262). Of the total patients, 39.7% reported no to minimal (0–9 mm) change in VAS. The remainder(55.7%) reported a clinically significant decrease in their pain using the VAS. Thirty-one reported at least a 50% reduction in their level of pain.

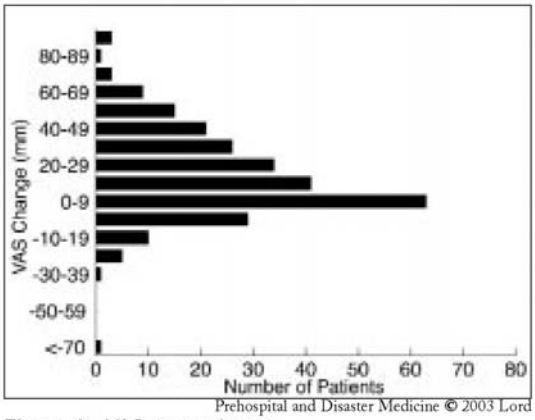


Figure 1—VAS score change

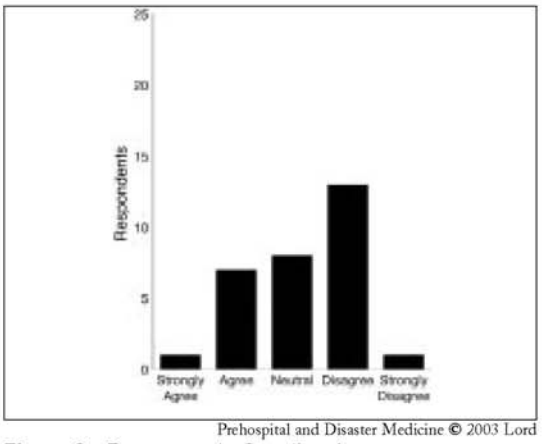
Forty-six patients (17.6%) recorded some deterioration in their pain score at Tend (T0-Tend <0 mm). Eight of these patients (17.4%) received methoxyflurane. None of the patients who received morphine sulfate reported worsening of their pain. The remaining 38 patients (82.6%) who experienced an increase iun their level of pain did not receive either methoxyflurane or morphine sulfate. Table 1 lists the agents used as analgesics in this study and their frequency of use. Just over 50% (51.1%) did not receive any pain medication; 42.7% received methoxyflurane, and 5.7% receive morphine sulfate. Thus, 71.6% of the patients who did not receive analgesia, reported at least no change or improvement in their level of pain.

Attitudinal Survey

Thirty-five paramedics (36%) returned the attitudinal survey. The attitudinal survey results should be interpreted on the basis that the low return rate represents a small and potentially biased sample, which limits any generalization of trends to the study population. However, the following responses are noteworthy as the stated beliefs may have a significant influence on the assessment and management of pain by paramedics:

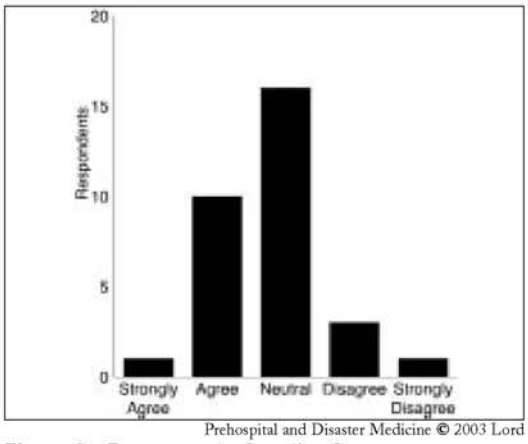
Question 4. "The Visual Analogue Scale (VAS) is too cumbersome to use in the prehospital setting." Only eight of the respondents (23%) agreed with this statement; 14 (40%) disagreed, eight (23%) remained neutral, and five did not answer the question (Figure 2).

Question 9. "A numeric rating scale (asking the patient to rate their pain between 1 and 10) is a more useful method of assessing pain." Thirty-one responded to this



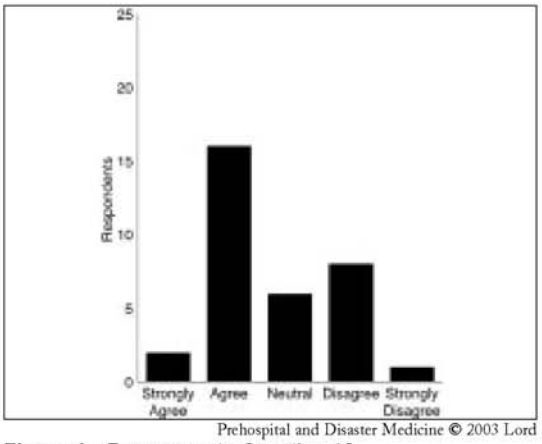
Prehospital and Disaster Medicine © 2003 Lord

Figure 2—Responses to Question 4



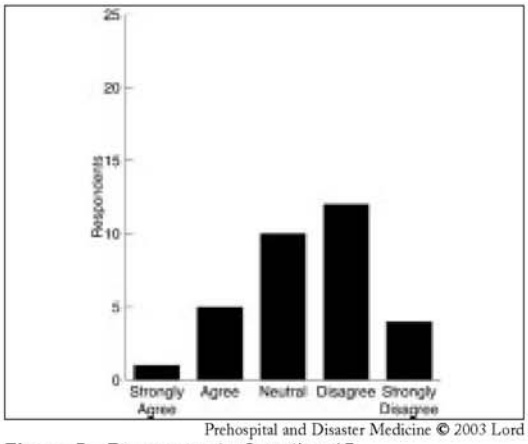
Prehospital and Disaster Medicine © 2003 Lord

Figure 3—Responses to Question 9



Prehospital and Disaster Medicine © 2003 Lord

Figure 4—Responses to Question 10



Prehospital and Disaster Medicine © 2003 Lord

Figure 5—Responses to Question 15

question (Figure 3). Of these, 35% agreed, and 13% disagreed, and the majority remained neutral.

Question 10. "I am able to assess the severity of the patient's pain without the use of a pain scale." Thirty-three responded to the question (Figure 4). One-third agreed and 27% disagreed. Only six (18%) remained neutral.

Question 15. "The VAS encourages patients to overstate their pain." Thirty-two paramedics answered the question of which half disagreed that the scale encourages patients to overstate the severity of their pain (Figure 5). Only six (19%) agreed with the statement.

Several respondents included additional comments. The following seemed particularly important:

Respondent #20. "Human nature would have us exaggerate [sic] our plight and my perception is patients give a higher pain rating on a visual scale versus numeric."

Respondent #35. "We felt embarrassed asking adult patients to use what looked like a child's toy. I have never had problems with the one to 10 scale. You can see that some patients overstate their pain on the one to 10 scale, but I think these same people would overrate their pain using the VAS as well".

Respondent #27. "I believe it is unnecessary. I believe I can assess [a] patient's [sic] level of pain without the VAS. The majority of patients exaggerate their pain."

Respondent #33. "My main concern is that patients, if given a chance, will overstate their pain level. I also don't think that this device has a place in our setting at times."

Discussion

This study analyzed the pain scores obtained by self-assessments by patients using a VAS, as a means of evaluating the effectiveness of pain management in this setting. The study also attempted to identify attitudes that may influence the paramedics' assessment of pain.

Given that only 42.7% of patients reported a change in pain score of ≥20 mm, the results suggest that inadequate analgesia is an issue in the study setting. Of concern is the data arising from the attitudinal survey administered to participating paramedics. Several respondents claimed that patients tend to over-rate the severity of their pain, and

that the caregivers are able to use their clinical judgment to assess patients' pain. This is in contrast with contemporary practice, as it is recognized that there is a poor correlation between patient and observer assessment of pain severity.[15] Ho *et al* reinforces the fact that "reliance on healthcare worker assessment of patient pain results in underestimation of the intensity of that pain".[16]

Measurement of the severity of pain in this study setting, is not formally required, making it impossible for the organization to assess pain management practice and the efficacy of analgesic agents for the treatment of pain. Although paramedics are familiar with the assessment of pain severity using a VNRS, the actual incidence of its use is unknown. Given that the use of pain measurement tools can help health professionals appreciate the severity of the patients' pain,[15] this study used a VAS to evaluate adequacy of prehospital pain management in a prehospital setting where formal measurement of the severity of pain was not common. The VAS was selected for use in this study on the basis of evidence validating its use in the emergency department.[10,14] There also is evidence that ambulance officers in the United Kingdom have successfully used the VAS for this purpose.[17]

A study of paramedic-administered analgesia involving seven ambulance services in the United Kingdom found that there was no provision for pain scores to be entered on the patient report forms (PRFs). The authors recommend that "means must be made available to permit assessment of the efficacy of prehospital analgesia, which must be included on the patient report form to allow automatic and consistent statistical analysis of this important aspect of clinical effectiveness and patient care."[18]

The practicality of the use of a VAS in the prehospital setting is an important consideration in deciding whether it may have a place in the assessment of pain severity. Eight respondents (26%) agreed or strongly agreed that the VAS is too cumbersome (Figure 2). Anecdotal evidence suggested that the VAS device often was lost or was not easy to locate, particularly during the initial pain assessment when the paramedics may have left the scale in the ambulance.

Responses to the attitudinal survey, which indicate paramedics believe they are able to judge the severity of a patient's pain, have serious implications in the general area of pain management, whether or not any type of pain scale is used. The belief that patients cannot be trusted to give a true indication of their pain is misguided, and probably would benefit from a focused effort to educate paramedics about the effect that their beliefs and attitudes can have on the effective management of pain.

Education that attempts to influence the paramedics' beliefs, values, and attitudes may help to improve pain management practice in the prehospital setting. Ricard-Hibon and colleagues demonstrated that the VAS can be an appropriate pain measurement tool in the out-of-hospital setting, and also showed that appropriate training led to improvements in analgesic practice.[5] However, this study involved emergency physicians in the prehospital setting. While education of paramedics may help to address analgesic practice, there is some doubt about the efficacy of such education.[19] Of critical importance is the prevailing organizational culture regarding pain management, and the mechanisms in place to achieve and maintain appropriate clinical standards for analgesia.

Conclusion

Effective analgesia requires formal protocols or clinical practice guidelines supported by effective analgesic therapies, along with regular audits as part of a clinical quality assurance program. However, such programs rely on reliable and valid data derived from patient self-assessment using a recognized pain measurement tool. If the VAS is not practical for use in the prehospital setting, other measurement tools, such as the VNRS, should be employed regularly to assess the severity of the patient's pain and the response to treatment.

References

1. Wilson JE, Pendleton JM: Oligonalgesia in the emergency department. *Am J Emerg Med* 1989;7:620–623.
2. Oden R: Acute postoperative pain: Incidence, severity and etiology of inadequate treatment. *Anesthesiol Clin North Amer* 1989;7:1–5.
3. Pargeon KL, Hailey BJ: Barriers to effective cancer pain management: A review of the literature. *J Pain Symptom Manage* 1999;18:358–368.
4. Chambers JA, Guly HR: The need for better prehospital analgesia. *Arch Emerg Med* 1993;10(3):187–192.
5. Ricard-Hibon A, Chollet C, Saada S, Loridant B, Marty JA: A quality control program for acute pain management in out-of-hospital critical care medicine. *Ann Emerg Med* 1999;34(6):738–744.
6. White LJ, Cooper JD, Chambers RM, Gradisek RE: Prehospital use of analgesia for suspected extremity fractures. *Prehosp Emerg Care* 2000;4(3): 205–208.
7. Vassiliadis J, Hitos K, Hill CT: Factors influencing prehospital and emergency department analgesia administration to patients with femoral neck fractures. *Emerg Med (Fremantle)* 2002;14(3):261–266.
8. Maio RF, Garrison HG, Spaite DW *et al*: Emergency Medical Services Outcomes Project (EMSOP) IV: Pain measurement in out-of-hospital outcomes research. *Ann Emerg Med* 2002;40(2):172–179.
9. Ducharme J: Whose pain is it anyway? Managing pain in the emergency department. *Emerg Med (Fremantle)* 2001;13(3):271–273.

Appendix B: Ethics approvals – quantitative research

Ethics approval 2004/754 - Epidemiology of pain in patients transported by ambulance paramedics.

Metropolitan Ambulance Service research approval R04-012: Epidemiology of pain in patients transported by ambulance paramedics.

MONASH University

Standing Committee on Ethics in Research Involving Humans
Research Grants and Ethics Branch

9 November 2004

Assoc Prof Frank Archer
Centre for Ambulance & Paramedic Studies
Peninsula Campus

Mr William Lord
Centre for Ambulance & Paramedic Studies
Peninsula Campus

2004/754 - Epidemiology of pain in patients transported by ambulance paramedics

Thank you for the information provided in relation to the above project. The items requiring attention have been resolved to the satisfaction of the Standing Committee on Ethics in Research Involving Humans (SCERH). Accordingly, this research project is approved to proceed subject to the receipt of the permission letter from MAS Medical Standards Committee.

Terms of approval

1. This project is approved for three years from the date of this letter and this approval is only valid whilst you hold a position at Monash University.
2. It is the responsibility of the Chief Investigator to ensure that all information that is pending (such as permission letters from organisations) is forwarded to SCERH, if not done already. Research cannot begin at any organisation until SCERH receives a letter of permission from that organisation. You will then receive a letter from SCERH confirming that we have received a letter from each organisation.
3. It is the responsibility of the Chief Investigator to ensure that all investigators are aware of the terms of approval and to ensure the project is conducted as approved by SCERH.
4. You should notify SCERH immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.
5. The Explanatory Statement must be on Monash University letterhead and the Monash University complaints clause must contain your project number.
6. **Amendments to the approved project:** Changes to any aspect of the project require the submission of a Request for Amendment form to SCERH and must not begin without written approval from SCERH. Substantial variations may require a new application.
7. **Future correspondence:** Please quote the project number and project title above in any further correspondence.
8. **Annual reports:** Continued approval of this project is dependent on the submission of an Annual Report. Please provide the Committee with an Annual Report determined by the date of your letter of approval.
9. **Final report:** A Final Report should be provided at the conclusion of the project. SCERH should be notified if the project is discontinued before the expected date of completion.
10. **Monitoring:** Projects may be subject to an audit or any other form of monitoring by SCERH at any time.
11. **Retention and storage of data:** The Chief Investigator is responsible for the storage and retention of original data pertaining to a project for a minimum period of five years.

All forms can be accessed at our website www.monash.edu.au/resgrant/human-ethics

We wish you well with your research.

[redacted]

Dr Andrea Lines
Human Ethics Officer (on behalf of SCERH)

Postal - Monash University, VIC 3800, Australia
Building 3D, Clayton Campus, Wellington Road, Clayton
Telephone +61 3 9905 2052 Facsimile +61 3 9905 1420
Email scerh@adm.monash.edu.au www.monash.edu.au/resgrant/human-ethics/
CRICOS Provider No. 00008C ABN 12 377 614 012

Ambulance
Metropolitan Ambulance Service
ABN 52 253 860 571

375 Manningham Road
Doncaster Victoria 3108

P.O. Box 2000
Doncaster 3108
Administration: 03 9840 3500
Facsimile: 03 9840 3583
www.ambulance.vic.gov.au

6 September 2005

Mr Bill Lord
Monash University Centre for Ambulance Paramedic Studies
Building H Peninsula Campus
McMahons Rd
Frankston Vic 3199

File Ref: COP/11/53

Dear Bill

Re: Research Project R04-012 Epidemiology of pain in patients transported by ambulance paramedics

I am pleased to inform you that MAS have approved the above study, subject to obtaining ethics approval for the amended study protocol from Monash University HREC. Please forward a copy of the final ethics approval as soon as it is available.

As discussed, MAS also requires that you meet all funding requirements associated with the project. In addition, it is expected that a review of preliminary study findings will be conducted with relevant MAS staff prior to more detailed analyses being conducted.

As a component of the ongoing communication processes, MAS requires quarterly status reports (see attached) and a final report on completion of the study. Please ensure that MAS is informed of any protocol changes as soon as possible.

We look forward to working with you on this important project.

Yours sincerely

[redacted]

ALEX CURRELL
General Manager Strategic Planning

Appendix C: Ethics approvals – qualitative research

Ethics approval CF07/0449 - 2007/0139: Paramedic attitudes and beliefs regarding pain assessment and pain management.

Metropolitan Ambulance Service research approval R07-010: Paramedic attitudes and beliefs regarding pain assessment and pain management.

MONASH University

Standing Committee on Ethics in Research Involving Humans (SCERH)
Research Office

Assoc Prof Frank Archer
Department of Community Emergency Health and Paramedic Practice
Faculty of Medicine, Nursing and Health Sciences
Peninsula Campus

23 July 2007

CF07/0449 - 2007/0139: Paramedic attitudes and beliefs regarding pain assessment and pain management

Dear Researchers,

Thank you for the information provided in relation to the above project. The items requiring attention have been resolved to the satisfaction of the Standing Committee on Ethics in Research Involving Humans (SCERH). Accordingly, this research project is approved to proceed.

Terms of approval

1. This project is approved for five years from the date of this letter and this approval is only valid whilst you hold a position at Monash University.
2. It is the responsibility of the Chief Investigator to ensure that all information that is pending (such as permission letters from organisations) is forwarded to SCERH, if not done already. Research cannot begin at any organisation until SCERH receives a letter of permission from that organisation. You will then receive a letter from SCERH confirming that we have received a letter from each organisation.
3. It is the responsibility of the Chief Investigator to ensure that all investigators are aware of the terms of approval and to ensure the project is conducted as approved by SCERH.
4. You should notify SCERH immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.
5. The Explanatory Statement must be on Monash University letterhead and the Monash University complaints clause must contain your project number.
6. **Amendments to the approved project:** Changes to any aspect of the project require the submission of a Request for Amendment form to SCERH and must not begin without written approval from SCERH. Substantial variations may require a new application.
7. **Future correspondence:** Please quote the project number and project title above in any further correspondence.
8. **Annual reports:** Continued approval of this project is dependent on the submission of an Annual Report. Please provide the Committee with an Annual Report determined by the date of your letter of approval.
9. **Final report:** A Final Report should be provided at the conclusion of the project. SCERH should be notified if the project is discontinued before the expected date of completion.
10. **Monitoring:** Projects may be subject to an audit or any other form of monitoring by SCERH at any time.
11. **Retention and storage of data:** The Chief Investigator is responsible for the storage and retention of original data pertaining to a project for a minimum period of five years.

All forms can be accessed at our website www.monash.edu.au/research/ethics/human/index.html

We wish you well with your research.

[redacted]

Dr Souheir Houssami
Executive Officer, Human Research Ethics (on behalf of SCERH)

Cc: Mr William Lord

Postal – Monash University, Vic 3800, Australia
Building 3E, Room 111, Clayton Campus, Wellington Road, Clayton
Telephone +61 3 9905 5490 Facsimile +61 3 9905 1420
Email scerh@adm.monash.edu.au www.monash.edu/research/ethics/human/index/html
ABN 12 377 614 012 CRICOS Provider #00008C

Ambulance

Metropolitan Ambulance Service

ABN 52 253 860 571

375 Manningham Road
Doncaster Victoria 3108

P.O Box 2000
Doncaster 3108
Administration: 03 9840 3500
Facsimile: 03 9840 3583
www.ambulance.vic.gov.au

16th July 2007

File Ref: COP/1177

A/Prof Frank Archer
Department of Community Emergency Health and Paramedic Practice
Monash University
McMahons Rd
FRANKSTON VIC 3199

RECEIVED
18 JUL 2007

Dear Frank

Re: Research Proposal R07-010: "Paramedics attitudes and beliefs regarding pain assessment and pain management " Protocol version 1.1 dated 10/05/2007

I am pleased to inform you that MAS have approved participation in the above study. Any changes to the original application will require submission of a protocol amendment to the MAS Research Committee for consideration, as this approval only relates to the protocol version as detailed above. Please ensure that MAS is informed of any protocol changes as soon as possible.

Bill will need to sign a new confidentiality agreement (attached) and return it to Karen Smith as soon as possible.

As a component of the ongoing communication processes, MAS requires quarterly status reports and a final report on completion of the study. A report on the September 2007 quarter will be due in October 2007 (see attached format). You will be e-mailed a copy of the status report pro-forma with a reminder closer to the date. Status reports are required to be submitted by e-mail.

We look forward to working with you on this important project.

Yours sincerely

[redacted]

ALEX CURRELL
General Manager Strategic Planning

Appendix D: The paramedic's role in pain management

Lord B. The paramedic's role in pain management. Am J Nurs 2004; 104(11):50-3.

Introduction

Several published papers based on findings arising from this research have been included as appendices as these support the discussion of pain in the paramedic practice setting and highlight specific findings. The following paper was published in the American Journal of Nursing following an invitation to publish received from Chris Pasero, a US based expert in pain management.

Chris Pasero is a nurse educator and clinical consultant based in California. She is a co-founder and past president of the American Society for Pain Management Nursing and serves on the Board of Directors of the American Chronic Pain Association. Chris has published extensively on the topic of pain management, and it was while corresponding with Chris about her research that she invited me to submit a paper on the paramedic's role in pain management. This invitation arose from an understanding that research on pain within this discipline was limited. In addition, the invitation to publish in one of the oldest and largest nursing journals in the world recognised the need to inform nurses of the paramedic's role in the management of pain to better inform nurses and other health professions about the influence that paramedic practice may have on the quality and continuity of patient care.

The following pages reproduce the paper in its published form. The paper highlights several themes identified in the literature review (Chapter 2). These include evidence of low rates of analgesic administration to patients with painful injury in the small number of EMS based studies that have investigated paramedic pain management practice. Having identified examples of low rates of analgesic interventions, the discussion considers potential barriers to pain relief based on research conducted in EMS and similar health disciplines. These include organisational barriers, but also personal influences such as the potential for bias in interpreting the patient's account of their pain experience. This paper contributes to the knowledge base relating to pain management in paramedic practice.

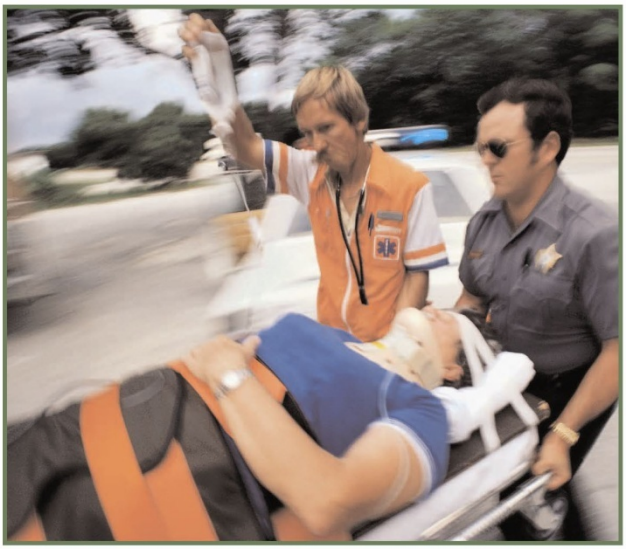
This paper has subsequently been cited in a paper that investigates nurses' attitudes and beliefs in pain assessment and management.[1]

List of References

Layman Young J, Horton FM, Davidhizar R. Nursing attitudes and beliefs in pain assessment and management. J Adv Nurs 2006; 53(4):412-21.

The Paramedic's Role in Pain Management

A vital component in the continuum of patient care.



Paramedics play an important role in the provision of community-based emergency health care, one that includes managing both acute and chronic pain. Clinical practice guidelines and protocols developed by emergency medical services (EMS) and EMS policymakers generally enable paramedics to administer analgesics to patients in pain. However, evidence shows this discipline is beset by the same problems associated with inadequate analgesia in other health disciplines (see *Pain Control*, September).

HISTORICAL CONTEXT

Studies in the United States and abroad show that pain is one of the most common reasons people seek care in the ED.[1-3] One French study showed that 78% of the patients admitted during a 16-day period reported pain, and 54% of these had intense pain.[3] American researchers concluded that 20% of people visiting EDs had moderate-to-severe pain.[2]

Paramedic-initiated analgesia appears to have received little attention in English-language research literature prior to 1970, when Baskett and Withnell first described the use in the United Kingdom of a nitrous oxide and oxygen mixture (sold there under the name Entonox) by an ambulance service.[4] Ambulance officers there apparently didn't have access to any agent for the relief of patients' pain until 1970 because the researchers claimed that, by using the mixture, "for the first time, ambulance personnel can do something specific to relieve pain." In Australia, EMS agencies had introduced an inhalational analgesic, trichloroethylene, by the early 1960s and continued to use it until the 1980s. This agent is still used in some developing countries,[5] but it's used more commonly as an industrial solvent and metal degreaser. There are no known published studies of trichloroethylene administration by paramedics.

While opioids were introduced in the United States by a few EMS agencies in the 1970s, their use was restricted to agencies that employed paramedics trained to deliver advanced levels of care, and they were often reserved for severe pain associated with myocardial ischemia.[6] Outside these agencies, access to effective analgesics such as opioids and nitrous oxide was limited. This situation began to change when studies in Canada[7] and the United States[8] confirmed the safety and efficacy of paramedic-administered nitrous oxide. In 1990 the National Association of EMS Physicians issued a position paper that recommended the administration of nitrous oxide by emergency medical technicians in order to manage pain in the field.[9]

Morphine has long been recognized as the standard against which other analgesics are measured.

Bill Lord is head of the undergraduate paramedic program at the Centre for Ambulance and Paramedic Studies, Monash University, Frankston, Victoria, Australia. Pain Control *is coordinated by Chris Pasero: cpasero@aol.com.*

By Bill Lord, BHlthSc, GDipCBL, MEd

CE 3 HOURS Continuing Education

However, its wider use in the prehospital setting has, until recently, faced opposition. While some barriers to its use have involved practical and legal issues surrounding the prescription and security of opioids, some of the resistance is based on erroneous notions that "the relatively long action of the drug may hinder accurate diagnosis on arrival at hospital by masking pain and obscuring pupillary signs."[4] Several studies in both the United States and Australia in more recent years have demonstrated the inaccuracy of this notion,[10, 11] and many EMS agencies worldwide have introduced paramedic administration of morphine in cases of patients suffering severe pain.

In the Australian state of Victoria, EMS ambulance agencies have recently embarked on an educational program for all clinical staff members that will ensure that morphine can be administered to any patient in pain, according to clinical practice guidelines. These agencies are also investigating the use of fentanyl administered intranasally, using an atomizing device that delivers the analgesic to the mucosa. This simple form of administration has the potential to enable paramedics at all levels of proficiency to provide rapid and effective analgesia. Another Australian EMS agency has authorized paramedic administration of midazolam (Versed) in conjunction with morphine for treating severe pain arising from injury, including back pain. These initiatives have the potential to provide more effective pain relief than can be achieved using inhalational analgesics such as nitrous oxide.

EVIDENCE OF INADEQUATE ANALGESIA

Although increased research into pain management, together with the availability of effective analgesics and clinical practice guidelines, should ensure that pain is well managed, evidence shows that paramedics and EMS systems need to improve their pain management practice.

Unfortunately, more than 30 years *after* Baskett and Withnell reported that "it is still nearly as unpleasant for a patient to be taken to hospital with a fractured femur or acute urinary retention as it was 30 years ago,"[4] it appears that little has changed. In a recent study conducted in the Midwest, paramedics cared for 1,073 patients with suspected extremity fractures, and only 18 patients (approximately 2%) received paramedic-initiated analgesia.[12] This occurred in an EMS setting in which morphine and nitrous oxide were available. In a retrospective study conducted two years later of 124 patients with hip or lower-extremity fracture who were transported by ambulance, 113 (approximately 91%) received analgesia in the ED, and only 22 (approximately 18%) received prehospital analgesia.[13]

Further evidence of inadequate analgesia in the prehospital setting arises from another recent U.S. study of paramedic-initiated analgesia for isolated extremity fractures. The paramedics provided analgesia to just 11% of patients who reported pain. After an educational program that addressed the measurement of pain severity, the efficacy of the analgesics used, and the misconception that short transport times reduced the time patients have to wait for analgesic administration in the ED, the incidence of analgesic use rose to 31%.[14] The authors noted that although this represented a significant improvement in analgesic use, almost 70% of patients were still left with untreated pain. A retrospective study of patients who sustained burn injuries, amputation injuries, or both found that although the paramedics involved in the study were allowed to administer morphine, only 11% of patients with burns and 17% of patients with amputation injuries received it.[15]

HINDRANCES TO EFFECTIVE PAIN MANAGEMENT

Several factors are responsible for the findings that pain is undertreated in the prehospital setting, and these are likely to be common to other health disciplines. However, the lack of discipline-specific research makes it difficult to confirm this assumption. Apprehension about adverse effects arising from analgesic use and the influence that administration of analgesics may have on the diagnostic process have been indirectly implicated. Evidence that the relief of pain may actually enhance the diagnostic process refutes the contention that opioids mask symptoms and complicate the diagnosis.[10] Withholding analgesics during the diagnostic process has been widely criticized and is considered unacceptable by many professional organizations today (see *Pain Control*, July 2003). Yet this unfounded concern has resulted in physicians refusing to give paramedics the authority to administer morphine in cases in which analgesia is clearly indicated.[16]

Relatively little emphasis is placed on the notion of pain as a condition that requires attention and management during prehospital care, which is

another barrier to effective management. Paramedic texts and curricula have generally ignored pain management, instead discussing pain as a diagnostic tool or an inevitable consequence of tissue injury. Furthermore, analgesia isn't seen as a priority in EMS training, in which paramedics are taught to focus on the resuscitation and stabilization of acutely ill and injured patients.

In a critique of evidence relating to EMS prehospital interventions, Callaham questioned the focus on "life-saving" interventions, given that the "majority of EMS patients have far more chronic, complex problems that are not amenable to a simple quick fix in the field." Instead, it was suggested that researchers turn their attention to conditions in which paramedics are able to significantly contribute to a broader range of patient outcomes, including well-managed pain.[17]

This requires a change of roles: the paramedic must become a patient advocate rather than a judge of veracity (and ultimately, of worthiness to receive care).

A subsequent U.S. study, known as the Emergency Medical Services Outcomes Project (EMSOP), recommended prioritizing the conditions and diseases encountered in the prehospital setting to guide research on the outcomes of prehospital care for high-priority conditions.[18] The EMSOP researchers identified "discomfort"—which includes pain—as a condition worthy of high priority among those conducting outcomes-based research on prehospital care. Similarly, in a recent position statement on prehospital pain management, the National Association of EMS Physicians Standards and Clinical Practices Committee recommended the development of prehospital pain management protocols, education that targets the treatment of pain, and mandatory assessment for pain and assessment of its severity.[19]

PREHOSPITAL PAIN MEASUREMENT

In the fourth of an ongoing series of EMSOP studies (EMSOP IV), the investigators focused on the "pain" dimension of discomfort, specifically examining pain measurement and the use of pain scales in the prehospital setting.[20] While recognizing the importance of the patient's own reporting of pain, Maio and colleagues were able to find only two published studies that evaluated pain-measurement scales used in prehospital settings. Therefore, the authors sought to identify pain scales that were practical to use in the prehospital setting and that had also been validated in other health care settings.

After reviewing the literature on the use of pain scales, the researchers recommended either the Adjective Response Scale or the Numeric Response Scale (NRS) for use in the prehospital setting. The latter is recommended by most Australian EMS providers as well as U.S. researchers.[21] The NRS involves asking the patient to rate pain between 0 and 10, with 0 representing no pain and 10 the worst pain imaginable.

A more serious treatment failure than not asking patients to evaluate their own pain using a pain scale is thinking that patients can't be trusted to make an accurate report, that a self-report lacks veracity. Such thinking is evident in one U.K. paramedic's comments: ". . . they can scream as loud as they like, if I don't believe it's genuine pain I won't give them a drug."[22]

A few patients may indeed be fabricating their pain experience; however, when health care professionals overestimate the incidence of such cases, it's possible that their perception of all self-reporting of pain severity will be adversely affected. Furthermore, paramedics don't have the right to deny care and treatment because they believe a patient is untrustworthy. Paramedics must learn to accept the patient's report of pain severity and provide care that's based on what the patient says rather than what the paramedic believes. This requires a change of roles: the paramedic must become a patient advocate rather than a judge of veracity (and ultimately, of worthiness to receive care).

RECOMMENDATIONS FOR CHANGE

Research that identifies attitudes that hinder the appropriate use of analgesia often recommends education as a solution. However, if attitudes predominate, education may have little impact. And while it used to be believed that the way to change behavior was to change attitudes, social psychologists in the mid-1960s found the converse to be

true: a change in behavior was more effective in changing attitudes.[23] Clinical mentors can help first to change paramedics' behavior regarding pain management, and the attitudes toward patients in pain may eventually follow. Pain management benchmarks and clinical audits are required to establish and maintain high levels of clinically significant pain relief. EMS systems also need to ensure that paramedics are supported by appropriate practice guidelines that allow independent administration of effective analgesics. For example, Australian EMS agencies use evidence-based clinical practice guidelines whenever possible, and clinical benchmarks, such as reduction in pain scores, are recommended by the Australian Convention of Ambulance Authorities.

Paramedics and EMS policymakers can learn much from the extensive research into pain already undertaken by nurses and other health care professionals; they can be guided by the experience of others and should view the management of pain as a collaboration involving other members of the health care community. Likewise, it's crucial for members of the health care team to acknowledge and support the expansion of the paramedic's role as a frontline pain manager. ED nurses, in particular, can be invaluable in helping to establish prehospital pain assessment and treatment protocols and in ensuring that paramedics are at ease in their role as pain managers. ED nurses should routinely inquire about the paramedic's evaluation of pain as well as interventions that were implemented prior to admission to the ED. This information can be used to determine the need for ongoing assessment and analgesia.

Paramedics are often the first point of care for patients experiencing prehospital pain. It's important that their pain management practice be evidence based. This includes acknowledging the validity of the patient's own report when assessing pain and implementing effective pain management strategies. ▼

Complete the CE test for this article by using the mail-in form available in this issue or visit NursingCenter.com's "CE Connection" to take the test and find other CE activities and "My CE Planner."

REFERENCES

1. Johnston CC, et al. One-week survey of pain intensity on admission to and discharge from the emergency department: a pilot study. *J Emerg Med* 1998;16(3):377-82.
2. McLean SA, et al. The epidemiology of pain in the prehospital setting. *Prehosp Emerg Care* 2002;6(4):402-5.

CE 3 HOURS
Continuing Education

After reading this article, plus "Respiratory Syncytial Virus" *(Emerging Infections)*, page 54, and "Urinary Incontinence in Nursing Homes" *(Bladder Matters)*, page 57, take the test on page 60 to earn 3 hours of continuing education credit.

3. Tcherny-Lessenot S, et al. Management and relief of pain in an emergency department from the adult patients' perspective. *J Pain Symptom Manage* 2003;25(6):539-46.
4. Baskett PJ, Withnell A. Use of Entonox in the ambulance service. *Br Med J* 1970;2(700):41-3.
5. Fenton P. Volatile anaesthetic agents. *Update in anaesthesia* 2000(11). http://www.nda.ox.ac.uk/wfsa/html/u11/u1115_01.htm.
6. Stewart RD. Analgesia in the field. *Prehospital Disaster Med* 1989;4(1):31-4.
7. McKinnon KD. Prehospital analgesia with nitrous oxide/oxygen. *Can Med Assoc J* 1981;125(8):836-40.
8. Stewart RD, et al. Patient-controlled inhalational analgesia in prehospital care: a study of side-effects and feasibility. *Crit Care Med* 1983;11(11):851-5.
9. Use of nitrous oxide: oxygen mixtures in prehospital emergency care. *Prehospital Disaster Med* 1990;5(3):273-4, 276.
10. National Health and Medical Research Council. *Acute pain management: scientific evidence*. Canberra: Commonwealth of Australia; 1999.
11. Pace S, Burke TF. Intravenous morphine for early pain relief in patients with acute abdominal pain. *Acad Emerg Med* 1996;3(12):1086-92.
12. White LJ, et al. Prehospital use of analgesia for suspected extremity fractures. *Prehosp Emerg Care* 2000;4(3):205-8.
13. McEachin CC, et al. Few emergency medical services patients with lower-extremity fractures receive prehospital analgesia. *Prehosp Emerg Care* 2002;6(4):406-10.
14. Lovesky D, et al. Effect of a paramedic pain management training program on pre-hospital analgesic use. *Acad Emerg Med* 2003;10(5):450.
15. Kozac R, et al. Utilization of pain medication in the out-of-hospital setting. *Prehosp Emerg Care* 1997;1(3):180.
16. Gabbay DS, Dickinson ET. Refusal of base station physicians to authorize narcotic analgesia. *Prehosp Emerg Care* 2001;5(3):293-5.
17. Callaham M. Quantifying the scanty science of prehospital emergency care. *Ann Emerg Med* 1997;30(6):785-90.
18. Maio RF, et al. Emergency Medical Services Outcomes Project I (EMSOP I): prioritizing conditions for outcomes research. *Ann Emerg Med* 1999;33(4):423-32.
19. Alonso-Serra HM, Wesley K. Prehospital pain management. *Prehosp Emerg Care* 2003;7(4):482-8.
20. Maio RF, et al. Emergency Medical Services Outcomes Project (EMSOP) IV: pain measurement in out-of-hospital outcomes research. *Ann Emerg Med* 2002;40(2):172-9.
21. McCaffery M, Pasero C. Underlying complexities, misconceptions and practical tools. In: McCaffery M, Pasero C. *Pain: a clinical manual*. St. Louis: Mosby; 1999. p. 35-102.
22. Jones GE, Machen I. Pre-hospital pain management: the paramedics' perspective. *Accid Emerg Nurs* 2003;11(3):166-72.
23. Myers D. *Social psychology*. Boston: McGraw-Hill; 2002.

Appendix E: The impact of patient sex on paramedic pain management in the prehospital setting

Lord B, Cui J, Kelly AM. The impact of patient sex on paramedic pain management in the prehospital setting. Am J Emerg Med 2009; 27(5):525-9.

Declaration for Thesis Appendix E

Declaration by candidate

In the case of Appendix E - ***The impact of patient sex on paramedic pain management in the prehospital setting***, the nature and extent of my contribution to the work was the following:

Nature of contribution	**Extent of contribution (%)**
Concept development, data review and analysis, manuscript compilation.	70%

The following co-authors contributed to the work. Co-authors who are students at Monash University must also indicate the extent of their contribution in percentage terms:

Name	**Nature of contribution**	**Extent of contribution (%) for student co-authors only**
Anne-Maree Kelly	Data review and analysis, manuscript revision.	
Jisheng Cui	Data review and analysis.	

Candidate's Signature	[redacted]	**Date** 15/07/10

Declaration by co-authors

The undersigned hereby certify that:

(1) the above declaration correctly reflects the nature and extent of the candidate's contribution to this work, and the nature of the contribution of each of the co-authors.
(2) they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;
(3) they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;
(4) there are no other authors of the publication according to these criteria;
(5) potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and
(6) the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

Location(s)	**Department of Community Emergency Health and Paramedic Practice** **Building H Peninsula Campus, Monash University**

Signature 1	[redacted]	**Date** 15/7/10
Signature 2	[redacted] Frank Archer for Jisheng Cui	05/10/10

Introduction

This paper was published in the American Journal of Emergency Medicine. The paper describes the effect of gender on analgesic administration by paramedics that was observed during data analysis undertaken in Chapter 3 of this thesis. The cause of the gender effect is unknown. One hypothesis is that the gender of the treating paramedic affects pain management practice. A research project that aims to test this hypothesis was commenced with the Ambulance Service of New South Wales in August 2010.

This paper has been cited by:

Galinski M, Ruscev M, Gonzalez G *et al*. Prevalence and management of acute pain in prehospital emergency medicine. Prehosp Emerg Care 2010; 14(3):334-9.

American Journal of Emergency Medicine (2009) 27, 525–529

ELSEVIER

The American Journal of Emergency Medicine

www.elsevier.com/locate/ajem

Original Contribution

The impact of patient sex on paramedic pain management in the prehospital setting

Bill Lord MEd[a,*], James Cui PhD[b], Anne-Maree Kelly MB, BS, MClinEd[c]

[a]*Department of Community Emergency Health and Paramedic Practice, Monash University, Victoria 3800, Australia*
[b]*Department of Epidemiology and Preventive Medicine, Monash University, Victoria 3800, Australia*
[c]*Joseph Epstein Centre for Emergency Medicine Research, Western Health, Footscray, Victoria 3011, and The University of Melbourne, Melbourne, Victoria 3010, Australia*

Received 15 March 2008; revised 6 April 2008; accepted 8 April 2008

Abstract

Objective: The aim of this study was to establish the impact of patient sex on the provision of analgesia by paramedics for patients reporting pain in the prehospital setting.

Methods: This retrospective cohort study of paramedic patient care records included all adult patients with a Glasgow Coma Score higher than 12 transported to hospital by ambulance in a major metropolitan area over a 7-day period in 2005. Data collected included demographics, patient report of pain and its type and severity, provision of analgesia by paramedics, and type of analgesia provided. The outcomes of interest were sex differences in the provision of analgesia. Data analysis was by descriptive statistics, χ^2 test, and logistic regression.

Results: Of the 3357 patients transported in the study period, 1766 (53%) reported pain; this forms the study sample. Fifty-two percent were female, median age was 61 years, and median initial pain score (on a 0-10 verbal numeric rating scale) was 6. Forty-five percent of patients reporting pain did not receive analgesia (791/1766) (95% confidence interval [CI], 43%-47%), with no significant difference between sexes (P = .93). There were, however, significant sex differences in the type of analgesia administered, with males more likely to receive morphine (17%; 95% CI, 15%-20%) than females (13%; 95% CI, 11%-15%) (P = .01). The difference remains significant when controlled for type of pain, age, and pain severity (odds ratio, 0.61, 95% CI, 0.44-0.84).

Conclusion: Sex is not associated with the rate of paramedic-initiated analgesia, but is associated with differences in the type of analgesia administered.

1. Introduction

The importance of pain management in the prehospital setting has been recognized by the Emergency Medical Services (EMS) Outcomes Project in the United States, with the assertion that "the relief of discomfort might be the most important task EMS providers perform for the majority of their patients" [1]. Supporting this, the National Association of Emergency Services Physicians position statement states that "the relief of pain and suffering of patients must be a priority for every EMS system" [2].

The Council of Ambulance Authorities—the peak body representing statutory and other providers of ambulance

* Corresponding author. Tel.: +1 61 409 232 828.
E-mail address: bill.lord@med.monash.edu.au (B. Lord).

0735-6757/$ – see front matter © 2009 Elsevier Inc. All rights reserved.
doi:10.1016/j.ajem.2008.04.003

services of Australia and New Zealand—has identified quality of pain relief as a surrogate measure of compassion and caring, and has recommended the development and adoption of clinical performance indicators that include reduction in pain. In the State of Victoria, the Metropolitan Ambulance Service has taken up this challenge and has set pain reduction benchmarks for paramedic management of cardiac and traumatic pain [3].

Although the importance of timely and effective prehospital analgesia has been acknowledged, factors that may influence paramedic administration of analgesia need to be identified to ensure that all patients have access to high-quality, equitable care. Although ED-based studies have suggested that sex might influence the provision of analgesia [4], there is ongoing debate about the existence of sex differences in analgesia, in part due to the limited number of studies and significant variations in study methodology and findings. The one study conducted in the prehospital setting suggests a sex bias, but has a number of flaws that limit its generalizability [5]. This study sought to determine the impact of patient sex on the provision of analgesia by paramedics for patients reporting pain in the prehospital setting in Australia.

2. Materials and methods

2.1. Study design and setting

This project is a substudy of a larger study investigating the prevalence and treatment of pain by paramedics in Australia. The study involved a retrospective analysis of anonymous patient care records (PCRs) for all adult patients (age, >14 years) with a Glasgow Coma Score higher than 12 transported to hospital by emergency ambulance for the 7-day period 16-22 August 2005. For cases involving documented reports of pain, demographics, provision of analgesia by paramedics, and type of analgesia provided, as well as the cause, duration, and region of pain and initial pain severity scores recorded by the treating paramedic were extracted by explicit review methodology [6]. The study was approved by the Monash University Standing Committee on Ethics in Research Involving Humans and by the Metropolitan Ambulance Service Research Committee.

The study setting was an ambulance service in Melbourne, Australia, where one organization provides emergency ambulance response to a population of approximately 3.9 million people. In 2005, when these data were collected, the service responded to approximately 253 000 emergency calls and transported 202 143 patients [3]. All paramedics in this jurisdiction may administer inhaled methoxyflurane or intravenous morphine sulfate according to protocols. Nonurgent cases or routine patient transfers may be referred to nonemergency transport agencies if the patient meets low acuity criteria [7], and these cases were not included in this study.

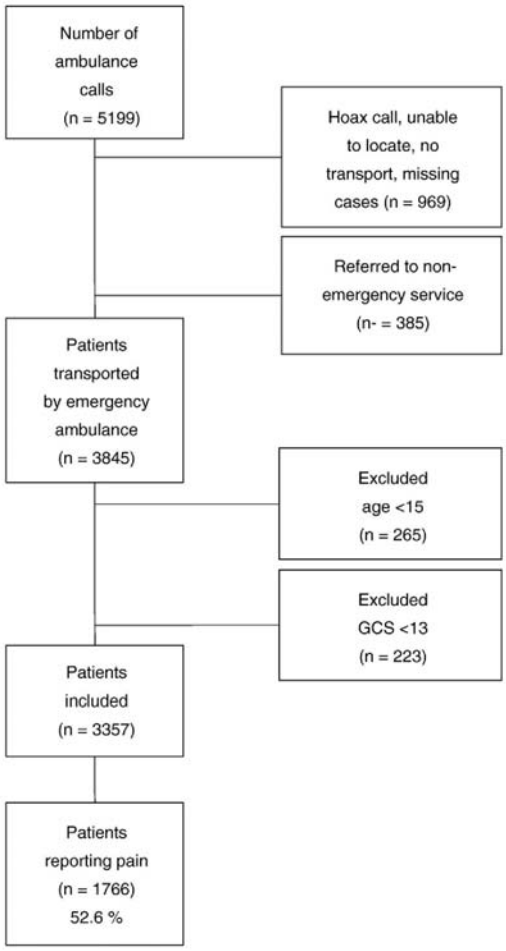


Fig. 1 Flow chart showing cases and excluded data.

2.2. Participants and data collected

Cases were included in this study if a description of pain was entered by the treating paramedic in the history section of the PCR, or where words associated with pain such as ache, headache, burning, or tearing sensations were noted. Pain was also identified by any notation of pain severity score in the vital sign section of the PCR. The most common pain severity assessment tool used by paramedics in this study was the verbal numeric rating scale (NRS), which requires the patients to rate their pain severity between 0 and 10, with 0 meaning no pain and 10 the worst pain imaginable. This tool has been validated in the ED for the assessment of acute pain [8,9] and is recommended for use in the prehospital setting [1].

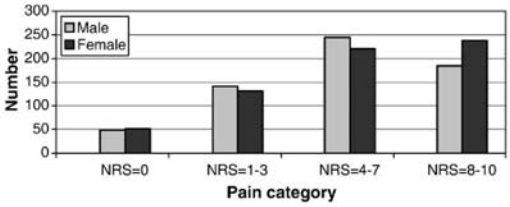


Fig. 2 Initial pain category distribution by sex.

2.3. Outcomes of interest

The primary outcome of interest was any differences in the provision of analgesia based on patient sex. Secondary outcomes were comparison of analgesic type administered by sex, refusal of analgesia by sex, and clinically significant reduction in NRS pain score. The latter was defined as a reduction in NRS pain score of 2 or more.

2.4. Data analysis

Data were analyzed using descriptive statistics and χ^2 test for the difference in the proportion of analgesia provided between males and females. Univariate and multivariate logistic regression methods were conducted to calculate odds ratios and their associated 95% confidence intervals (CIs). The explanatory variables used in the multivariate analysis include age, sex, pain severity, and initial pain score. The goodness-of-fit of the model was evaluated by the R^2 statistic, in which $R^2 = 0.13$ and the associated P value = .99. This suggests that the logistic model fitted the data very well. All statistical tests were 2 sided and considered to be significant at the .05 level. Stata version 9 (Stata Corporation, College Station, Tex) was used to undertake the statistical analysis.

3. Results

Of the 3357 patients transported by paramedics, 1766 (53%) reported pain (Fig. 1). The median age of transported patients was 61 years (interquartile range, 39-79) and 52% were female. Paramedics recorded an assessment of pain severity in 95% of cases (n = 1672), with an NRS most frequently used to record pain severity (71% of cases, n = 1262). More females than males reported severe pain (pain score, 8-10) at the first pain assessment ($P = .05$) (Fig. 2).

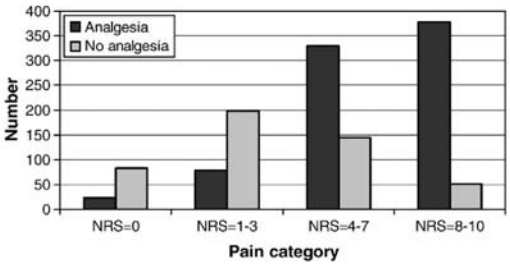


Fig. 3 Proportion of patients receiving analgesia by initial pain category.

The proportion of patients reporting pain that did not receive analgesia was 45% (791/1766) (95% CI, 43%-47%). Analgesic administration for each NRS category is shown in Fig. 3.

Of the 1766 patients reporting pain, 15% (n = 263; 95% CI, 13%-17%) received morphine, 34% (n = 605; 95% CI, 32%-37%) received methoxyflurane, and 6% (n = 104; 95% CI, 5%-7%) received both. In cases where an NRS was recorded, 25% (n = 109) of patients with severe pain (NRS, 8-10) received morphine, with the rate falling to 20% (n = 95) for patients having moderate pain (NRS, 4-7).

Analysis of administration of analgesia, either methoxyflurane and/or morphine, showed no significant sex difference ($P = .93$). There were, however, significant sex differences in the type of analgesia administered, with females less likely to receive morphine (13% vs 17%; $P = .01$). This difference remains significant when controlled for type of pain, age, and pain severity (odds ratio for females receiving morphine, 0.61; 95% CI, 0.44-0.84) (Table 1).

There was a strong relationship between pain score category and receiving analgesia ($P \leq .001$) (Fig. 3). There was no sex difference in the proportion of patients reporting reduction in NRS pain score by 2 or more (46% vs 46%; $P = .82$).

Paramedics recorded that 11% (95% CI, 9%-13%) of patients declined analgesia when it was offered. There was no significant sex difference in the proportion of refusal (female, 10.9%; male, 10.7%; $P = .92$).

Table 1 Logistic regression of factors influencing the administration of morphine

Variable	Odds ratio	95% CI	*P* value
Age category (y)			
15-40	1.0		
>40 and ≤60	1.42	0.92-2.20	.114
>60 and ≤80	1.34	0.86-2.07	.193
>80	1.33	0.80-2.20	.266
Sex			
Male	1.0		
Female	0.61	0.44-0.84	.002
Pain cause			
Cardiac	1.0		
Trauma	0.51	0.32-0.82	.005
Initial NRS pain score			
0	1.0		
1-3	2.24	0.49-10.30	.301
4-7	11.96	2.86-49.95	.001
8-10	20.65	4.93-86.53	<.001

4. Discussion

Inadequate analgesia has been well documented in the ED setting [10,11]. Studies that have attempted to identify barriers to adequate analgesia in EDs have found that ethnicity [12], health insurance status [13], and extremes of age [14-16] were associated with risk of inadequate analgesia. However, these results have not always been reproduced in other studies, and as such the debate on the influence of these variables continues.

Although evidence of inadequate analgesia also exists in the prehospital setting [17-19], only a small number of studies have attempted to identify barriers to effective prehospital analgesia. One study identified paramedic concerns regarding the truthfulness of the patients' report of pain severity as a factor that influenced pain management practice [20]. As behavioral cues may be used to validate patient self-reports of pain severity, observational measures of pain require the observer to be cognizant of the effect that cultural, social, contextual, and interpersonal influences have on the expression of pain to minimize observer bias that may adversely affect treatment decisions [21]. Underestimation of pain has been found to occur when paramedics attempt to rate the patient's pain severity [22], and this phenomena has also been described in other health settings [23].

Few studies have investigated the effect of sex on analgesic administration, and of those published, the results are inconsistent. We found no sex bias in administration of analgesia, but a significant sex difference in the administration of morphine despite women having significantly higher levels of severe pain at the point of first assessment by paramedics. The only other published prehospital study to date of sex difference in paramedic-initiated analgesia also found that females are less likely to receive morphine [5]. However, that study has several limitations that included exclusion of pain caused by conditions other than isolated extremity injury.

These results are similar to the findings of others in a variety of practice settings. A study of nurses' intention to administer prescribed analgesia using clinical vignettes found that female patients were less likely to be given analgesics than males in identical circumstances [24]. However, the author did not posit reasons for this difference. In a postoperative setting, females were found to have received less analgesics than males, although this result was compromised owing to the failure to report sex differences in pain severity [25]. Sex differences in pain management have been documented in an oncology setting, with females less likely than males to receive adequate analgesia [26]. In contrast, a study of analgesic practice in an ED setting found conflicting results, with females more likely to receive analgesia and receive stronger analgesics, for headache, neck, or back pain [4]. A recent multicenter study of pain management practice in the ED also found no sex differences [27].

The difference in morphine administration is an interesting finding. Possible explanations might include bias in analgesic choice based on sex and female patients' reluctance to accept morphine analgesia. The design of this study does not enable reasons for the described sex differences to be identified. To do this, a further study of paramedic attitudes and beliefs is planned using focus groups and interviews to elicit attitudes and beliefs regarding pain assessment and pain management. This may also reveal reasons for the low overall rates of analgesia for patients in moderate to severe pain.

Studies of sex differences regarding pain expectations have demonstrated that both sexes expect women to be more likely to report pain, to be more sensitive to pain, and less tolerant of pain than men [28,29]. If this finding applies to this research setting, these beliefs may influence the paramedic's decision to administer or withhold morphine, which is seen as an analgesic reserved for severe pain. There is also evidence that treating physician's sex influences pain management decisions [30], and that in an experimental pain setting the sex of the experimenter influenced pain reporting [31]. Although the sex of the paramedic may have had some influence on decisions to administer morphine, this could not be tested in this study as information about the treating paramedic was deidentified.

4.1. Limitations

This study has some limitations that must be considered when interpreting the results. It is a retrospective study which used a convenience sample of adult patients transported by ambulance paramedics over a 7-day period. The well-known problems with documentation associated with this method may have occurred, including the possibility of documentation errors or bias in recording patient observations and drug therapy. Sex differences in propensity to refuse analgesia may also have influenced the results. However, we consider this unlikely as refusal rates were similar between sexes. It is possible that transport time or ability to establish intravenous access influenced analgesia delivery. The study was conducted at a single ambulance service and may not be generalizable to other settings.

5. Conclusion

Sex is not associated with the rate of paramedic-initiated analgesia, but is associated with differences in the type of analgesia administered. A significant proportion of patients reporting pain decline analgesia when it is offered.

References

[1] Maio RF, Garrison HG, Spaite DW, et al. Emergency Medical Services Outcomes Project (EMSOP) IV: pain measurement in out-of-hospital outcomes research. Ann Emerg Med 2002;40:172-9.

[2] Alonso-Serra HM, Wesley K. Position paper: prehospital pain management. Prehosp Emerg Care 2003;7:482-8.
[3] Metropolitan Ambulance Service. Metropolitan Ambulance Service 2005-2006 annual report. Doncaster, (Australia); Metropolitan Ambulance Service; 2006.
[4] Raftery KA, Smith-Coggins R, Chen AH. Gender-associated differences in emergency department pain management. Ann Emerg Med 1995;26:414-21.
[5] Michael GE, Sporer KA, Youngblood GM. Women are less likely than men to receive prehospital analgesia for isolated extremity injuries. Am J Emerg Med 2007;25:901-6.
[6] Gilbert EH, Lowenstein SR, Koziol-McLain J, Barta DC, Steiner J. Chart reviews In emergency medicine research: where are the methods? Ann Emerg Med 1996;27:305-8.
[7] Department of Human Services. Non-emergency patient transport: clinical practice protocols. Melbourne: Programs Branch, Metropolitan Health and Aged Care Services Division, Victorian Government Department of Human Services; 2006.
[8] Todd KH. Pain assessment instruments for use in the emergency department. Emerg Med Clin North Am 2005;23:285-95.
[9] Berthier F, Potel G, Leconte P, Touze MD, Baron D. Comparative study of methods of measuring acute pain intensity in an ED. Am J Emerg Med 1998;16:132-6.
[10] Wilson JE, Pendleton JM. Oligonalgesia in the emergency department. Am J Emerg Med 1989;7:620-3.
[11] Todd KH, Ducharme J, Choiniere M, et al. Pain in the emergency department: results of the Pain and Emergency Medicine Initiative (PEMI) Multicenter Study. J Pain 2007;8:460-6.
[12] Pletcher MJ, Kertesz SG, Kohn MA, et al. Trends in opioid prescribing by race/ethnicity for patients seeking care in US emergency departments. JAMA 2008;299:70-8.
[13] Hostetler MA, Auinger P, Szilagyi PG. Parenteral analgesic and sedative use among ED patients in the United States: combined results from the National Hospital Ambulatory Medical Care Survey (NHAMCS) 1992-1997. Am J Emerg Med 2002;20:83-7.
[14] Jones JS, Johnson K, McNinch M. Age as a risk factor for inadequate emergency department analgesia. Am J Emerg Med 1996;14:157-60.
[15] Petrack EM, Christopher NC, Kriwinsky J. Pain management in the emergency department: patterns of analgesic utilization. Pediatrics 1997;99:711-4.
[16] Neighbor ML, Honner S, Kohn MA. Factors affecting emergency department opioid administration to severely injured patients. Acad Emerg Med 2004;11:1290-6.
[17] White LJ, Cooper JD, Chambers RM, et al. Prehospital use of analgesia for suspected extremity fractures. Prehosp Emerg Care 2000; 4:205-8.
[18] Vassiliadis J, Hitos K, Hill CT. Factors influencing prehospital and emergency department analgesia administration to patients with femoral neck fractures. Emerg Med (Fremantle) 2002;14:261-6.
[19] McEachin CC, McDermott JT, Swor R. Few emergency medical services patients with lower-extremity fracture receive prehospital analgesia. Prehosp Emerg Care 2002;6:406-10.
[20] Jones GE, Machen I. Pre-hospital pain management: the paramedics' perspective. Acc Emerg Nurs 2003;11:166-72.
[21] Hadjistavropoulos T, Craig KD. A theoretical framework for understanding self-report and observational measures of pain: a communications model. Behav Res Ther 2002;40:551-70.
[22] Luger TJ, Lederer W, Gassner M, et al. Acute pain is underassessed in out-of-hospital emergencies. Acad Emerg Med 2003;10: 627-32.
[23] Solomon P. Congruence between health professionals' and patients' pain ratings: a review of the literature. Scand J Caring Sci 2001;15: 174-80.
[24] Cohen FL. Postsurgical pain relief: patients' status and nurses' medication choices. Pain 1980;9:265-74.
[25] Calderone KL. The influence of gender on the frequency of pain and sedative medication administered to postoperative patients. Sex Roles 1990;23:713-25.
[26] Cleeland CS, Gonin R, Hatfield AK, et al. Pain and its treatment in outpatients with metastatic cancer. NEJM 1994;330:592-6.
[27] Safdar B, Choiniere M, Crandall C, et al. Impact of patient gender on pain management practices in the emergency department: a multicenter study: ACEP RESEARCH FORUM. Ann Emerg Med 2006;48 (4, Suppl 1):121.
[28] Robinson ME, Gagnon CM, Dannecker EA, Brown JL, Jump RL, Price DD. Sex differences in common pain events: expectations and anchors. J Pain 2003;4:40-5.
[29] Robinson ME, Riley JL, Myers CD, et al. Gender role expectations of pain: relationship to sex differences in pain. J Pain 2001;2: 251-7.
[30] Weisse CS, Sorum PC, Dominguez RE. The influence of gender and race on physicians' pain management decisions. J Pain 2003;4: 505-10.
[31] Weisse CS, Foster KK, Fisher EA. The influence of experimenter gender and race on pain reporting: does racial or gender concordance matter? Pain Med 2005;6:80-7.

Appendix F: Ambulance call triage outcomes for patients reporting pain

Lord B, Cui J, Woollard M. Ambulance call triage outcomes for patients reporting pain: a retrospective cross sectional analysis of pain score versus triage level. Emerg Med J 2009; 26:123-7.

Declaration for Thesis Appendix F

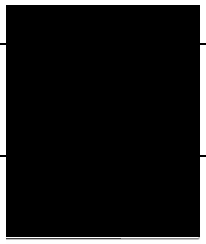
Declaration by candidate

In the case of Appendix F - ***Ambulance call triage outcomes for patients reporting pain: a retrospective cross sectional analysis of pain score versus triage level***, the nature and extent of my contribution to the work was the following:

Nature of contribution	**Extent of contribution (%)**
Concept development, data review and analysis, manuscript compilation.	70%

The following co-authors contributed to the work. Co-authors who are students at Monash University must also indicate the extent of their contribution in percentage terms:

Name	**Nature of contribution**	**Extent of contribution (%) for student co-authors only**
Jisheng Cui	Data analysis	
Malcolm Woollard	Data review and analysis, manuscript revision.	

Candidate's Signature		**Date** 22/09/10

Declaration by co-authors

The undersigned hereby certify that:

(1) the above declaration correctly reflects the nature and extent of the candidate's contribution to this work, and the nature of the contribution of each of the co-authors.
(2) they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;
(3) they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;
(4) there are no other authors of the publication according to these criteria;
(5) potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and

(6) the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

Location(s)	**Department of Community Emergency Health and Paramedic Practice** **Building H Peninsula Campus, Monash University**

Signature 1	[redacted] rank Archer for Jisheng Cui	**Date** 05/10/10
Signature 2	[redacted] Malcolm Woollard	29/9/10

Introduction

The following paper was published in the UK-based Emergency Medicine Journal in 2009. This paper is based on data from the qualitative study presented in Chapter 3 that found that the triage code indicating urgency of the case generated during the initial call for an ambulance was not influenced by the severity of the pain experienced by the individual seeking paramedic attention. The conclusion arising from an analysis of this data was that after adjusting for gender, age, cause of pain and duration of pain, a multivariate logistic regression analysis found no significant change in the odds of a patient in pain receiving a time-critical response compared with patients who had no pain, regardless of their initial pain score.

The following pages reproduce the paper in its published form. This is followed by a detailed analysis and discussion of the nature of triage, which includes a comparison of the system used by some Australian EMS to triage calls for assistance with the national triage system used to triage patients who present to emergency departments. The implications of changes to EMS triage systems to accommodate pain as a determinant of paramedic response are also discussed.

The rationale for this study is based on the premise that, to enable timely and effective care for patients reporting pain, EMS triage systems need to prioritise care and deploy appropriately skilled paramedics to these cases. This requires a risk benefit analysis to enable a model that balances the need for early interventions against resource constraints associated with paramedic crew availability.

Ambulance call triage outcomes for patients reporting pain: a retrospective cross-sectional analysis of pain score versus triage level

B Lord,[1] J Cui,[2,3] M Woollard[4]

[1] Department of Community Emergency Health and Paramedic Practice, Monash University, Melbourne Australia; [2] Department of Epidemiology and Preventive Medicine, Monash University, Melbourne Australia; [3] World Health Organization Collaborating Centre for Obesity Prevention, Deakin University, Melbourne, Australia; [4] Pre-hospital, Emergency and Cardiovascular Care Applied Research Group, Coventry University, Coventry, UK

Correspondence to: Mr B Lord, Monash University, Department of Community Emergency Health and Paramedic Practice, Building H, McMahons Road, Frankston, VIC 3199, Australia; Bill.Lord@med.monash.edu.au

Accepted 18 June 2008

ABSTRACT

Objective: To identify any association between the response priority code generated during calls to the ambulance communication centre and patient reports of pain severity.

Methods: A retrospective analysis of patient care records was undertaken for all patients transported by paramedics over a 7-day period. The primary research interest was the association between the response code allocated at the time of telephone triage and the initial pain severity score recorded using a numeric rating scale (NRS). Univariate and multivariate logistic regression methods were used to analyse the association between the response priority variable and explanatory variables.

Results: There were 1246 cases in which both an initial pain score using the NRS and a response code were recorded. Of these cases, 716/1246 (57.5%) were associated with a code 1 ("time-critical") response. After adjusting for gender, age, cause of pain and duration of pain, a multivariate logistic regression analysis found no significant change in the odds of a patient in pain receiving a time-critical response compared with patients who had no pain, regardless of their initial pain score (NRS 1–3, odds ratio (OR) 1.11, 95% CI 0.7 to 1.8; NRS 4–7, OR 1.12, 95% CI 0.7 to 1.8; NRS 8–10, OR 0.84, 95% CI 0.5 to 1.4).

Conclusion: The severity of pain experienced by the patient appeared to have no influence on the priority (urgency) of the dispatch response. Triage systems used to prioritise ambulance calls and decide the urgency of response or type of referral options should consider pain severity to facilitate timely and humane care.

Pain is a commonly encountered patient complaint in paramedic practice.[1 2] The importance of early and effective management of pain has been recognised by the Emergency Medical Services Outcomes Project (EMSOP) in the USA, with the authors finding that the relief of pain and discomfort may be "the most important task EMS providers perform for the majority of their patients."[3]

The timely and effective management of pain requires the appropriate triage of calls for an ambulance. However, triage algorithms used to prioritise ambulance response are designed to identify complaints known to be associated with an immediate threat to life.[4] Pain, unless associated with body regions such as "chest pain", which is itself indicative of a potential time-critical emergency, is not considered a time-critical problem. Failure to identify severe pain as a patient complaint at the point of the emergency call may constrain attempts to provide appropriate care for patients with pain if this results in a delayed response or inappropriate referral of the patient to other agencies.

In this study setting the medical priority dispatch system (MPDS; Priority Dispatch Corp, Salt Lake City, Utah, USA), is used to triage and prioritise the response to calls made to the ambulance dispatch centre. The call taker uses scripted questions to interrogate the caller in order to generate a complaint-based code and response priority, known as a response determinant. At the time this study was conducted MPDS version 10.2 used response determinants alpha, bravo, charlie and delta. The delta determinant represents cases that are immediately life threatening, with the lowest level of urgency represented by an alpha determinant. The MPDS determinants are translated into a locally established three-category response priority code (codes 1–3) that governs the urgency of response and the clinical capabilities of the responding ambulance crew. All code 1 and 2 triage categories result in an emergency ambulance response, with advanced life support the base level of clinical care. A more advanced level of response, known locally as a mobile intensive care ambulance, is also responded to some code 1 cases that are predicted to require a higher level of clinical care, such as suspected cardiac arrest or chest pain associated with severe respiratory distress. Analgesic options for advanced life support are methoxyflurane or morphine, with a mobile intensive care ambulance having an additional agent in the form of fentanyl. Patients assigned a code 3 triage category may be referred to a privatised "non-emergency" transport provider whose staff lack the capability to administer opioids. Patients assigned to this response category may wait up to one hour for an ambulance to arrive.

This study sought to identify any association between the priority (urgency) of the response code generated during calls to the ambulance communication centre and patients' reports of pain severity during initial assessments performed by the attending paramedic.

STUDY DESIGN AND SETTING

This study is part of a larger research project investigating the epidemiology of pain in patients transported by ambulance paramedics. It was conducted in a major urban centre (Melbourne, Australia) where one organisation provides emergency ambulance response to a population of

Table 1 Agency response code and target response times with examples of MPDS determinants

Agency response priority code	Definition[8]	Target response times (90th percentile)	Example of MPDS determinant
Code 1	A time-critical (urgent) case	13 minutes[8]	All delta, eg chest pain associated with severe respiratory distress (10D1)
Code 2	Acute non-time-critical (non-urgent) case	25 minutes	Charlie and bravo, some alpha, eg, headache, sudden onset of severe pain (18C4)
Code 3	Non-acute or routine case	60 minutes	Mostly alpha, eg, sick person no priority symptoms (26A1)

For the purposes of analysis, pain severity was collated into four categories (see table 2). MPDS, medical priority dispatch system.

approximately 3.9 million people. In 2005, when the data were collected, the service responded to approximately 253 000 emergency calls and transported 202 143 patients.[5]

A retrospective analysis of anonymous patient care records (PCR) was undertaken for all adult patients with a Glasgow coma scale score greater than 12 transported by paramedics over a 7-day period. This convenience contiguous dataset of PCR was selected using an arbitrary commencement date in August 2005. For cases involving documented reports of pain, data for case response code, as well as the cause, duration and region of pain and initial pain severity scores recorded by the treating paramedic were extracted. The study was approved by the Monash University Standing Committee on Ethics in Research Involving Humans (protocol no 2004/754) and by the Metropolitan Ambulance Service Research Committee.

The research question was "In calls to the emergency ambulance service in Melbourne, Australia, what is the relationship between the dispatch response priority code and the patient's initial pain score?"

DATA COLLECTION AND PROCESSING

All PCR generated for patients transported by paramedics in the study setting between 16 August and 22 August 2005 were reviewed. Cases involving children (aged less than 15 years) or cases in which the initial Glasgow coma scale score was less than 13 were excluded, as different approaches to pain measurement are required when assessing children or patients with cognitive impairment. The remaining cases were searched for evidence of pain assessment or reports of pain. Cases were included in this study if a description of pain was entered by the treating paramedic in the history section of the PCR and a rating of pain severity was recorded. The most common pain severity assessment tool used by paramedics in this study setting is the numeric rating scale (NRS), which requires the patient to rate their pain severity between 0 and 10, with 0 meaning no pain and 10 the worst pain imaginable. This tool has been validated in the emergency department for the assessment of acute pain,[6 7] and is recommended for use in the prehospital setting.[8]

The MPDS determinant for each call is assigned an agency response priority code based on a predetermined matrix linking MPDS determinants with three possible outcomes. An example of MPDS determinants along with corresponding agency response codes and performance percentiles are listed in table 1.[8 9]

Table 2 Pain score categories

Pain category	
0	No pain, NRS 0
1	Mild pain, NRS 1–3
2	Moderate pain, NRS 4–7
3	Severe pain, NRS 8–10

NRS, numeric rating scale.

Primary data analysis

Data were manually transcribed from the PCR to an Access database (Microsoft Corp, Redmond, Washington, USA). The primary research interest was the association between the response code and the initial pain score. The outcome variable was the ambulance service response priority code assigned to the case following the initial call. Code 2 and code 3 cases were

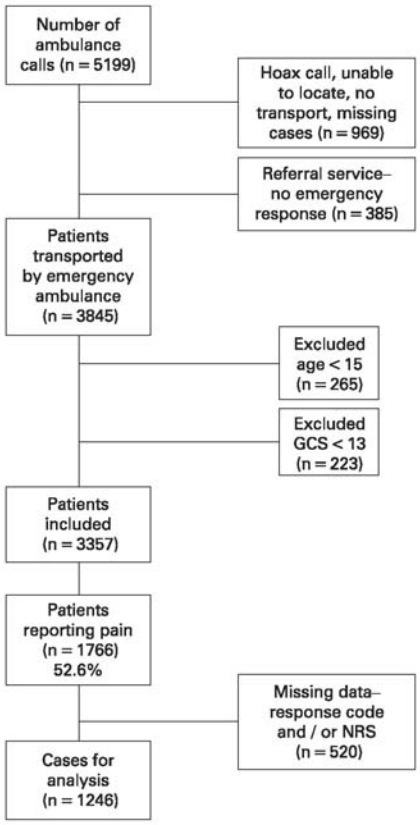


Figure 1 Flow chart showing case and excluded data. GCS, Glasgow coma scale; NRS, numeric rating scale.

combined in order to permit the reporting of a binary outcome—either "time-critical" (response code 1) or "non-time-critical" (response codes 2 or 3). Explanatory variables included age, gender, pain severity (as recorded by the paramedic during patient assessment), pain cause and duration of pain. Descriptive statistics and univariate and multivariate logistic regression methods were used to analyse the association between the response variable (response priority code) and the explanatory variables. Odds ratios (OR) and their associated 95% CI were calculated accordingly. All statistical analyses were considered to be significant at the 0.05 level. Stata version 9 was used to undertake the statistical analysis, with the exception of differences in proportions that were analysed using StatsDirect version 2.6.4 (StatsDirect Ltd, Altrincham, UK).

RESULTS

A total of 3357 patients was transported by paramedics during the study period, with 1766 (53%) reporting pain (fig 1). The median age of these transported patients was 61 years (interquartile range 39–79). Fifty-two per cent were women. There were 1246 cases in which both an initial pain score using the NRS and a response priority code were recorded. Of these cases, 716/1246 (57.5%) were associated with a code 1 ("time-critical") response. Code 2 (n = 467/1246, 37.5%) and code 3 (n = 63/1246, 5%) cases were combined to give a total number of 530/1246 (42.5%) "non-time-critical" cases. These cases were combined as the sample size of the code 3 group was not large enough to provide sufficient power to detect a difference between the two non-time-critical groups.

An analysis of the relationship between the response code and the initial pain category (table 3) showed that patients with the most severe pain (NRS 8–10) account for approximately 52% of urgent responses and approximately 48% of non-urgent responses.

Table 3 shows statistically significantly greater proportions of patients being assigned to time-critical responses for all grades of severity of pain, with the exception of severe pain, in which there is no significant difference between response priorities assigned. However, as the 95% CI of the pain severity groups do not overlap, it can be stated that although almost all patients are more likely to be assigned a time-critical response than not, this is equally true of patients experiencing no pain as it is of patients experiencing mild, moderate or severe pain in this study (fig 2). This implies that a factor other than the severity of pain influences the response priority code assigned.

Throughout the analysis detailed below the odds (likelihood) of a patient with one of three levels of severity of pain receiving a time-critical response is compared with the odds of a patient with no pain receiving a time-critical response.

A univariate logistic regression analysis found no statistically significant difference in the odds of a patient in pain receiving a time-critical response compared with patients who had no pain, regardless of their initial pain score (NRS 1–3, OR 1.04, 95% CI 0.7 to 1.6; NRS 4–7, OR 1.16, 95% CI 0.7 to 1.8; NRS 8–10, OR 0.77, 95% CI 0.5 to 1.2). After adjusting for gender, age, cause of pain and duration of pain, a multivariate logistic regression analysis also found no significant change in the odds of a patient in pain receiving a time-critical response compared with patients who had no pain, regardless of their initial pain score (NRS 1–3, OR 1.11, 95% CI 0.7 to 1.8; NRS 4–7, OR 1.12, 95% CI 0.7 to 1.8; NRS 8–10, OR 0.84, 95% CI 0.5–1.4).

The cause of pain (in general terms) was, however, found to be statistically significant in predicting the response code priority assigned. The proportion of cases assigned a code 1 response was higher if paramedics reported a cardiac cause for pain 174/192 (91%) as opposed to a traumatic aetiology 213/555 (38%) (95% CI for difference 46% to 58%, $p<0.001$) or pain from other causes (561/957 (59%), 95% CI for difference 26% to 37%, $p<0.001$). A univariate logistic regression confirmed that patients with cardiac pain were more likely to be assigned to a time-critical response category than patients with pain arising from a traumatic injury (OR 14.5, 95% CI 8.2 to 25.6). However, further sensitivity analysis found that when the cardiac cause of pain was dropped from the multivariate logistic regression analysis there was still no significant difference in the odds of a patient in pain receiving a time-critical response compared with patients who had no pain, regardless of their initial pain score (NRS 1–3, OR 1.0, 95% CI 0.6 to 1.7; NRS 4–7, OR 0.94, 95% CI 0.6 to 1.6; NRS 8–10, OR 0.73, 95% CI 0.4 to 1.2).

DISCUSSION

In this study the severity of pain experienced by the patient appeared to have no influence on the level (priority) of the dispatch response. This result may be expected as, with one exception—MPDS protocol number 18 (headache)—the call prioritisation system does not seek information about pain severity.

MPDS is used to assess the caller's complaints to assign an appropriate response code based on an assessment of the immediate threat to life. The main objective of prioritising dispatch is to send the right resources to each call within the right time interval.[10] This aims to ensure that timely response of the most appropriate clinical level of practitioner is achieved while ensuring that finite ambulance resources are effectively and efficiently deployed.

Non-urgent cases (most MPDS alpha categories) or routine patient transfers may be referred to non-emergency transport agencies if the patient meets low acuity criteria.[11] A call referral service was introduced by the metropolitan ambulance service in Melbourne in 2003 to manage low acuity "no priority symptoms" cases that do not necessarily need an ambulance. Callers with no priority symptoms may be provided "over the phone" self-care advice or referral to an alternative healthcare provider, including locum medical services, mental health practitioners, nurses and outreach workers.[5] Approximately

Table 3 Difference in proportions of patients coded as time-critical or non-time-critical by pain severity

Pain category	Time-critical response (%)	Non-time-critical response (%)	Difference in proportions (95% CI, p)
No pain (NRS 0) n = 105	61/105 (58%)	44/105 (42%)	−16% (−29 to −3%, p = 0.02)
Mild pain (NRS 1–3) n = 266	157/266 (59%)	109/266 (41%)	−18% (−26 to −10%, p<0.001)
Moderate pain (NRS 4–7) n = 456	281/456 (62%)	175/456 (38%)	−23% (−30 to −17%, p<0.001)
Severe pain (NRS 8–10) n = 419	217/419 (52%)	202/419 (48%)	−4% (−10 to +3%, p = 0.30)
Totals	716/1246 (58%)	530/1246 (43%)	−15% (−19 to −11%, P = 0.02)

NRS, numeric rating scale.

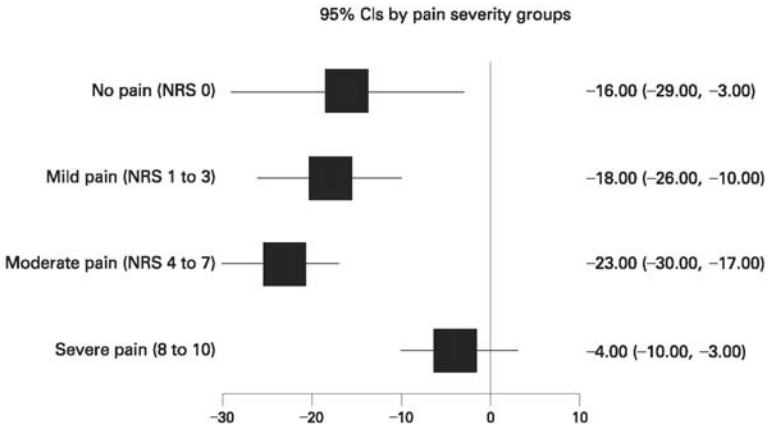


Figure 2 Comparison of differences in proportions of patients assigned to non-time-critical versus time response priority codes by pain severity groupings. NRS, numeric rating scale.

5% of emergency calls are classified as low priority and these do not generate an emergency ambulance response but are instead referred to alternative service providers.[12]

In this study setting, the ambulance service clinical practice guidelines that inform paramedic care list "severe undiagnosed pain" as a time-critical medical emergency.[13] However, this study found that pain severity does not influence dispatch priority coding. As such, patients with severe pain could be classified as a non-acute (response priority code 3) case and referred to a non-emergency transport agency. As an example, patients with a complaint of a hip injury following a fall at ground level are classified as having a "not dangerous" injury and may be assigned a low acuity MPDS determinant (17A1) if they are alert and breathing normally. The MPDS advice to the call taker is that "ground-level falls in elderly patients commonly result in hip fractures, which are **not pre-hospital emergencies**" (original emphasis).[14] Such patients may consequently be triaged to a response priority code 3, which may result in a response time of an hour and an unnecessary delay before the provision of analgesia. In addition, clinical protocols approved for use by non-emergency ambulance providers do not allow for the administration of opioids for severe pain.

Although it appears reasonable to triage calls to decide whether the call can be referred to another health agency, attempts to do this in the UK have highlighted the significant number of referrals that are returned to the referring ambulance service. In a study of the benefits of managing selected low priority calls by referring these to NHS Direct nurse advisers, the presence of pain and pain severity was reported as a symptom that patients considered inappropriate for referral and which influenced patient satisfaction with the referral service.[15]

An extended range of ambulance response codes that consider pain severity may help to triage patients to ensure that threats to life continue to receive the highest priority and most urgent response, whereas those with emergencies such as severe pain are triaged to receive timely care by the most appropriate agency. This would involve review of the way that MPDS determinants are reclassified at a local level to determine the urgency and nature of the ambulance response. However, this would require careful planning to predict the effect this may have on ambulance availability, as well as the likely influence on the agency's ability to respond ambulances within locally agreed or mandated response times. Critics may highlight the difficulty of estimating pain when the caller cannot be seen as an obstacle, particularly as call takers may not be medically trained. The use of an NRS to estimate the patient's pain severity may provide important information to guide ambulance response and can easily and quickly be taught to a caller. Unfortunately, however, currently available call prioritisation systems are not designed to gather information regarding pain severity.

Limitations

This was a retrospective, observational study that used a convenience sample of PCR. Response codes were transcribed from the PCR. This code is transmitted to the responding crew and the paramedic providing the patient care documents the response code on the PCR. This process may have produced transcription errors. Second, only 63/1246 of the cases in this study were coded as response category 3. These cases represent those that may have been managed by emergency ambulance crews due to the unavailability of referral services such as non-emergency transport. This study design precludes an analysis of patient reports of pain that were referred to other agencies, representing a weakness in the study design. Third, the process of matching the MPDS determinant with the appropriate response is locally determined, and as such the results may not be generalisable to other practice settings. Finally, the pain score used as a comparator to the level of response was that documented by paramedics after they had arrived on the scene. It is therefore possible that the severity of pain experienced by patients at the time the call was made was greater or less than that experienced when paramedics arrived on the scene. As no sample size calculation was performed prospectively, it is possible that our failure to detect significant differences in OR for pain severity as a predictive factor of response priority code was due to type II errors.

CONCLUSION

Triage and decision-support systems used to prioritise calls and decide the level of ambulance response or referral options need to factor in pain severity as a significant variable that should be considered as part of the prioritisation process. Despite the importance of the rapid provision of analgesics as a humane intervention, in this study pain severity did not influence the triage category and ambulance response priority. Further research in the form of a qualitative study of patients' and

carers' perceptions about delayed pain management may encourage revisions to dispatch systems to provide timely pain control.

Acknowledgements: The authors wish to thank the Metropolitan Ambulance Service, Melbourne Australia, for their help in facilitating this study.

Competing interests: None.

Ethics approval: The study was approved by the Monash University Standing Committee on Ethics in Research Involving Humans (protocol number 2004/754) and by the Metropolitan Ambulance Service Research Committee.

REFERENCES

1. **McLean SA,** Maio RF, Domeier RM. The epidemiology of pain in the prehospital setting. *Prehosp Emerg Care* 2002;**6**:402–5.
2. **Fisher JD,** Brown SN, Cooke MW, editors. *UK ambulance service clinical practice guidelines: management of pain in adults*. London: Joint Royal Colleges Ambulance Liaison Committee, 2006.
3. **Maio RF,** Garrison HG, Spaite DW, *et al*. Emergency Medical Services Outcomes Project (EMSOP) IV: pain measurement in out-of-hospital outcomes research. *Ann Emerg Med* 2002;**40**:172–9.
4. **Slovis CM,** Carruth TB, Seitz WJ, *et al*. A priority dispatch system for emergency medical services. *Ann Emerg Med* 1985;**14**:1055–60.
5. **Metropolitan Ambulance Service**. *Metropolitan Ambulance Service 2005–2006, annual report*. Doncaster, VIC: MAS, 2006.
6. **Berthier F,** Potel G, Leconte P, *et al*. Comparative study of methods of measuring acute pain intensity in an ED. *Am J Emerg Med* 1998;**16**:132–6.
7. **Todd KH.** Pain assessment instruments for use in the emergency department. *Emerg Med Clin North Am* 2005;**23**:285–95.
8. **Metropolitan Ambulance Service**. *Response codes, 2006*. http://www.ambulance.vic.gov.au/Main-home/What-We-Do/Operations/Response-levels.html (accessed 4 July 2007).
9. **Department of Human Services**. *2006–7 Statement of priorities: agreement between Minister for Health and the Metropolitan Ambulance Victoria*. Melbourne: Victorian Government Department of Human Services, 2006.
10. **Clawson JJ,** Dernocoeur KB. *Principles of emergency medical dispatch*, 3rd ed. Salt Lake City, UT: Priority Press, 2003.
11. **Department of Human Services**. *Non-emergency patient transport: clinical practice protocols*. Melbourne: Programs Branch, Metropolitan Health and Aged Care Services Division, Victorian Government Department of Human Services, 2006.
12. **Metropolitan Ambulance Service**. *Call referral service, 2006*. http://www.ambulance-vic.com.au/Main-home/Doing-it-Better/Call-Referral.html (accessed 15 July 2007).
13. **Victorian Ambulance Services**. *Clinical practice guidelines: CPGA0101 Time critical guidelines*, version 3. Melbourne, Victoria: Victorian Ambulance Services, 2005.
14. **AMPDS**. *Advanced medical priority dispatch system*. 10.3 edition. Salt Lake City, UT: Medical Priority Consultants, Inc, 1996.
15. **Turner J,** Snooks H, Youren A, *et al*. *The costs and benefits of managing some low priority 999 ambulance calls by NHS Direct nurse advisers*. UK: School of Health and Related Research, University of Sheffield, 2006.

Commentary on "Ambulance call triage outcomes for patients reporting pain"

The preceding paper reported that "After adjusting for gender, age, cause of pain and duration of pain, a multivariate logistic regression analysis found no significant change in the odds of a patient in pain receiving a time-critical response compared with patients who had no pain, regardless of their initial pain score."

This finding was not surprising, as the telephone triage tool used in the study setting does not seek information about pain severity, with one exception; calls reporting a symptom of "headache".

While ambulance services are beginning to recognise effective pain management as an important clinical outcome, triage algorithms used to screen telephone calls for ambulance attendance may not identify patients with severe pain as a response priority, as computer-based decision-support systems used by Australian ambulance services to determine response priority are designed to identify complaints that may be associated with an immediate threat to life.[1]

Although ambulance services have traditionally responded urgently to all calls to the emergency number, increasing demand for ambulance services and limited resources have driven the need to prioritise ambulance response to calls for assistance. This need has seen the development of decision-support systems such as the Medical Priority Dispatch System (MPDS) (Priority Dispatch Corp. Salt Lake City, UT), a software system designed to triage and prioritise calls made to ambulance communications and dispatch centres. The call taker uses scripted questions to categorise caller responses to complaint-based codes to assign a response category and to provide appropriate pre-arrival advice to the patient or caller. At the time this study was conducted, MPDS version 10.3 used response categories, also known as response determinants – Alpha, Bravo, Charlie and Delta - with these categories determining the priority of the call. The Delta category represents cases that are immediately life-threatening, with the lowest level of acuity represented by an Alpha category.

MPDS is used to assess the caller's complaints to assign an appropriate response code based on assessment of clinical urgency. The main objective of prioritising

dispatch is to "send the right resources to each call".[2] This aims to ensure quality of care is achieved while ensuring that finite ambulance resources are effectively and efficiently deployed. Ambulance services using this system may determine the appropriate crew skill level for each case, based on the MPDS category. In this study setting the ambulance response to a call ranges from a basic life support service provided by a privatised "non-emergency" transport provider, to Advanced Life Support (ALS) or a higher clinical level of response, known locally as a Mobile Intensive Care Ambulance (MICA). In this study setting the base crew level for emergency ambulance response is ALS. Non-urgent cases (most MPDS Alpha categories) or routine patient transfers may be referred to non-emergency transport agencies if the patient meets low acuity criteria.[3] A Call Referral Service was introduced by the Metropolitan Ambulance Service (MAS) in 2003 to manage low acuity 'no priority symptoms' cases that do not necessarily need an ambulance. Callers with no priority symptoms may be provided over the phone self-care advice or referral to an alternate healthcare provider, including locum medical services, mental health practitioners, nurses and outreach workers.[4] Approximately 5% of emergency calls to the Metropolitan Ambulance Service are classified as low priority and these do not generate an ambulance response but are instead referred to alternate service providers.[5]

For cases categorised as requiring an emergency ambulance response the agency assigns a response code designed to ensure arrival of an ambulance with the required crew skills within a predetermined "call to arrival" time. These response times are commonly reported on the basis of 50% and 90% percentiles, with benchmarks set by government departments responsible for ambulance services in Australia.[6] Similar benchmarking and reporting of performance occurs in the UK.[7]

In the UK, Category A emergencies represent an immediate life threat, with ambulance services expected to reach 75% of calls within 8 minutes and have a vehicle capable of transporting the patient arrive on scene within 19 minutes 95% of the time. Category B emergencies are classified as serious but not immediately life threatening. Services are required to respond to have a vehicle capable of transporting the patient on scene within 19 minutes in 95% of cases. Category C calls are those classified as not immediately serious or life threatening. Response times for Category C response times are set locally (from 1 October 2004).[7] Category C cases

may be managed using alternative clinical pathways such as "self-care advice, referral to other health and/or social care providers, attendance by an Emergency Care Practitioner (ECP)".[8]

The MPDS aims to identify patients with high risk conditions that may benefit from a rapid response, such as cases of suspected cardiac arrest. Although response codes may be interpreted as being synonymous with "clinical priority", a patient with severe pain but with no significant injury, mechanism of injury or listed clinical signs or symptoms may be triaged to a low priority. For example, a person of any age who sustains an isolated lower leg fracture may be triaged to MPDS category that in Victoria results in the dispatch of an ALS ambulance without "lights and siren" if the patient is alert and breathing normally. While the MPDS licence agreement prevents users from changing the category outcome, services are free to determine how quickly to respond to this case, and the skill level of the responding crew. In this study setting, a matrix is used to match MPDS categories with response. In the case described the associated response code is a code 2, which means a non-urgent response that requires a call to arrival time within 25 minutes in 90% of cases. This response allocation is similar to international users of MPDS, such as in the UK, where a 30A1 category is coded as a category C, the lowest response level.[9] The triage outcome is independent of pain severity as the MPDS Traumatic Injuries algorithm does not contain any questions regarding pain.

Non-traumatic injuries involving pain that result in an Alpha MPDS category include abdominal pain (MPDS category 1), and when the patient is an alert male aged less than 35 or an alert female aged less than 45, the case is a AMPDS category 1A1, which in Victoria results in a non-urgent response. Females aged between 12-50 who are reported to have fainted are assigned a higher (more urgent) category. Calls that are categories as 1A1 in this study setting are assigned a response code 3, which is a non-urgent response that requires a call to arrival time within 45 minutes in 90% of cases. This is again similar to international MPDS users, with this same category allocated a category C according to UK Department of Health MPDS call categorisation guidelines.[9]

Non-traumatic back pain (MPDS category 5) assigns an Alpha category to alert patients with a complaint of non-traumatic back pain who have not fainted. The

MPDS lists dissecting aortic aneurysm and kidney stones as possible causes of lower back pain, but advises that "severity of pain is not related to the seriousness of the problem".[10]

Although in this study setting the ambulance service clinical practice guidelines list "severe undiagnosed pain" as a time-critical medical emergency,[11] the only type of pain that results in a high level (more urgent) MPDS category other than those already described is chest pain where the patient's age is greater than 34, or where pain is associated with complaints of abnormal breathing, respiratory distress, skin changes, alteration in consciousness or cocaine use.

The MPDS system was developed in the US, and the possibility that regional differences in prioritising pain management affect the operation of this triage system is reflected in advice to Emergency Medical Dispatchers in the textbook used to teach the principles of MPDS. In the section dealing with non-traumatic back pain, readers are advised that the pain associated with kidney stones is possibly "the most painful of all health problems". However, this is not considered to be a high priority condition. The authors state that "even though ALS personnel can administer effective pain medications, this is seldom ordered by base station physicians who must later evaluate these patients".[2] As such a case involving severe acute pain due to nephrolithiasis may result in an MPDS Alpha determinant (5A1) that will generate a Basic Life Support (BLS) response in many EMS agencies. In the UK this category is listed as a Category C case.[9]

The need to prioritise calls and dispatch ambulances on the basis of urgency of the problem has arisen from increasing demand for ambulance services. In Australia, the number of patients managed by ambulance services in 2005-06 increased by 7.4% over the previous reporting period.[12] In the UK, ambulance services reported a 6.3% increase in ambulance calls in 2007-07, but a continuing fall in urgent (non-emergency) journeys per 100 incidents attended. This is reportedly due to the introduction of call prioritisation and "changes to operational practice".[7] In contrast, call prioritisation in Australia is a more recent initiative, with the largest ambulance service in Australia – the Ambulance Service of New South Wales – introducing call prioritisation in May 2005.[13] Prior to this all ambulance emergency calls were assigned an equal priority.

Response times are an emotive issue, with the public demanding a rapid response to a call for an ambulance, and governments demanding the development of performance benchmarks for response times and evidence that ambulance services are meeting the published benchmarks. Response time benchmarks are developed by considering "medical and patient care issues, financial, political, and social factors, and the public's perceived needs."[14]

Call prioritisation has been introduced to enable more efficient allocation of ambulance resources, but this has also been influenced by safety concerns arising from the increased risk to ambulance crews and the public that occurs when ambulances respond at high speed ("lights and sirens").[15] The need to respond at high speed has also been questioned by a lack of evidence that this type of response significantly reduces call to arrival time, or that any time saving improves patient outcomes. The National Association of EMS Physicians states that "except for cardiac arrest, there is little or no scientific evidence suggesting a causal relationship between response interval and improved patient outcomes."[14]

The process of call prioritisation may be considered a form of *triage*, first described during the Napoleonic wars as a process of sorting casualties according to clinical need to ensure that limited resources could be best deployed to treat injured soldiers in a way that aimed to ensure that those with the most critical needs were the first to be evacuated to medical care. This concept was later applied to multi-casualty situations involving citizens involved in war or natural disasters, to ensure that the greatest good could be done for the greatest number of people in a way that allocated scare medical resources in a clinically appropriate manner. Triage principles were subsequently introduced within hospital emergency departments to sort and prioritise people presenting at the hospital so that those in most need of urgent care could be identified. The process of sorting those presenting at a hospital emergency department has been described as a clinical risk management system "to manage patient flow safely when clinical need exceeds capacity".[16]

Australia was one of the fist countries to develop a triage process suitable for use in hospital emergency departments. In the 1970s, the Box Hill Hospital in Melbourne developed a five-level triage scale used that was subsequently refined and became known as the National Triage Scale (NTS).[17] Later development of this scale by the

Australasian College for Emergency Medicine resulted in the design of the five-category Australasian Triage Scale (ATS), which was implemented nation wide in 2000.[18]

Although the five ATS categories consider urgency of care, implementation guidelines state that triage "is not synonymous with severity."[19] Triage does not attempt to diagnose or predict severity of illness; it is undertaken to determine urgency of medical attention and intervention. As such triage in this context is a means of ranking clinical priority and to allocate the patient to the most appropriate care and treatment area. Hence, while category 2 – the second most time-critical category - includes imminently life-threatening conditions such as severe respiratory distress or circulatory compromise, this category also includes presentations that are not life threatening but which are associated with significant disability, such as acid or alkali splashes to the eye which may benefit from prompt medical intervention.

Internationally, triage scales that have achieved wide use in emergency departments include the Manchester Triage System (MTS) and the Canadian Emergency Department Triage and Acuity Scale (CTAS). Both are based on the ATS. Pain is a determinant of triage category when the ATS, MTS and CTAS are used to assess urgency of care. The ATS lists "very severe pain" as an indicator for triage category 2. This triage category requires that patients are seen no more than 10 minutes after arrival. Severe pain is usually associated with a numeric pain score (pain severity expressed on a 0-10 scale) of >7/10. The ATS cites "humane practice" as the basis for the relief of pain within 10 minutes of triage.[19] A patient who presents with acute severe (> 8/10) flank pain due to nephrolithiasis may be triaged to category 2, for although not a threat to life, the suffering that results from severe pain demands urgent attention.

Pain severity is an important component of the MTS, which requires that pain assessment be included as part of the triage process.[16] Using this system, severe pain is prioritised as an "orange" (very urgent) category requiring the patient to be seen within 10 minutes. This category is equivalent to the ATS category 2. Mackway-Jones and colleagues admit that the requirement to assess pain and use pain severity to select triage category has resulted in more patients being assigned a higher triage category than was the case prior to the introduction of the MTS. However, this is

described as an explicit attempt to change pain management practice in the emergency department, given the considerable evidence that highlights excessive delays to analgesia and inadequate relief of pain.[20-25]

The use of pain as a discriminator to decide triage category has been criticised, particularly when chronicity is not considered in the decision making process.[26] This is addressed by CTAS, which includes assessment of pain severity but differentiates between acute and chronic pain and location of pain. Acute, "central" pain is assigned CTAS category 2, whereas acute peripheral pain – for example extremity fracture or superficial soft tissue injury – is assigned to category 3.[27] The CTAS dictates that time to physician assessment for category 2 patients should not exceed 15 minutes.

During the 1980s ambulance services in the US began to use triage principles to respond more quickly to cases identified as potentially life-threatening, and to ensure that urgent "lights and siren" responses were limited to cases where it was believed that the few minutes saved by urgent driving justified the risk to the community and crew.[28 29] Systems were developed that required the call-taker to use a protocol to interrogate callers to categorise illness or injury severity and to decide vehicle response (urgent or non-urgent) and crew configuration (basic or advanced life support).[30] In a systematic review of evidence supporting the prioritisation of dispatch of emergency ambulances published in 2002, the authors found very few high quality studies and conclude that "there is very little evidence to support the effect of prioritization of emergency ambulances on patient outcome".[31] However, the outcomes of interest are often survival, rather than disability and quality of life issues.

As well as identifying threats to life, telephone triage systems have the potential to identify low acuity cases that may not need ambulance attendance. In determining which MPDS response categories could be safely referred to a non-emergency response or other health care provider, a Delphi study using physician consensus reported that consensus was reached on 13 MPDS codes, and up to 54 codes when a majority vote was used.[32] Codes that were considered a UK Category C by majority consensus included falls involving not dangerous body areas, headache, and back pain due to injuries occurring at least 6 hours earlier.

The identification of MPDS codes associated with low acuity cases has also been attempted by using BLS interventions as a proxy for low acuity conditions. The authors found that certain MPDS codes – such as abdominal pain (1A) received only BLS-level care in almost 95% of cases.[33] However, this may have reflected local practice guidelines that place a low priority on management of acute abdominal pain, or protocols that prohibit administration of analgesia for acute undiagnosed abdominal pain.

One study that sought to validate "low acuity" dispatch codes using the MPDS found that low-acuity codes identified by previous research as those requiring a basic life support response resulted in a high number of ALS responses in the validation setting. One reason for the disparity was the "increased use of analgesics" in cases coded as low-acuity.[34] Again, this highlights differences in classifying cases requiring advanced life support, which may include the need for advanced pain management options.

Call triage systems used by ambulance services aim to respond the appropriate level of paramedic skill to cases based on estimated acuity. The time to treatment should influence the response, with the response designed to positively influence patient outcomes. Given that pain relief is cited as a research priority by the EMSOP project group[35], it seems reasonable to consider pain as an important component of the call triage process. . The major difference between the ED triage system and telephone triage is the ability for nursing or medical staff to see the patient at the point of triage in the hospital in order to form a better impression of the problem. As well as not having these additional cues during the telephone triage process, the caller may be a third party, which further complicates the information gathering process.

Thirty-two response categories are used by MPDS version 10. Three category headings incorporate the word "pain" – abdominal pain (category 1), back pain (category 5), and chest pain (category 10). Headache is also listed as a MPDS category (category 18). The call taker is not required to ask the patient to rate their pain severity to guide the determination of response priority. Instead, age, gender and defined clinical features such as alterations in consciousness guide the assessment of response code.

Patients sustaining traumatic injuries may be categorised to an Alpha (the lowest priority) code despite the presence of severe pain. For example, a young male falls from a skateboard and sustains a closed fracture to his right leg which is evidenced by severe angulation and reduced mobility. If the patient is alert and is breathing normally the response category will be Alpha as the body region injured (lower leg) is considered to be a "not dangerous" area. Similarly, an elderly woman who suffers a same-height fall at home and who has severe pain in her hip after possibly sustaining a fracture is assigned an Alpha category unless they are not alert, have abnormal breathing has fallen >= 2 metres, or has a "dangerous injury". If they satisfy one or more of these conditions they are assigned a Delta category. If the fall is not recent (=> 6 hours) or the injury is considered "not dangerous" the patient is triaged to the Alpha category. The MPDS advice to the call taker is that "ground-level falls in elderly patients commonly result in hip fractures which are not pre-hospital emergencies" (original emphasis). This patient may consequently be triaged to the Alpha category which may result in a prolonged response time, despite the severity of pain and associated distress. Furthermore, if this case occurred in the Melbourne metropolitan area the case may be classified as a Non-Emergency Patient Transport (NEPT) and referred to a non-emergency transport agency. This classification is supported by NEPT guidelines which state that "patients aged over 55 years with a suspected simple fracture of the neck of femur or pelvis following a fall from a standing position is not regarded as major trauma and may be suitable for NEPT".3 The clinical protocols developed for NEPT agencies further state that "significant pain other than chest pain or headache does not necessarily make the patient an emergency patient".3 However, NEPT protocols do not allow for the administration of opioids for severe pain – the only authorised analgesic is methoxyflurane, a fluorinated hydrocarbon that is administered by inhalation.

While it may be reasonable to refer cases to other health agency on the basis of acuity, attempts to do this in the UK (referenced in the preceding paper) have highlighted patient dissatisfaction with referral to another care pathway when patients have severe pain, as evidenced by a comment provided by one survey respondent: "People in severe pain should not be transferred to NHS Direct but to let the ambulance come immediately".[36] This study used a questionnaire to survey caller's satisfaction or dissatisfaction with referral, and this showed that some

respondents believed that calls to the emergency number should result in an emergency response, particularly where a patient is distressed by severe pain. The authors concluded that "this may be an equally valid reason for an immediate response as a life-threatening condition".[36] In discussing adverse events that arose from the decision to refer the call, the authors defined an example of an adverse event as "the transfer of a call that clearly needs an ambulance response and hospital assessment and where delay causes additional pain or distress for a patient although outcome is not altered. An example is bone fractures where hospital treatment is required and early splintage and analgesia by the ambulance crew reduces pain".[36]

The authors conclude that "although the call assessment process may detect a call as not being clinically urgent (that, is the absence of any life-threatening condition), future service development will also need to take into a count other factors such as pain that are important to patients and callers".[36]

Conclusions

Agencies responsible for community based emergency health care must set evidence-based benchmarks for care that require the measurement of mortality, morbidity, patient comfort, safety and satisfaction. In order to achieve these benchmarks call triage and decision-support systems used to prioritise calls and decide the level of response or referral options need to consider pain severity as an important variable that needs to be considered as part of this decision making process.

The paper presented was not intended to highlight a failure in the call taking system used in the study setting (MPDS). Rather, it sought to draw attention to triage outcomes for patients with severe pain, which may include triage to alternate care pathways. When ambulance services have the capacity to refer patients to other care pathways in lieu of an ambulance response, triage systems used to decide care pathways should screen for patients complaints of severe pain. While not necessarily associated with a threat to life, severe pain requires prompt assessment by carers who have the capacity to effectively manage this complaint. Although it appears that patients with a complaint of pain that may represent a threat to life – for example chest pain – are already triaged to receive an immediate response by appropriately qualified paramedics, other cases involving severe pain may also be eligible for prompt attendance on humanitarian grounds. This is not suggest that all cases

involving severe pain should elicit and immediate “lights and sirens” response. Rather, it is argued that the timeliness of response and the type of response should be engineered to ensure that patients receive appropriate care at the earliest opportunity.

List of References

1. Slovis CM, Carruth TB, Seitz WJ, Thomas CM, Elsea WR. A priority dispatch system for emergency medical services. Ann Emerg Med 1985; 14(11):1055-60.

2. Clawson JJ, Dernocoeur KB. Principles of emergency medical dispatch. 3rd edition. Salt Lake City, UT: Priority Press, 2003.

3. Department of Human Services. Non-emergency patient transport: Clinical practice protocols. Melbourne: Programs Branch, Metropolitan Health and Aged Care Services Division, Victorian Government Department of Human Services, 2006.

4. Metropolitan Ambulance Service. Metropolitan Ambulance Service 2005-2006 annual report. Doncaster, VIC: MAS, 2006.

5. Metropolitan Ambulance Service. Call referral service [Web Page]. 2006; Available at http://www.ambulance-vic.com.au/Main-home/Doing-it-Better/Call-Referral.html. (Accessed 15 July 2007).

6. Department of Human Services. 2006-07 Statement of Priorities: Agreement between Minister for Health and the Metropolitan Ambulance Victoria. Melbourne: Victorian Government Department of Human Services, 2006.

7. The Information Centre for Health and Social Care, National Health Service. Ambulance Services England 2006-07. Leeds, UK: The Information Centre for Health and Social Care, 2007.

8. South East Coast Ambulance Service NHS Trust. Annual report 2006/07. Surrey, UK: South East Coast Ambulance Service NHS Trust, 2007.

9. Department of Health (UK). Emergency Call Categorisation Datasets: Category C reporting dataset for MPDS Vers 10 and Vers 11 users (April 2005) [Web Page]. 2005; Available at http://www.dh.gov.uk/en/PolicyAndGuidance/OrganisationPolicy/EmergencyCare/DH_4136003. (Accessed 4 July 2007).

10. AMPDS. Advanced Medical Priority Dispatch System. 10.2 edition. Salt Lake City, UT: Medical Priority Consultants, Inc, 1996.

11. Victorian Ambulance Services. Clinical practice guidelines: CPGA0101 Time Critical Guidelines. Version 3. Melbourne, Victoria: Victorian Ambulance Services, 2005.

12. Council of Ambulance Authorities. 2005-06 annual report. Flinders Park, South Australia: Council of Ambulance Authorities, 2006.

13. NSW Auditor-General's Report: Performance audit. Readiness to respond: Ambulance Service of New South Wales. Sydney, NSW: The Audit Office of New South Wales, 2007.

14. Bailey ED, Sweeney T. Considerations in establishing emergency medical services response time goals. Prehosp Emerg Care 2003; 7(3):397-9.

15. NAEMSP Position Statement. Use of warning lights and siren in emergency medical vehicle response and patient transport. National Association of Emergency Medical Services Physicians (NAEMSP) and the National Association of State EMS Directors (NASEMSD). Prehospital Disaster Med 1994; 9(2):133-6.

16. Manchester Triage Group. Emergency Triage. Mackway-Jones K, Marsden J, Windle J eds. 2nd edition. Malden, Mass: Blackwell Publishing, 2006: 178.

17. Brentnall EW. A history of triage in civilian hospitals in Australia. Emerg Med 1997; 9(1):50-4.

18. Monash Institute of Health Services Research. Consistency of triage in Victoria's emergency departments: literature review. Clayton, VIC: Monash Institute of Health Services Research, 2001.

19. Australasian College for Emergency Medicine. Guidelines for implementation of the Australasian Triage Scale in emergency departments (G24) [Web Page]. 5 August 2005; Available at http://www.acem.org.au/media/policies_and_guidelines/G24_Implementation__ATS.pdf. (Accessed 23 April 2007).

20. Fosnocht DE, Swanson ER, Bossart P. Patient expectations for pain medication delivery. Am J Emerg Med 2001; 19(5):399-402.

21. Brown JC, Klein EJ, Lewis CW, Johnston BD, Cummings P. Emergency department analgesia for fracture pain. Ann Emerg Med 2003; 42(2):197-205.

22. Arendts G, Fry M. Factors Associated With Delay to Opiate Analgesia in Emergency Departments. J Pain 2006; 7(9):682-6.

23. Grant PS. Analgesia delivery in the ED. Am J Emerg Med 2006; 24(7):806-9.

24. Karwowski SF , Lessenot-Tcherny S, Lamarche-Vadel A *et al*. Pain in an emergency department: an audit. Eur J Emerg Med 2006; 13(4):218-24.

25. Todd KH, Crandall C, Choiniere M *et al*. Pain in the Emergency Department: A Multicenter Study. Acad Emerg Med 2006; 13(5_suppl_1):S88-a, 89.

26. Dann E, Jackson R, Mackway-Jones K. Appropriate categorisation of mild pain at triage: a diagnostic study. Emerg Nurse 2005; 13(1):28-32.

27. Murray M, Bullard M, Grafstein E. Revisions to the Canadian Emergency Department Triage and Acuity Scale Implementation Guidelines. CJEM : Journal of the Canadian Association of Emergency Physicians 2004; 6(6):421-7.

28. Clawson JJ. Medical priority dispatch--it works! Journal of Emergency Medical Services 1983; 8(2):29-33.

29. Clawson JJ, Martin RL, Cady GA, Maio RF. The wake-effect: emergency vehicle-related collisions. Prehospital Disaster Med 1997; 12(4):274-7.

30. Clawson JJ. Emergency Medical Dispatching. Prehospital Disaster Med 1989; 4:163-6.

31. Wilson S, Cooke M, Morrell R, Bridge P, Allan T. A systematic review of the evidence supporting the use of priority dispatch of emergency ambulances. Prehosp Emerg Care 2002; 6(1):42-9.

32. Woollard M. Emergency calls not requiring an urgent ambulance response: Expert consensus. Prehosp Emerg Care 2003; 7(3):384-91.

33. Shah MN, Bishop P, Lerner EB, Czapranski T, Davis EA. Derivation of emergency medical services dispatch codes associated with low-acuity patients. Prehosp Emerg Care 2003; 7(4):434-9.

34. Michael GE, Sporer KA. Validation of low-acuity emergency medical services dispatch codes. Prehosp Emerg Care 2005; 9(4):429-33.

35. Maio RF, Garrison HG, Spaite DW *et al*. Emergency medical services outcomes project I (EMSOP I): prioritizing conditions for outcomes research. Ann Emerg Med 1999; 33(4):423-32.

36. Turner J, Snooks H, Youren A *et al*. The costs and benefits of managing some low priority 999 ambulance calls by NHS Direct nurse advisers. UK: School of Health and Related Research, University of Sheffield, 2006.

Appendix G: The reliability of vital signs in estimating pain severity among adult patients treated by paramedics

Lord B, Woollard M. The reliability of vital signs in estimating pain severity among adult patients treated by paramedics. Emerg Med J 2010; doi:10.1136/emj.2009.079384.

Declaration for Thesis Appendix G

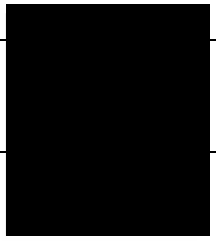
Declaration by candidate

In the case of Appendix G - ***The reliability of vital signs in estimating pain severity among adult patients treated by paramedics***, the nature and extent of my contribution to the work was the following:

Nature of contribution	**Extent of contribution (%)**
Concept development, data review and analysis, manuscript compilation.	75%

The following co-authors contributed to the work. Co-authors who are students at Monash University must also indicate the extent of their contribution in percentage terms:

Name	**Nature of contribution**	**Extent of contribution (%) for student co-authors only**
Malcolm Woollard	Data review and analysis, manuscript revision.	

Candidate's Signature		**Date** 22/09/10

Declaration by co-authors

The undersigned hereby certify that:

(1) the above declaration correctly reflects the nature and extent of the candidate's contribution to this work, and the nature of the contribution of each of the co-authors.
(2) they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;
(3) they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;
(4) there are no other authors of the publication according to these criteria;
(5) potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and
(6) the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

Location(s)	**Department of Community Emergency Health and Paramedic Practice** **Building H Peninsula Campus, Monash University**

Signature 1	[redacted]	**Date** **29/9/10**

Introduction

A central theme arising from the analysis of the focus group transcripts was that of "believing the patient". This analysis found that paramedics may doubt the patient's report of pain severity when their behaviour or vital signs (pulse rate, blood pressure and respiratory rate) are inconsistent with the paramedic's expected findings. Beliefs that vital signs are reliably correlated with pain severity are evident in the following statements provided by different focus group participants:

"... sometimes someone will tell you they're nine out of ten pain and they're sitting there and they're calm and their pulse is low and their blood pressure's good and they're not anxious at all and they're saying its nine out of ten, well they've obviously got some pain, but is it a nine out of ten? Don't know." (Group 3.3)

"… vital signs and patient demeanour and things don't lie." (Group 3.1)

These expectations regarding the validity and reliability of vital signs in validating pain severity are based on beliefs that vital signs changes are a physiological reflex associated with severe pain. Indeed, advice that confirms this belief may be identified in reference texts used to support paramedic education. However, the reliability of the presumed association between pain severity and vital sign changes must be tested before this association can be recommended as an aid to validating the patients self-report of pain severity.

In order to test the association between vital signs and pain severity scores the dataset of patient care records analysed in Chapter 4 was reanalysed to establish the level of correlation between the patient's initial pain severity score (recorded as a score from 0-10 using the NRS) and their initial pulse rate, systolic blood pressure and respiratory rate. The results of this analysis were submitted to the Emergency Medicine Journal in the UK and were published in 2010.[1] The paper is included in this chapter. The results should inform paramedic education regarding the use of vital signs for estimating pain severity or for validating the patient's self report.

The reliability of vital signs in estimating pain severity among adult patients treated by paramedics

Bill Lord,[1] Malcolm Woollard[2]

[1]Department of Community Emergency Health and Paramedic Practice, Monash University, Melbourne, Australia
[2]Pre-hospital, Emergency and Cardiovascular Care Applied Research Group, Coventry University, Coventry, UK

Correspondence to
Bill Lord, Monash University, Department of Community Emergency Health and Paramedic Practice, Building H, McMahons Road, Frankston VIC 3199, Australia;
Bill.Lord@med.monash.edu.au

Accepted 29 January 2010

ABSTRACT

Background The aim of this study was to examine the strength of correlation between initial pain severity score and systolic blood pressure, heart rate and respiratory rates among adults reporting pain in the prehospital setting as a means of validating the presence and severity of pain.

Methods A retrospective cohort study was conducted including all adults with a Glasgow Coma Score >12 assessed by paramedics in a metropolitan area over a 7 day period in 2005. Pain was self-scored by patients using a 0—10 numeric rating scale (NRS).

Results Of the patients transported, 1766/3357 (53%) reported pain, and an NRS score was recorded for 1286. Median age was 57 years, 51% were women, and median initial NRS was six. Mean heart rate was 85 (95% CI 84 to 86), mean systolic blood pressure was 139 mmHg (95% CI 138 to 141) and mean respiratory rate was 18 (95% CI 18 to 18). There was no significant correlation between NRS and heart rate (r=0.002, p=0.61, 95% CI −0.007 to +0.011) or blood pressure (r=−0.0007, p=0.81, 95% CI −0.007 to +0.005), although this was statistically significant for initial pain score and respiratory rate (r 0.058, p=0.001, 95% CI 0.024 to 0.093).

Conclusion A lack of any meaningful correlation between pain scores and changes in vital signs in this population demonstrates that these signs cannot be used to validate the severity of pain reported by adult patients.

INTRODUCTION

Background

Pain is an innately personal experience that cannot be directly measured. Underestimation of pain has occurred when health professionals attempt to calculate the severity of a patient's pain experience.[1] Consequently, the assessment of pain relies on the patient's self-report of his/her experience.[2] Questions designed to elicit information about the characteristics of the pain should explore the multiple dimensions of pain, including pain severity.[3] Other clinical data may be used to substantiate the patient's report, including the use of behavioural cues and changes to vital signs,[3] and this may be relevant where communication difficulties impair the patient's ability to report his/her pain.[4 5]

Pain is a commonly encountered complaint in the prehospital setting,[6] and the assessment and management of pain is an important component of care delivered by paramedics. Although paramedics are encouraged to use validated pain measurement tools to assess pain severity,[7] they may also use other clinical cues to develop a clinical impression of the nature of the complaint. When there is uncertainty about the reported symptoms due to a lack of obvious injury or cause of pain, paramedics may seek additional information to confirm their clinical impression before committing to treat with analgesics such as opioids.

Advice regarding clinical features that may be associated with the presence of pain cite physiological changes arising from sympathetic stimulation as a typical response to acute pain.[8–12] Evidence such as increased heart rate, blood pressure and respiratory rate are described as signs that 'normally accompany a painful event',[13] with the magnitude of the changes 'approximately proportional to the intensity of the stimulus'.[14] An association between pain and increased sympathetic activity such as pallor and sweating has been described as an aid to pain assessment, in the belief that these features 'serve to substantiate the patient's reports of pain'.[15] A belief that vital sign changes help to validate the patient's self-report of pain could result in a failure to believe the patient if expected physiological findings are inconsistent with the patient's self-report of pain severity. It is conceivable that clinical decisions that are informed by this data may lead to decisions to withhold analgesia.

In order to locate evidence linking the presence of acute pain with consistent changes in vital signs a literature search was undertaken, but this failed to identify any published evidence from the prehospital setting. Although two studies have investigated the association between vital signs and pain severity in the Emergency Department (ED),[16 17] differences in methodology and inclusion criteria limit the generalisation of findings to pain assessment in the prehospital setting.

In the absence of any evidence from the prehospital setting linking pain severity with vital sign changes this study sought to identify any association between an individual's heart rate, respiratory rate or blood pressure and the initial pain severity score recorded by paramedics as part of the patient assessment process.

MATERIALS AND METHODS

Study design and setting

This study is part of a larger project investigating the epidemiology of pain in the prehospital setting, and is a companion to a previously published study investigating the influence of pain severity on the triage of ambulance calls.[18] The study involved a retrospective analysis of anonymised ambulance patient care records (PCR) for all patients aged >14 years with a Glasgow Coma Score (GCS) >12 transported to hospital by paramedics during a 7 day period in 2005. Paramedics in this study setting are required to document at least two sets of vital signs,

which include heart rate, blood pressure, respiratory rate and a record of pain severity (when reported), for all patients transported to hospital by emergency ambulance.

For cases that included a documented report of pain, demographic data as well as data relating to the estimated duration of pain, initial pain severity scores and vital signs that were recorded by the treating paramedic were extracted from the PCR. The study was approved by the Monash University Standing Committee on Ethics in Research Involving Humans and by Ambulance Victoria.

The study setting was an ambulance service in Melbourne, Australia where one organisation provides emergency ambulance response to a population of approximately 3.9 million people. In 2005, when these data were collected, the service responded to approximately 253 000 emergency calls and transported 202 143 patients.[19] Non-urgent cases or routine patient transfers may be referred to non-emergency transport agencies if the patient meets low acuity criteria, and these cases were not included in this study.

Selection of participants

This convenience contiguous dataset of PCR was selected using an arbitrary commencement date in August 2005. Cases were included in this study if an initial assessment of pain severity was documented using a score derived from a numeric rating scale (NRS). This scale requires the patient to rate their pain severity between 0 and 10, with 0 meaning no pain and 10 the worst pain imaginable. This tool has been validated in the ED for the assessment of acute pain,[20 21] and is recommended for use in the prehospital setting.[7] Data collected included vital signs and initial pain severity score at first point of assessment, duration of pain, and an estimate of cause of pain (cardiac, trauma or other, determined by the researchers on the basis of the clinical notes). Further differentiation of the cause of pain was limited by the level of information provided by paramedics on the PCR. Duration of pain was determined by measuring the interval between the recorded time of onset and the time of initial assessment documented by the paramedic on the PCR. Cases that did not include a NRS score for the initial record of pain severity were excluded.

Primary data analysis

Data were analysed using descriptive statistics and tests of correlation to identify any relationships between initial pain severity scores and vital signs. Tests of associations between pain severity scores and vital signs were calculated using Pearson's correlation coefficients and 95% CIs. Multiple regression analysis was used to identify the effect that other variables had on these associations. All statistical tests were two-sided and considered to be significant at the 0.05 level. Stata version 9 (Stata Corporation) was used to undertake the statistical analysis.

Outcome measures

The primary outcome of interest was any associations between the first recorded pain severity score and the patient's heart rate, respiratory rate or systolic blood pressure.

Secondary outcomes of interest were any correlation between changes in these vital signs by age, gender and cause of pain.

RESULTS

Of the 3357 patients transported in the study period, 1766 (53%) reported pain, and a record of pain severity using the NRS was recorded in 1286 (73%) of these cases, which form the study sample. The median age was 57 years (IQR 37–77, range 15–99), 51% were women, and the median initial NRS pain score was 6 (IQR 3–8, range 0–10). The possible cause of the pain was documented as traumatic in 399/1286 of cases (31%) and cardiac in 166/1286 of cases (13%). The remaining cases were coded as 'other' causes of pain. Onset of pain was recorded as being less than 6 h from first paramedic assessment in 910/1286 (71%) of cases.

The mean heart rate was 85 beats per min (bpm) (95% CI 84 to 86), mean systolic blood pressure was 139 mmHg (95% CI 138 to 141) and mean respiratory rate was 18 breaths per min (95% CI 18 to 18). There were no significant correlations between pain severity score and heart rate or blood pressure, although a very small but statistically significant association was noted between initial pain score and respiratory rate (table 1).

Table 2 lists variations in vital signs across each pain severity score. These relationships are shown as box plots in figures 1–3. The line across each box represents the median, with the end of each box representing the 25th and 75th percentiles for each pain severity score for pulse rate, systolic blood pressure and respiratory rate.

Multiple linear regression analysis was used to examine associations between vital signs by initial NRS pain severity score, age, gender and cause of pain.

The coefficient of determination (R^2=0.02) indicates that the predictor variables have little effect on the pulse rate. The pulse rate was not significantly associated with the initial pain severity score (p=0.83, 95% CI −0.37 to +0.30) when controlling for age, cause of pain and gender. Age was significantly associated with the initial pulse rate, with the rate decreasing by 0.12 bpm for each year increase in age, when controlling for initial pain score, cause of pain and gender (p<0.001, 95% CI −0.17 to −0.08).

Initial systolic blood pressure was significantly associated with age, with blood pressure increasing by 0.44 mmHg for each year increase in age (p<0.001, 95% CI 0.37 to 0.50) when controlling for initial pain score, cause of pain and gender. There was no significant association between systolic blood pressure and initial pain score.

A statistically significant association between respiratory rate and the initial pain score was identified (p=0.001, 95% CI 0.068 to 0.24) with each one point increase in pain severity associated with an increase in respiratory rate of 0.16 breaths per min. Age (p=0.01, 95% CI 0.004 to 0.03) and cause of pain (p=0.003, 95% CI 0.16 to 0.77) were also significantly associated with the respiratory rate.

DISCUSSION

Acute pain is known to be associated with activation of a stress response that produces increases in plasma catecholamine levels and adrenergic activity.[22] A link between nociceptor activation and autonomic nervous system stimulation has been proposed whereby acute nociceptor stimulation induces sympathetic discharge that may be associated with an increase in blood pressure.[23]

Although studies of experimentally induced pain have examined the relationship between the strength of the painful stimuli and corresponding autonomic responses, the response has been shown to habituate quickly and where association has been

Table 1 Correlations between vital signs and initial pain score (numeric rating scale)

Vital sign	Pearson r	p Value	95% CI
Heart rate	0.002	0.61	−0.007 to +0.011
Systolic blood pressure	−0.0007	0.81	−0.007 to +0.005
Respiratory rate	0.058	0.001	+0.024 to +0.093

Lord B, Woollard M. *Emerg Med J* (2010). doi:10.1136/emj.2009.079384

Table 2 Mean heart rate, systolic blood pressure, and respiratory rate (95% CI) for each NRS pain score category

Initial pain score (n)	Heart rate (bpm)		Systolic blood pressure (mmHg)		Respiratory rate (breaths per min)	
	Mean/median	95% CI	Mean/median	95% CI	Mean/median	95% CI
0 (106)	84/82	80 to 88	139/140	133 to 145	19/16	17 to 20
1 (58)	88/84	83 to 93	139/140	133 to 145	18/16	16 to 20
2 (137)	84/84	82 to 87	136/130	131 to 141	17/16	17 to 18
3 (81)	87/84	82 to 91	137/140	131 to 142	18/16	17 to 19
4 (86)	86/84	81 to 90	136/130	130 to 141	17/16	16 to 18
5 (141)	85/82	82 to 88	142/140	138 to 147	18/16	17 to 19
6 (109)	83/80	80 to 87	143/140	137 to 149	18/16	18 to 19
7 (139)	86/84	83 to 90	140/140	135 to 144	19/18	18 to 20
8 (186)	87/84	84 to 89	139/140	135 to 143	19/18	18 to 20
9 (76)	85/80	81 to 90	137/135	130 to 144	19/18	18 to 20
10 (167)	85/84	82 to 88	136/130	132 to 140	19/18	18 to 20
Total=1286						

demonstrated the specificity of the response is poorly understood.[24] Some evidence suggests that the site of the nociception may influence autonomic responses, so that visceral pain results in changes in heart rate and blood pressure that are opposite to responses arising from cutaneous or superficial pain.[25] Studies of experimental pain involving healthy volunteers have also shown gender differences, with males showing a significant increase in heart rate associated with a painful stimulus of up to 11% over the resting rate, whereas females did not demonstrate any significant increase.[26]

Although relationships between a painful stimulus and vital sign changes have been demonstrated in the experimental pain settings, there is little evidence from clinical research confirming a strong and consistent association between pain severity and changes in patient vital signs. Although an association between severe pain and a stress response appears intuitive, an expectation that the patient's report of pain severity should be associated with stress-related changes in vital signs may cause the clinician to doubt the veracity of the patient's complaint in cases where anticipated autonomic changes are absent.

Limitations

This was a retrospective, observational study that used a convenience sample of patient care records. There was a considerable proportion of PCR missing the required information and which therefore had to be excluded from the study, potentially biasing the results. Patient data were copied from the PCR, potentially producing transcription errors.

Only patients with a GCS between 13 and 15 were included in the study due to difficulties in obtaining a self-report of pain in patients with cognitive impairment. Patients with a GCS verbal score of 4 are considered to be 'confused', and 5% (66/1286) of patients with a recorded NRS had a verbal GCS score (GCS-V) of 4. The remainder of the patients with a NRS recorded had a GCS-V of 5. There were no patients with a GCS-V of less than 4. Although a GCS-V of 4 has the potential to complicate the assessment of pain, evidence relating to the assessment of patients with dementia indicates that patients with mild to moderate dementia (ie, confused) may still be able to use the NRS to rate their pain severity.[27]

This study was unable to control for the effect of concurrent disease processes, environmental stressors or medications, such as β blockers, that affect heart rate and blood pressure as this information was not consistently available on the PCR; however, the presence of these factors is typical of the population of interest. It was not possible to document ethnicity due to the absence of identifying data on the PCR, and therefore the authors cannot comment on the potential influence of this factor on the results.

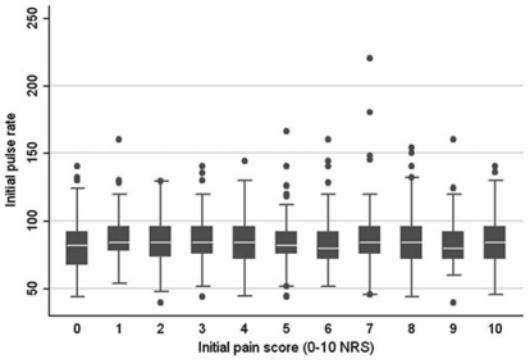


Figure 1 Relationship between initial pain score (0–10 NRS) and initial pulse rate.

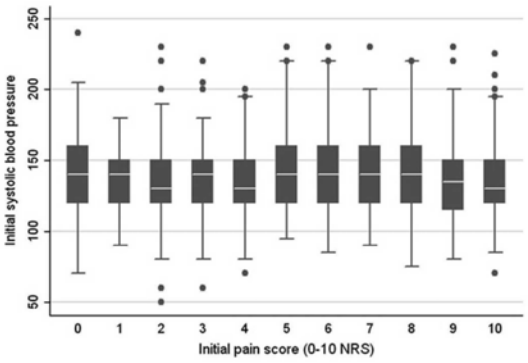


Figure 2 Relationship between initial pain score (0–10 NRS) and initial systolic blood pressure.

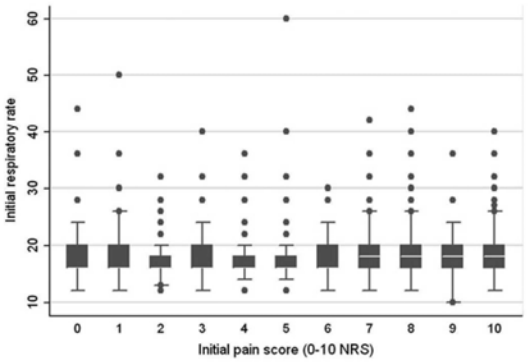


Figure 3 Relationship between initial pain score (0–10 NRS) and initial respiratory rate.

CONCLUSION

Although this study found a statistically significant association between respiratory rate and pain severity, the degree of change was so small it cannot be considered to be clinically significant. There were no statistically or clinically significant associations between pain severity score and pulse rate or systolic blood pressure. The absence of clinical features normally associated with a stress response cannot be used to disregard the patient's report of pain severity or to rule out the presence of pain. A lack of a meaningful correlation between pain severity and changes in vital signs in this prehospital setting demonstrates that changes in vital signs cannot be used to estimate or validate the severity of episodes of pain reported by adult patients. Paramedics should rely on validated objective tools for the assessment of pain severity such as the NRS.

Acknowledgements The authors acknowledge the assistance of Ambulance Victoria in facilitating this study, and acknowledge statistical support provided by Dr Baki Billah, Senior Lecturer of Biostatistics, Department of Epidemiology and Preventive Medicine, Monash University.

Competing interests None.

Ethics approval This study was conducted with the approval of the Monash University Standing Committee on Ethics in Research Involving Humans (Protocol 2004/754).

Contributors BL conceived and designed the study and drafted the manuscript, and takes responsibility for the paper as a whole. MW contributed substantially to the data analysis and revision of the manuscript. Statistical analysis and advice was provided by a statistical consultant.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

1. **Solomon P.** Congruence between health professionals' and patients' pain ratings: a review of the literature. *Scand J Caring Sci* 2001;**15**:174–80.
2. **Australian and New Zealand College of Anaesthetists and Faculty of Pain Medicine.** *Acute pain management: scientific evidence*. 2nd ed. Melbourne: ANZCA, 2005.
3. **Melzack R,** Katz J. Pain assessment in adult patients. In: McMahon SB, Koltzenburg M, eds. *Textbook of pain*. 5th ed. Philadelphia: Elsevier Churchill Livingstone, 2006:291–304.
4. **Herr K,** Bjoro K, Decker S. Tools for assessment of pain in nonverbal older adults with dementia: a state-of-the-science review. *J Pain Symptom Manage* 2006;**31**:170–92.
5. **McGrath PJ,** Unruh AM. Measurement and assessment of paediatric pain. In: McMahon SB, Koltzenburg M, eds. *Textbook of pain*. 5th ed. Philadelphia: Elsevier Churchill Livingstone, 2006:305–16.
6. **McLean SA,** Maio RF, Domeier RM. The epidemiology of pain in the prehospital setting. *Prehosp Emerg Care* 2002;**6**:402–5.
7. **Maio RF,** Garrison HG, Spaite DW, *et al*. Emergency Medical Services Outcomes Project (EMSOP) IV: pain measurement in out-of-hospital outcomes research. *Ann Emerg Med* 2002;**40**:172–9.
8. **Craven RF,** Hirnle CJ. *Fundamentals of nursing: human health and function*. 5th ed. Philadelphia: Lippincott Williams & Wilkins, 2007.
9. **White L.** *Foundations of nursing: caring for the whole person*. Albany, NY: Thomson Learning, 2001.
10. **McCarthy A.** Psychosocial aspects of pain and fatigue. In: Rogers-Clark C, McCarthy A, Martin-McDonald K, eds. *Living with illness: psychosocial challenges for nursing*. Sydney: Elsevier Australia, 2005:117.
11. **Miaskowski C.** Principles of pain assessment. In: Pappagallo M, ed. *The neurological basis of pain*. New York: McGraw-Hill, 2005:198.
12. **Twaddle ML,** Cooke KJ. Assessment of pain & common pain syndromes. In: Von Roenn JH, Paice JA, Preodor ME, eds. *Current diagnosis & treatment of pain*. New York: Lange Medical Books/McGraw-Hill, 2006:10.
13. **Bledsoe BE,** Myers J. Pain & comfort: the pathophysiology of pain & prehospital treatment options. *JEMS* 2003;**28**:50–67.
14. **Devine EC.** Somatosensory function, pain, and headache. In: Porth C, ed. *Pathophysiology: concepts of altered health states*. 7th ed. Philadelphia: Lippincott Williams & Wilkins, 2005:1175.
15. **Hawthorn J,** Redmond K. *Pain: causes and management*. Malden, MA: Blackwell Science, 1998:p. 41.
16. **Marco CA,** Plewa MC, Buderer N, *et al*. Self-reported pain scores in the emergency department: lack of association with vital signs. *Acad Emerg Med* 2006;**13**:974–9.
17. **Bossart P,** Fosnocht D, Swanson E. Changes in heart rate do not correlate with changes in pain intensity in emergency department patients. *J Emerg Med* 2007;**32**:19–22.
18. **Lord B,** Cui J, Woollard M. Ambulance call triage outcomes for patients reporting pain: a retrospective cross sectional analysis of pain score versus triage level. *Emerg Med J* 2009;**26**:123–7.
19. **Metropolitan Ambulance Service.** *Metropolitan Ambulance Service 2005–2006 annual report*. Doncaster, VIC: MAS, 2006.
20. **Todd KH.** Pain assessment instruments for use in the emergency department. *Emerg Med Clin North Am* 2005;**23**:285–95.
21. **Berthier F,** Potel G, Leconte P, *et al*. Comparative study of methods of measuring acute pain intensity in an ED. *Am J Emerg Med* 1998;**16**:132–6.
22. **Chapman CR,** Tuckett RP, Song CW. Pain and stress in a systems perspective: reciprocal neural, endocrine, and immune interactions. *J Pain* 2008;**9**:122–45.
23. **Meyer RA,** Ringkamp M, Campbell JN, *et al*. Peripheral mechanisms of cutaneous nociception. In: McMahon SB, Koltzenburg M, eds. *Textbook of pain*. 5th ed. Philadelphia: Elsevier Churchill Livingstone, 2006:3–34.
24. **Gracely RH.** Studies of pain in human subjects. In: McMahon SB, Koltzenburg M, eds. *Textbook of pain*. 5th ed. Philadelphia: Elsevier Churchill Livingstone, 2006:267–89.
25. **Jänig W.** The sympathetic nervous system in pain. *Eur J Anaesthesiol* 1995;**12**:53–60.
26. **Tousignant-Laflamme Y,** Rainville P, Marchand S. Establishing a link between heart rate and pain in healthy subjects: a gender effect. *J Pain* 2005;**6**:341–7.
27. **Closs S,** Barr B, Briggs M, *et al*. A comparison of five pain assessment scales for nursing home residents with varying degrees of cognitive impairment. *J Pain Symptom Manage* 2004;**27**:196–205.

Appendix H: Paramedic assessment of pain in the cognitively impaired adult patient

Lord B. Paramedic assessment of pain in the cognitively impaired adult patient. BMC Emerg Med 2009; 9(20):doi:10.1186/1471-227X-9-20.

BMC Emergency Medicine

BioMed Central

Research article

Open Access

Paramedic assessment of pain in the cognitively impaired adult patient

Bill Lord

Address: Monash University, Department of Community Emergency Health and Paramedic Practice, Building H, McMahons Road, Frankston VIC 3199, Australia

Email: Bill Lord - bill.lord@med.monash.edu.au

Published: 6 October 2009

BMC Emergency Medicine 2009, **9**:20 doi:10.1186/1471-227X-9-20

Received: 18 November 2008
Accepted: 6 October 2009

This article is available from: http://www.biomedcentral.com/1471-227X/9/20

Abstract

Background: Paramedics are often a first point of contact for people experiencing pain in the community. Wherever possible the patient's self report of pain should be sought to guide the assessment and management of this complaint. Communication difficulty or disability such as cognitive impairment associated with dementia may limit the patient's ability to report their pain experience, and this has the potential to affect the quality of care. The primary objective of this study was to systematically locate evidence relating to the use of pain assessment tools that have been validated for use with cognitively impaired adults and to identify those that have been recommended for use by paramedics.

Methods: A systematic search of health databases for evidence relating to the use of pain assessment tools that have been validated for use with cognitively impaired adults was undertaken using specific search criteria. An extended search included position statements and clinical practice guidelines developed by health agencies to identify evidence-based recommendations regarding pain assessment in older adults.

Results: Two systematic reviews met study inclusion criteria. Weaknesses in tools evaluated by these studies limited their application in assessing pain in the population of interest. Only one tool was designed to assess pain in acute care settings. No tools were located that are designed for paramedic use.

Conclusion: The reviews of pain assessment tools found that the majority were developed to assess chronic pain in aged care, hospital or hospice settings. An analysis of the characteristics of these pain assessment tools identified attributes that may limit their use in paramedic practice. One tool - the Abbey Pain Scale - may have application in paramedic assessment of pain, but clinical evaluation is required to validate this tool in the paramedic practice setting. Further research is recommended to evaluate the Abbey Pain Scale and to evaluate the effectiveness of paramedic pain management practice in older adults to ensure that the care of all patients is unaffected by age or disability.

Background

Although pain is a commonly encountered complaint in prehospital and emergency medicine settings, evidence of inadequate analgesia has been widely documented. Poor pain management practice has been described in the emergency department (ED)[1], and variations in pain management practice in this setting have been associated with ethnicity[2], gender[3], and extremes of age[4].

Reasons for inadequacies in pain management practice are likely to be multifactorial. Failure to assess for the presence and severity of pain may be one factor, as efforts to make pain measurement mandatory in the ED have been shown to improve the frequency of analgesic administration[5]. The importance of early and systematic assessment of pain is exemplified by recommendations to include pain as the "5th vital sign"[6], reinforcing the need to seek and record evidence of pain in every patient encounter. However, even when pain assessment is encouraged or required, patients may be unable to communicate their experience to carers, or be reluctant to report pain due to concerns about treatment side effects or the possibility that they will be viewed as a complaining or difficult patient, a belief that has been documented in settings that include oncology [7] and aged care[8,9].

Paramedics have an important role in the assessment and management of pain, and are often a first point of contact for people experiencing pain in the community. Effective management of pain in this context is made possible by evidence-based clinical practice guidelines that enable paramedics to relieve pain by pharmacological and non-pharmacological means. However, effective management of pain depends on the paramedic's ability to gather relevant clinical information to reveal the presence, nature and severity of the patient's pain. As pain is a personal experience with external manifestations that are associated with significant interpersonal variations of expression[10] that limit generalisations regarding standards of pain behaviour, wherever possible the patient's self report of pain should be sought to guide the clinician's assessment and management of this complaint[11].

Pain severity is one component of a complex and highly personal experience that involves sensory-discriminative, motivational-affective and cognitive-evaluative dimensions[12]. Assessment of pain severity is specifically sought to guide paramedics' pain management decisions, which may include strategies designed to mitigate the cause of the pain and to provide relief from pain that includes efforts to manage the environmental, social and psychological mediators of the perception and expression of pain[10]. In addition, the assessment and evaluation of the patient's pain experience will influence pharmacological interventions aimed at providing relief from pain.

Tools used to elicit a patient report of severity include the Verbal Descriptor Scale (VDS), which requires the patient to rate their pain using adjectives such as "none," "slight," "moderate," "severe," or "agonizing," and the Verbal Numeric Rating Scale (VNRS), where the patient assigns a number from 0-10 to quantify their pain, with 0 representing no pain and 10 representing the worst pain imaginable. Both types of scale are recommended for use by paramedics[13]. The Visual Analogue Scale (VAS) has also been used to measure pain severity in adults in the prehospital setting[14,15].(In Australia the Victorian Ambulance Service recommends the use of the VNRS for the assessment of pain in adults[16], and in the United Kingdom, the clinical practice guidelines developed by the Joint Royal Colleges Ambulance Liaison Committee also recommends the use of the VNRS for scoring pain severity in adult patients[17].

While these scales have been shown to be valid methods of documenting pain severity and changes in severity, their effectiveness depends on the patient's ability to understand instructions in their use in order to quantify their pain. In addition, self-report of pain severity requires the use of higher cognitive functions and the ability to use abstract reasoning to associate numbers or a list of adjectives with the severity of pain that an individual may be experiencing. While many patients can use these scales to indicate the severity of their pain, in others the ability to communicate their pain experience may be impaired by language difficulties, developmental barriers (developmental disability and pre-verbal children), physiological barriers (for example coma), or cognitive barriers that include diseases such as dementia. These problems can pose special challenges for health professionals seeking to establish the nature and severity of the patient's distress, and this has the potential to result in suboptimal care.

Evidence to support this assertion may be found in a recent study involving a large number of nursing home residents (n = 551), which revealed that the incidence of nursing staff records of pain in residents declined as cognitive disability increased[18]. While 34% of patients with no cognitive disability reported pain during the study period, pain prevalence rates of 31%, 24%, and 10% were associated with residents with mild, moderate, and severe cognitive impairment. Furthermore, as cognitive disability increased the administration of analgesics decreased, despite there being no statistical difference in the prevalence of painful pathologies between cognitively impaired and cognitively normal residents. This suggests that the higher the level of cognitive impairment the more difficult it is to record or report pain.

The results may also illustrate a lack of willingness to seek evidence of pain in individuals where communication dif-

ficulties complicate the assessment process. A similar result has been observed in an earlier study that found a decrease in the prescription and administration of analgesics in cognitively impaired nursing home residents despite similar proportions of painful pathologies in the impaired and non-impaired cohorts[19].

Dementia is a major cause of cognitive impairment in adults. Many developed countries are experiencing a rapidly aging population, and as dementia is an age-related disease, the prevalence of dementia in many countries is predicted to increase. For those living in Australia who are aged more than 65, the likelihood of having dementia doubles every five years, so that by age 85 it is estimated that 24% of people are affected[20]. The prevalence in this country is estimated to increase from approximately 175,000 in 2003 to approximately 465,000 by 2030[21]. Although this disease may impair an individual's ability to report pain, the ability to feel pain may remain unimpaired[22,23].

The increasing prevalence of this disease means that more people may be at risk of living with pain that cannot be adequately reported to others, making the need to establish a valid and reliable means of identifying pain in this population a priority, as failure to identify pain and subsequently implement strategies to relieve a patient's pain may be considered a form of medical error and a denial of a basic human right[24,25].... As tools currently used by paramedics to assess pain may be unreliable in the presence of cognitive impairment this paper aims to identify tools that may assist paramedics to assess these challenging cohorts of patients in order to ensure that their pain is recognised, thereby enabling interventions aimed at relieving their pain. The primary objective of this review was to systematically locate evidence relating to the use of pain assessment tools that have been validated for use with cognitively impaired adults and to identify those that have been recommended for use by paramedics. A secondary objective was to make recommendations regarding the paramedic assessment of pain in cognitively impaired individuals if no existing recommendations could be found. The focus will be the assessment of pain in people with cognitive impairment due to dementia, as this represents the major cause of cognitive impairment in older adults.

Method

In order to locate evidence relating to the research questions the following databases were searched over the period January 1985 through June 2008: Medline, Cumulative Index to Nursing & Allied Health (CINAHL), Biological Abstracts, and Psycinfo. The search included key words and/or medical subject headings (pain measurement OR pain assessment) AND (dementia OR cognition disorders/cognitive impairment OR nonverbal communication).

An extended search was subsequently conducted of the electronic database of the National Guideline Clearinghouse to identify guidelines on pain assessment in older adults, particularly those recommended for the assessment of the nonverbal older adult or those with dementia. In addition, position statements and clinical practice guidelines were sought through searches of relevant Internet sources such as the International Association for the Study of Pain, the Australian Pain Society, and the National Health and Medical Research Council.

Due to the large number of research reports that were located using the initial search strategy it was decided to restrict the search to reports that met the following criteria:

Type of studies

Systematic reviews.

Participants

Cognitively impaired adult patients suspected of having acute or chronic pain in a clinical setting.

Interventions

Assessment of pain using a previously developed tool that claimed to assess one or more dimensions of the patient's pain experience, including pain severity.

Outcomes

Measures of validity, reliability and practicality of the pain assessment tools.

Results

The search strategy returned 575 results:

```
1 pain measurement.mp. or Pain Measure
ment/(48729)

2 pain assessment.mp. (11225)

3 Dementia/or dementia.mp. (111623)

4 Cognition Disorders/or cognitive dis
orders.mp. (46458)

5 cognitive impairment.mp. (34158)

6 nonverbal communication.mp. or Non
verbal Communication/(5621)

7 1 or 2 (53402)
```

```
8 limit 7 to (english language and
humans and yr="1985 - 2008")(43422)

9 3 or 4 or 5 or 6 (165940)

10 limit 9 to (english language and
humans and yr="1985 - 2008") (129860)

11 8 and 10 (857)

12 remove duplicates from 11 (575)
```

When the search result was limited using keywords "paramedic" OR "emergency medical technician" OR "ambulance/s" OR "prehospital" OR "emergency medical services", there were no (0) results.

The full-text versions of studies that matched the initial inclusion criteria were reviewed. This strategy identified two reports that met the selection criteria:

- Herr K, Bjoro K, Decker S:**Tools for assessment of pain in nonverbal older adults with dementia: a state-of-the-science review**. J Pain Symptom Manage 2006, **31**:170-92.

- Zwakhalen SM, Hamers JP, Abu-Saad HH, Berger MP:**Pain in elderly people with severe dementia: a systematic review of behavioural pain assessment tools**. BMC Geriatr 2006, **6**.

Analysis and evaluation of the systematic reviews

Herr and colleagues used the following selection criteria for their systematic review:

1. Studies based on behavioural indicators of pain;

2. Developed for assessment of pain in nonverbal older adults with severe dementia or evaluated for use with nonverbal older adults;

3. Available in English; and

4. At least one published research report of psychometric evaluation available in English[26].

These criteria identified 10 behaviourally-based pain assessment tools for use with older adults with dementia. The tools were evaluated in each of the areas of "conceptualization, subjects, administration, reliability, and validity." The authors independently critiqued each tool and applied a score from 0-3 for each of the five evaluation categories, with a score of 3 indicating strong evidence for each construct to 0 for no evidence. Studies that described the implementation and evaluation of the 10 tools were analysed and the strengths and limitations noted to arrive at a total score for each tool. This process revealed that only one tool has been tested with older adults in acute care settings (the Abbey Pain Scale)[27].

The authors concluded that, while some tools are potentially useful, weaknesses in the tools evaluated mean that there is currently "no standardized tool based on nonverbal behavioural pain indicators in English that may be recommended for broad adoption in clinical practice"[26]. One reason given for this conclusion was the acknowledgment that the ability to recognise pain and rate pain severity on the basis of behavioural cues is limited by significant inter-patient variability in pain-related behaviours that may also be affected by co morbid conditions such as stroke and psychiatric illness.

The study by Zwakhalen et al used a more comprehensive scoring method that, in addition to the categories evaluated by Herr et al, included an evaluation of study size and homogeneity of studies. The expanded range of scores for each of the constructs being evaluated produced a total possible score of 20. The authors evaluated seven of the tools reported by Herr and colleagues, and evaluated an additional five tools that were not included in the former study, before recommending the Pain Assessment Checklist for Seniors with Limited Ability to Communicate (PACSLAC)[28] and DOLOPLUS-2[29]. scales as the most appropriate scales currently available.

The difference in results between these two studies reflects differences in evaluation methodology. For example, the highest rating tool in the Herr et al study was the DS-DAT, but this tool was excluded from the study by Zwakhalen and colleagues as this tool attempted to rate discomfort rather than pain, and was therefore conceptually different than other tools designed to evaluate pain in this population. Differences in the study results may also reflect a lack of consensus on how to validate tools for observational assessment of pain behaviours.

In addition to the literature search already described an Internet search for paramedic clinical practice guidelines or documents that were not cited in the search databases was undertaken, but this failed to identify any evidence of tools for the assessment of pain in adults with cognitive impairment that are recommended for use by paramedics in community emergency care settings.

Reference to cognitive impairment and the consequent impact this condition has on the paramedic's ability to assess pain is rarely mentioned in the paramedic literature. Although no specific recommendations were found regarding the paramedic assessment of pain in cognitively impaired individuals, there was some evidence of general

advice regarding the need to assess cues such as behaviour in the absence of a self-report. The clinical practice guidelines that inform paramedic practice in the United Kingdom advise that the use of pain assessment tools such as the VNRS in the assessment of patients with cognitive impairment may be difficult, and recommend that "in these circumstances behavioural cues will be more important in assessing pain"[30]. However, no further guidance is provided regarding the types of behavioural cues that are strongly correlated with pain and pain severity.

Discussion

The reviews of pain assessment tools for the cognitively impaired that were included in the cited systematic reviews show that the majority were developed to assess chronic pain in aged care, hospital or hospice settings. An analysis of the characteristics of these pain assessment tools identified attributes that may limit their use in paramedic practice. These include assessment that is possibly too comprehensive and time consuming for paramedics to perform. For example, several tools included in the systematic reviews are recommended for use in aged care institutions and involve complex scoring that requires repeated observation of patient behaviours over time by trained observers. Some, such as the NOPAIN tool[31], are designed to be used while observing the patient undertaking daily tasks such a dressing and bathing, which restricts its use by paramedics.

The DOLOPLUS-2[29] scale requires observation of patient behaviour over time in several different situations including social interactions and sleep. Its use is limited in the acute setting as the patient's normal behaviour must be well known to the carers who complete the assessment. A recent review of this tool has questioned its validity and has identified the considerable administrative demands required to assess pain behaviours[32].

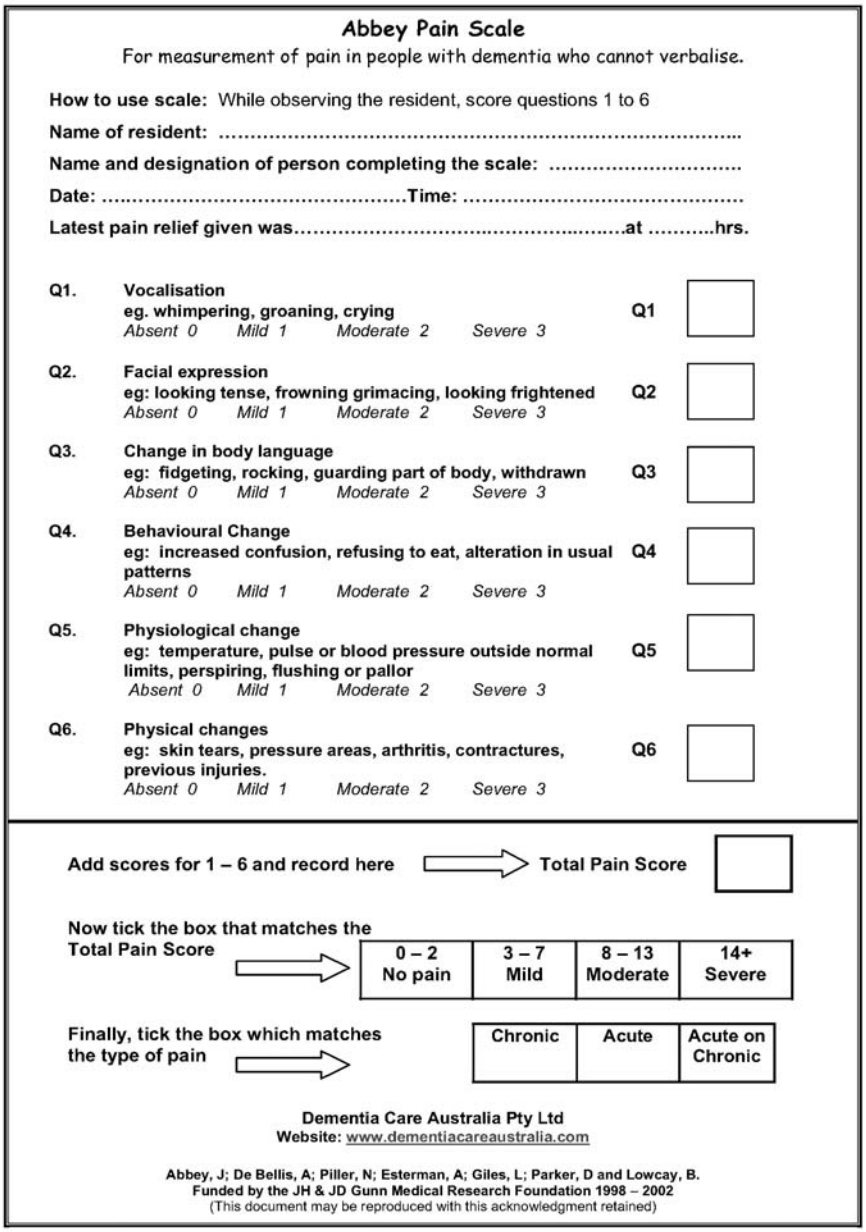
Assessment of pain using PACSLAC[28] involves observation of 60 items that include behaviour during movement, eating and sleeping as well as mood and changes in social interactions. This tool also requires observation of the patient over time to enable observation of often subtle changes in behaviour. As such this tool is likely to be impractical for paramedic use.

One behaviourally-based pain assessment tool that is currently used by paramedics in the Australian state of Victoria is the Face, Legs, Activity, Cry and Consolability (FLACC) tool, which is used to assess pain in nonverbal children[33]. Although there is some evidence of the use of this tool for assessment of pain in cognitively impaired older adults[26], this tool may not be appropriate for the assessment of pain in this population. The FLACC scale was developed to guide the assessment of pain in infants and pre-verbal children, and the pain-related behaviours that form the basis of this tool were identified from studies of children undergoing painful procedures such as circumcision. Some behaviour addressed by this scale such as leg kicking and a quivering chin does not appear to be relevant when assessing adults. The review of adult pain assessment tools undertaken by Herr and colleagues found that the FLACC has low levels of validity and reliability and as such was not recommended for use in this population[26].

Any tool used by paramedics must be reliable, valid and practical, with the latter influenced by operational requirements to minimise time spent on scene. As such, tools that assess multiple dimensions of pain that require observation of behaviour over time during different activities may have less utility than a tool that identifies the presence of pain and attempts to evaluate the severity in a way that parallels tools that are already familiar to paramedics for use in patients without cognitive impairment. In a report published by the Australian Pain Society[34] that describes the use of best available evidence and the results of a clinical trial of pain assessment tools to inform pain management practice in aged care facilities, the Abbey pain scale (Figure 1) was recommended as the most appropriate means of assessing pain in residents with severe cognitive impairment. This one-dimensional scale is designed to rate pain severity. Although this tool attempts to address acute, chronic and acute-on-chronic pain using six behaviour categories that include physiological and physical changes, vocalisation, facial expressions, and changes in body language and behaviour, some cues may be non-specific. This is particularly apparent in the facial cue category, where cues such as frowning may not have a strong correlation with pain[35]. The tool takes between two to six minutes to complete[36], and as such this tool may be practical for use in the paramedic practice setting.

Following a recent review of available evidence the Abbey Pain Scale was recommended by the Royal College of Physicians in the UK for assessment of pain in patients with severe cognitive impairment[37]. The authors of this report recognised that limited clinical data was available to support this decision, but made this recommendation on the basis on ease of use while adding the caveat that no single method of pain assessment could be recommended for this cohort.

At this time no pain assessment tools for use in the setting of cognitive impairment have been validated for use by paramedics. Until studies of the paramedic use of tools such as the Abbey Pain Scale are undertaken, general recommendations can be made to aid the assessment of pain in patients with cognitive impairment. The following clin-



Abbey Pain Scale

For measurement of pain in people with dementia who cannot verbalise.

How to use scale: While observing the resident, score questions 1 to 6

Name of resident: .....

Name and designation of person completing the scale: .....

Date: .....**Time:** .....

Latest pain relief given was.....**at** .....**hrs.**

Q1. **Vocalisation**
eg. whimpering, groaning, crying **Q1**
Absent 0 Mild 1 Moderate 2 Severe 3

Q2. **Facial expression**
eg: looking tense, frowning grimacing, looking frightened **Q2**
Absent 0 Mild 1 Moderate 2 Severe 3

Q3. **Change in body language**
eg: fidgeting, rocking, guarding part of body, withdrawn **Q3**
Absent 0 Mild 1 Moderate 2 Severe 3

Q4. **Behavioural Change**
eg: increased confusion, refusing to eat, alteration in usual patterns **Q4**
Absent 0 Mild 1 Moderate 2 Severe 3

Q5. **Physiological change**
eg: temperature, pulse or blood pressure outside normal limits, perspiring, flushing or pallor **Q5**
Absent 0 Mild 1 Moderate 2 Severe 3

Q6. **Physical changes**
eg: skin tears, pressure areas, arthritis, contractures, previous injuries. **Q6**
Absent 0 Mild 1 Moderate 2 Severe 3

Add scores for 1 – 6 and record here → **Total Pain Score**

Now tick the box that matches the Total Pain Score

0 – 2 No pain	3 – 7 Mild	8 – 13 Moderate	14+ Severe

Finally, tick the box which matches the type of pain

Chronic	Acute	Acute on Chronic

Dementia Care Australia Pty Ltd
Website: www.dementiacareaustralia.com

Abbey, J; De Bellis, A; Piller, N; Esterman, A; Giles, L; Parker, D and Lowcay, B.
Funded by the JH & JD Gunn Medical Research Foundation 1998 – 2002
(This document may be reproduced with this acknowledgment retained)

Figure 1
Abbey Pain Scale. From: Abbey J et al. The Abbey pain scale: a 1-minute numerical indicator for people with end-stage dementia [27].

ical practice recommendations are adapted from the American Society of Pain Management Nursing Position Statement on Pain Assessment in the Nonverbal Individual[38]. Given the evidence that establishes a link between cognitive impairment and reduced pain management interventions, paramedics need to be proactive in seeking evidence of pain in this vulnerable population. Strategies that may be employed to improve the identification of pain in cognitively impaired adults include assessment of injuries associated with pain, interpretation of behaviour, surrogate estimation of pain by carers or close family members, use of a pain assessment tool, and observation of clinical response to analgesics or other non-pharmacological interventions designed to relieve pain. However, no single assessment strategy is sufficient by itself[38].

1. Identify possible causes of pain

The likelihood of pain may be inferred by the presence of injury or disease that is normally associated with pain. Where the patient has an obvious recent fracture or dislocation, extensive soft tissue injury due to a fall or from burns and scalds, the patient is likely to be experiencing pain even though they may be unable to clearly communicate this. Assessment of pain may be aided by evidence of a pattern of injury such as the limb shortening and external rotation frequently associated with fractures to the neck of the femur. There is no strong evidence that patients with dementia suffer less pain, with some evidence suggesting that patients with dementia suffer more pain than those without cognitive impairment[39]. However, paramedics may not consider the need for analgesia if they believe that cognitive impairment is associated with reduced pain perception.

Where the patient's behaviour suggests the presence of pain but the cause is less obvious, such as pain arising from ischaemia of visceral organs, the confirmation of pain is more difficult. The assessment may also be complicated by chronic pain from conditions such as arthritis and osteoporosis, or from cancer or recent surgical procedures. However, pain may have no identifiable pathological basis, and confirmation of an injury or disease process to account for the pain is not needed. Withholding analgesia in the absence of an obvious source is inappropriate where other clinical cues suggest that the patient is experiencing pain.

2. Observe patient behaviour

Assessment of pain in the cognitively impaired adult may require the establishment of individual benchmarks for behaviour. This is done by asking carers, relatives or close friends to describe normal behaviour and any recent changes in the patient's behaviour. Where the patient is a resident of an aged care facility the nursing staff should be questioned regarding the use of pain assessment tools, and if used, whether an attempt has been made to assess the patient to identify evidence of pain.

Some behaviours have been shown to be associated with pain, and these include facial expressions, vocalising, certain body movements, and changes in interpersonal interactions or in activity or daily routines[40]. While pain assessment tools should attempt to address each of these behaviours, the assessment of some requires evidence of prior behavioural norms and observation of behavioural changes over time. For paramedics called to see patients with the potential presence of pain this information may unavailable, and observation over time impractical given the operational pressures to minimise scene and transport times. However, facial expressions may be an important indicator of pain, with evidence that prototypical facial expressions of pain are reliably identified by observers of another individual's pain-related expressions, and that observers are able to discriminate between facial expressions associated with pain and those associated with other emotions such as fear[35]. In an experimental pain setting the facial responses of patients with dementia and those in the healthy control group were closely related to the intensity of the stimulation, leading to a conclusion that facial expression may be an important pain assessment tool in patients with impaired cognition or inability to self-report their pain experience[41]. Facial changes associated with pain have been shown to be consistent across the lifespan [42], and as the identification of facial cues does not require the establishment of base rate data or trends in behaviour this may be an important cue that can be assessed by paramedics in order to identify the presence of pain. In addition, this does not demand assessment over time as is required by some other behavioural cues.

3. Seek information from others

Information should be sought from the patient's family, close friends or carers regarding changes in behaviour that may be associated with the presence of pain. People who know the patient well are likely to be able to report subtle changes in the patient's behaviour or daily activities that may suggest pain. This use of surrogate reporting of pain has some advantages over a naive assessment of pain. However, evidence shows a tendency for doctors[43] and allied health professionals to underestimate the severity of the patient's pain experience[44,45]... This phenomenon has also been observed in the prehospital setting[46]. As such the

use of surrogate measures of pain should be supported by other clinical evidence wherever possible.

4. Use a pain assessment tool

Although the patient's ability to use pain assessment tools such as the VNRS and VNRS depends on the extent of cognitive impairment, patients should still be asked to provide an assessment of their pain using these tools as there is evidence that they may be successfully used in patients with mild to moderate cognitive impairment[47]. Other barriers to communication not related to dementia - such as hearing loss - should be considered and aids used to ensure that the communication problem is not related to another disability before considering the use of a pain assessment tool designed for patients with cognitive impairment.

5. Consider an analgesic trial

If all the available evidence suggests that the patient is experiencing pain and other interventions have failed to relieve the pain it may be reasonable to administer an analgesic to observe the response this has on pain-related behaviours. Patients with moderate to severe cognitive impairment due to dementia may have difficulty understanding instructions regarding the self-administration of inhalational analgesics such as nitrous oxide or methoxyflurane, and as such small aliquots of a parenteral analgesic may be required. While it is important to be guided by principles of beneficence and to adopt a humanitarian approach to relieving pain and suffering, of equal importance is the need to minimise harm arising from unnecessary administration of analgesics in response to a false positive arising from an assessment of the presence of pain. Unlike other forms of diagnostic tests there is no gold standard tool for confirming the variable and very personal experience of pain.

Conclusion

Paramedics have the tools to relieve pain in the form of effective pharmacological - opioid and non-opioid - and non-pharmacological adjuncts. However, equitable and effective management of pain relies on the self-report of this symptom. In patients whose self-report is limited by cognitive disability paramedics may need to use other methods of seeking evidence of pain. A patient who cannot clearly articulate their pain experience is just as deserved of relief from pain as those who are not burdened with disability. While some pain assessment tools have been recommended for use in patients with cognitive impairment there is currently lack of consensus on the most appropriate tool to use. As such, research is recommended that aims to test the utility, validity and reliability of the Abbey Pain Scale in identifying pain in this at-risk population in the prehospital setting. Further research should also evaluate the effectiveness of paramedic pain management practice in older adults to ensure that the care of all patients is unaffected by age or disability.

Competing interests

The author declares that he has no competing interests.

References

1. Rupp T, Delaney KA: **Inadequate analgesia in emergency medicine.** *Ann Emerg Med* 2004, **43:**494-503.
2. Todd KH, Deaton C, D'Adamo AP, Goe L: **Ethnicity and analgesic practice.** *Ann Emerg Med* 2000, **35:**11-6.
3. Chen EH, Shofer FS, Dean AJ, Hollander JE, Baxt WG, Robey JL, Sease KL, Mills AM: **Gender disparity in analgesic treatment of emergency department patients with acute abdominal pain.** *Acad Emerg Med* 2008, **15:**414-8.
4. Neighbor ML, Honner S, Kohn MA: **Factors affecting emergency department opioid administration to severely injured patients.** *Acad Emerg Med* 2004, **11:**1290-6.
5. Nelson BP, Cohen D, Lander O, Crawford N, Viccellio AW, Singer AJ: **Mandated pain scales improve frequency of ED analgesic administration.** *Am J Emerg Med* 2004, **22:**582-5.
6. Campbell D, Brand C, Bucknall T, Copnell B: **Pain: the 5th vital sign. Review of acute pain management in Victoria.** Melbourne: Victorian Quality Council; 2003.
7. Reyes-Gibby CC, McCrory LL, Cleeland CS: **Variations in patients' self-report of pain by treatment setting.** *J Pain Symptom Manage* 2003, **25:**444-8.
8. Yates P, Dewar A, Fentiman B: **Pain: the views of elderly people living in long-term residential care settings.** *J Adv Nurs* 1995, **21:**667-674.
9. Fox P, Solomon P, Raina P, Jadad A: **Barriers and facilitators in pain management in long-term care institutions: a qualitative study.** *Canadian Journal on Aging* 2004, **23:**269-80.
10. Craig KD: **The social communication model of pain.** *Canadian Psychology* 2009, **50:**22-32.
11. Australian and New Zealand College of Anaesthetists and Faculty of Pain Medicine: **Acute pain management: scientific evidence.** 2nd edition. Melbourne: ANZCA; 2005.
12. Melzack R, Katz J: **Pain assessment in adult patients.** In *Textbook of pain* 5th edition. Edited by: McMahon SB, Koltzenburg M. Philadelphia: Elsevier Churchill Livingstone; 2006:291-304.
13. Maio RF, Garrison HG, Spaite DW, Desmond JS, Gregor MA, Stiell IG, Cayten CG, Chew JL Jr, Mackenzie EJ, Miller DR, O'Malley PJ: **Emergency Medical Services Outcomes Project (EMSOP) IV: pain measurement in out-of-hospital outcomes research.** *Ann Emerg Med* 2002, **40:**172-9.
14. Ricard-Hibon A, Chollet C, Saada S, Loridant B, Marty JA: **A quality control program for acute pain management in out-of-hospital critical care medicine.** *Ann Emerg Med* 1999, **34:**738-44.
15. Lord BA, Parsell B: **Measurement of pain in the prehospital setting using a visual analogue scale.** *Prehospital Disaster Med* 2003, **18:**353-8.
16. Victorian Ambulance Services: **Clinical practice guidelines.** Melbourne, Victoria: Victorian Ambulance Services; 2006.
17. JRCALC: **UK Ambulance Service Clinical Practice Guidelines.** UK: Joint Royal Colleges Ambulance Liaison Committee; 2006.
18. Reynolds KS, Hanson LC, DeVellis RF, Henderson M, Steinhauser KE: **Disparities in pain management between cognitively intact and cognitively impaired nursing home residents.** *J Pain Symptom Manage* 2008, **35:**388-96.
19. Horgas AL, Tsai P-F: **Analgesic drug prescription and use in cognitively impaired nursing home residents.** *Nurs Res* 1998, **47:**235-42.
20. Henderson AS, Jorm AF: **Dementia in Australia: Aged and community care service development and evaluation reports; no. 35.** Canberra: Australian Government Publishing Service; 1998.
21. Australian Institute of Health and Welfare (AIHW): **Dementia in Australia: national data analysis and development.** AIHW cat. no. AGE 53. Canberra: AIHW; 2007.

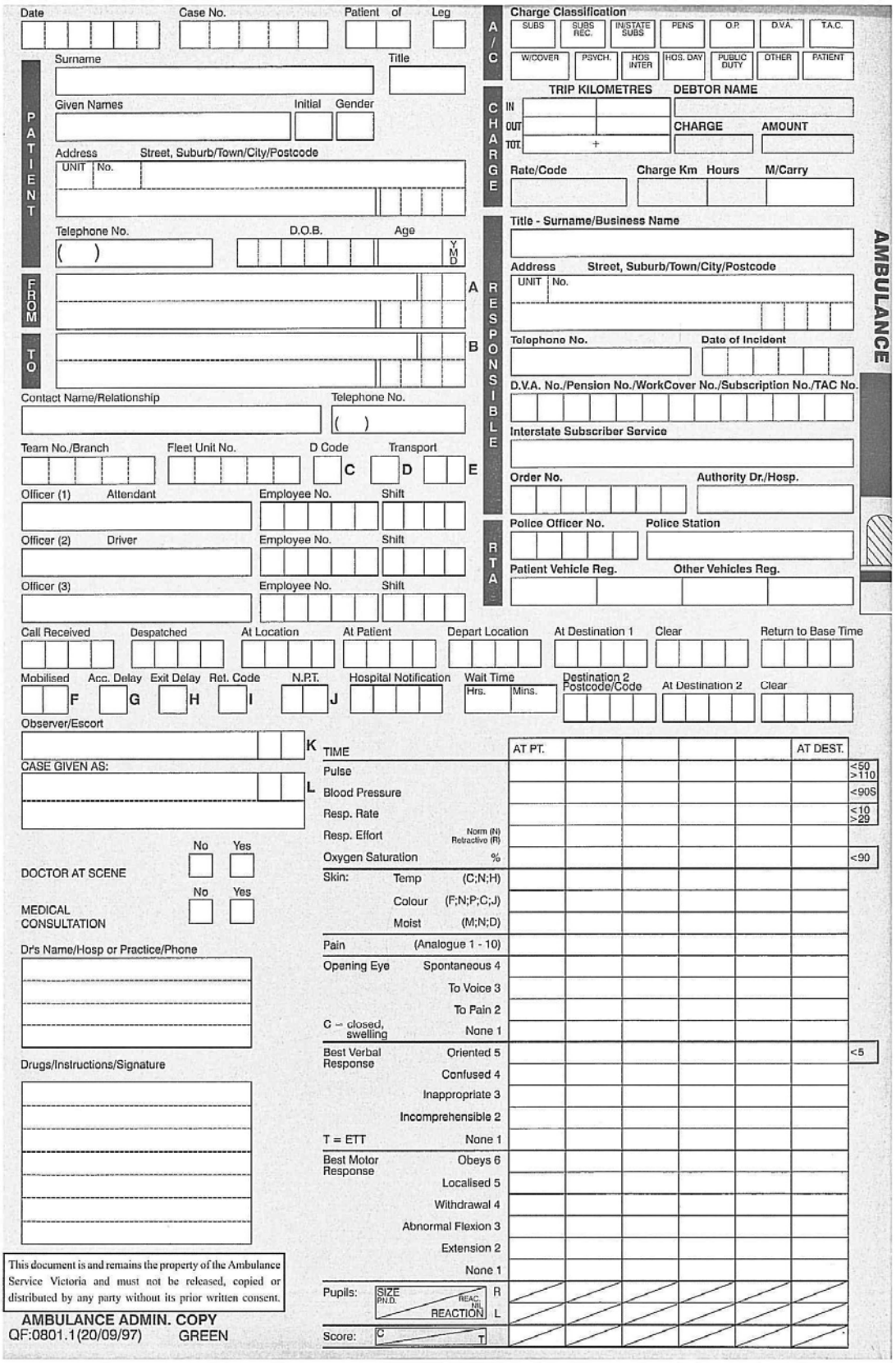
22. Cole LJ, Farrell MJ, Duff EP, Barber JB, Egan GF, Gibson SJ: **Pain sensitivity and fMRI pain-related brain activity in Alzheimer's disease.** *Brain* 2006, **129:**2957-65.
23. Scherder EJ, Sergeant JA, Swaab DF: **Pain processing in dementia and its relation to neuropathology.** *Lancet Neurol* 2003, **2:**677-86.
24. Cousins MJ, Brennan F, Carr DB: **Pain relief: a universal human right.** *Pain* 2004, **112:**1-4.
25. McNeill JA, Sherwood GD, Starck PL: **The hidden error of mismanaged pain: a systems approach.** *J Pain Symptom Manage* 2004, **28:**47-58.
26. Herr K, Bjoro K, Decker S: **Tools for assessment of pain in nonverbal older adults with dementia: a state-of-the-science review.** *J Pain Symptom Manage* 2006, **31:**170-92.
27. Abbey J, Piller N, De Bellis A, Esterman A, Parker D, Giles L, Lowcay B: **The Abbey pain scale: a 1-minute numerical indicator for people with end-stage dementia.** *Int J Palliat Nurs* 2004, **10:**6-13.
28. Fuchs-Lacelle S, Hadjistavropoulos T: **Development and preliminary validation of the Pain Assessment Checklist for Seniors With Limited Ability to Communicate (PACSLAC).** *Pain Mgmt Nurs* 2004, **5:**37-49.
29. Wary B, Doloplus C: **Doloplus-2, a scale for pain measurement.** *Soins Gerontol* 1999, **19:**25-7.
30. JRCALC: **JRCALC clinical guidelines: management of pain in adults.** UK: Joint Royal Colleges Ambulance Liaison Committee. London; 2006.
31. Snow AL, Weber JB, O'Malley KJ, Cody M, Beck C, Bruera E, Ashton C, Kunik ME: **NOPPAIN: a nursing assistant-administered pain assessment instrument for use in dementia.** *Dement Geriatr Cogn Disord* 2004, **17:**240-6.
32. Holen JC, Saltvedt I, Fayers PM, Hjermstad MJ, Loge JH, Kaasa S: **Doloplus-2, a valid tool for behavioural pain assessment?** *BMC Geriatr* 2007, **7:**29.
33. Victorian Ambulance Services: **Clinical practice guidelines - paediatric pain assessment (CPG:P1101).** *Melbourne, Victoria* 2006.
34. Australian Pain Society (APS): **Pain in residential aged care facilities: management strategies.** *North Sydney (Australia)* 2005.
35. Simon D, Craig KD, Gosselin F, Belin P, Rainville P: **Recognition and discrimination of prototypical dynamic expressions of pain and emotions.** *Pain* 2008, **135:**55-64.
36. Gibson SJ, Scherer SC, Goucke CR: **Preliminary field testing and preparations for implementation of Australian Pain Society and Australian Pain Relief Association pain management guidelines for residential care.** [http://www.apsoc.org.au/pdfs/APRA-finalreport7.doc].
37. Royal College of Physicians, British Geriatrics Society and British Pain Society: **The assessment of pain in older people: national guidelines. Concise guidance to good practice series, No 8.** London: RCP; 2007.
38. Herr K, Coyne PJ, Key T, Manworren R, McCaffery M, Merkel S, Pelosi-Kelly J, Wild L: **Pain assessment in the nonverbal patient: position statement with clinical practice recommendations.** *Pain Mgmt Nurs* 2006, **7:**44-52.
39. Kunz M, Mylius V, Scharmann S, Schepelman K, Lautenbacher S: **Influence of dementia on multiple components of pain.** *Eur J Pain* 2009, **13:**317-25.
40. AGS Panel on Persistent Pain in Older Persons: **The management of persistent pain in older persons.** *J Am Geriatr Soc* 2002, **50(6 Suppl):**S205-24.
41. Kunz M, Scharmann S, Hemmeter U, Schepelmann K, Lautenbacher S: **The facial expression of pain in patients with dementia.** *Pain* 2007, **133:**221-8.
42. Prkachin KM: **Assessing pain by facial expression: facial expression as nexus.** *Pain Res Manag* 2009, **14:**53-8.
43. Marquie L, Raufaste E, Lauque D, Marine C, Ecoiffier M, Sorum P: **Pain rating by patients and physicians: evidence of systematic pain miscalibration.** *Pain* 2003, **102:**289-96.
44. Solomon P: **Congruence between health professionals' and patients' pain ratings: a review of the literature.** *Scand J Caring Sci* 2001, **15:**174-80.
45. Puntillo K, Neighbor M, O'Neil N, Nixon R: **Accuracy of emergency nurses in assessment of patients' pain.** *Pain Mgmt Nurs* 2003, **4:**171-5.
46. Luger TJ, Lederer W, Gassner M, Lockinger A, Ulmer H, Lorenz IH: **Acute pain is underassessed in out-of-hospital emergencies.** *Acad Emerg Med* 2003, **10:**627-32.
47. Closs SJ, Barr B, Briggs M, Cash K, Seers K: **A comparison of five pain assessment scales for nursing home residents with varying degrees of cognitive impairment.** *J Pain Symptom Manage* 2004, **27:**196-205.

Pre-publication history

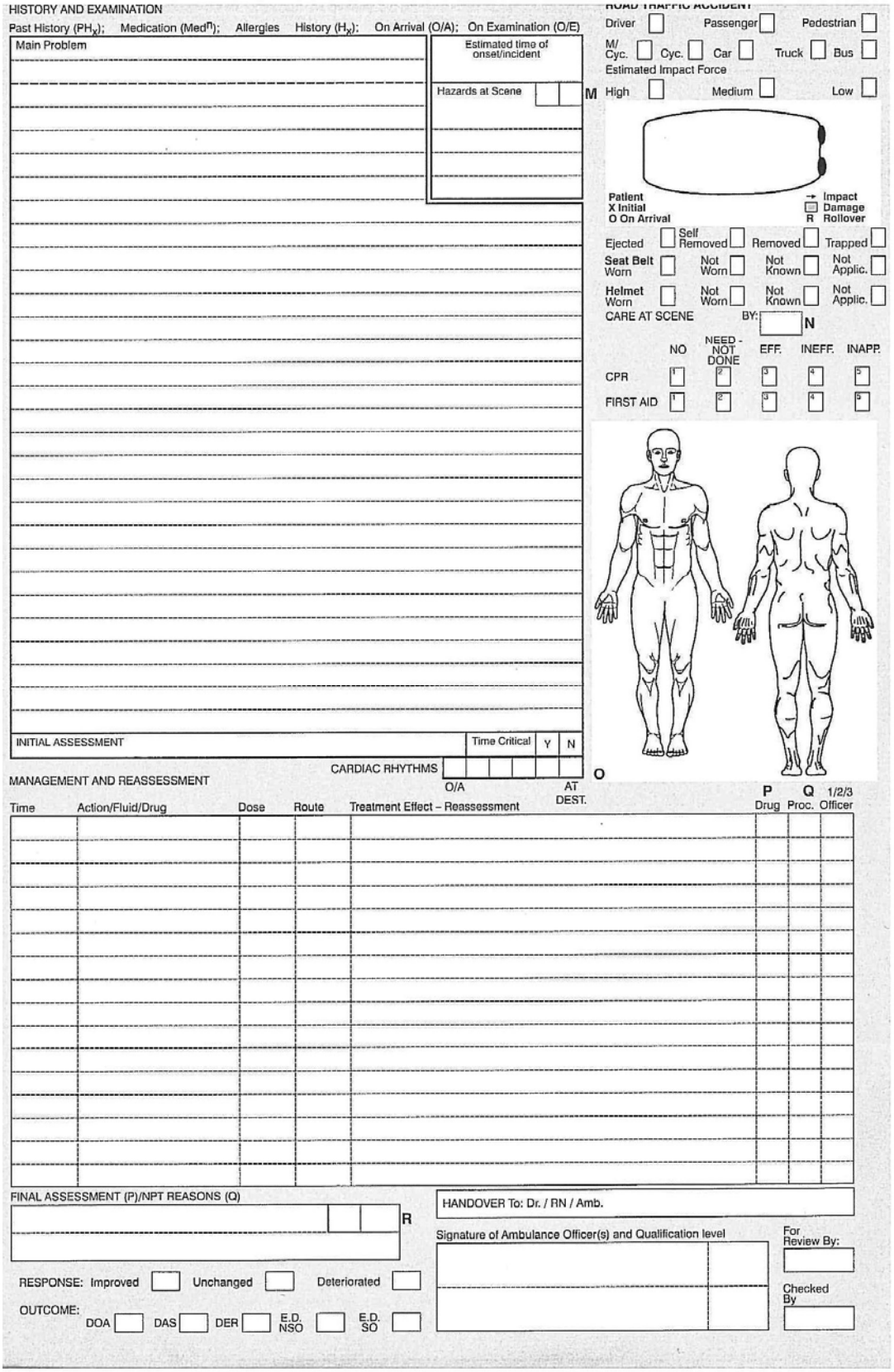
The pre-publication history for this paper can be accessed here:

http://www.biomedcentral.com/1471-227X/9/20/prepub

Appendix I: Patient care record



Patient care record (Part B)



Appendix J: Consent and study information forms for participants

MONASH University

Explanatory Statement: Paramedic Student Focus Groups

Project Title: Paramedics attitudes and beliefs regarding pain assessment and pain management

My name is Bill Lord and I am conducting a research project under the supervision of Associate Professor Frank Archer, who is the Director of the Department of Community Emergency Health and Paramedic Practice. This research comprises part of the requirements for the award of PhD at Monash University.

Assessment of patients reporting pain and the management of their pain is a common and important role undertaken by paramedics. As student paramedics we are inviting you to share your experiences of assessing and managing patients in pain to improve our understanding of the factors that influence this aspect of patient care. It is hoped that the findings of this project will add to the evidence used to guide the development of clinical standards for managing pain, and inform education programs that aim to prepare paramedics for clinical practice that involves pain management.

We are inviting students undertaking paramedic education within this Department to attend a discussion group (also known as a Focus Group) to talk about their pain management experiences. The discussion will be tape recorded to make sure the records are accurate. The information you provide to us may be presented at conferences or published in journals, but you will not be identified.

The discussion group will take approximately 90 minutes of your time. The discussion group starts with an introduction of myself and the project, and is followed by some questions that all the participants together can discuss if they wish. Some refreshments and food will be provided while you are there. Confidentiality cannot be guaranteed for any information that might be raised within the discussion group, because it is conducted in a small group with other students that are known to each other. However, no information will be collected that enables the identity of individual participants to be known by anyone other than the principal researcher.

The aim of the discussion group is to talk about your thoughts during the assessment and management of patients reporting pain, and the factors that may influence your management decisions. You will also be invited to complete a questionnaire related to the focus group discussions. This will require short answers to questions relating to pain management, and will include brief clinical cases that ask you to describe you likely treatment of the patient described in each case.

No details that could identify any individual involved in the study will be published. Only the combined results of all participants will be published. Only the Monash research team will have access to the information you supply, your identity will not be associated with any of this information. Although the Victorian Ambulance Services have approved this study no information regarding the identity of the participants will be released to these or any other agency. The information you provide will be kept for 5 years, and will be stored in a secure

(locked filing cabinet) location. This is a legal requirement we comply with to ensure the information you provide is used appropriately.

Participation in this research is entirely voluntary. If you agree to participate, you may withdraw from the study by informing any of the project research staff or by calling the phone number below. You will not be required to give a reason either to the researcher or to any other participant in the study. Not participating at all or withdrawing will not have any negative effect on your future study or progression within this current course or future studies at Monash. The research staff understand that personal circumstances may make it unreasonable or difficult for some people to be involved. All study participants also have the right to decline to do particular activities without giving reasons. As the discussion group is tape recorded, withdrawal of your data from the study after the discussion group has begun is not possible as identification of individual voices for removal from the tape will be impossible. However, you can leave the discussion group at any time.

You will not be paid to attend the discussion group, but some light refreshments will be provided for you while you are there. If you become by talking about your experiences, we can refer you to appropriate confidential counselling services if you wish.

If you would like to contact the **researchers** about any aspect of this study, or would like to receive a summary of the study findings, please contact the Chief Investigator:	If you have a **complaint** concerning the manner in which this research **CF07/0449 - 2007/0139** is being conducted, please contact:
Associate Professor Frank Archer Tel: (03) 9904 4330 Fax: (03) 9904 4168 e-mail: frank.archer@med.monash.edu.au	Human Ethics Officer Standing Committee on Ethics in Research Involving Humans (SCERH) Building 3e Room 111 Research Office Monash University VIC 3800 Tel: +61 3 9905 2052 Fax: +61 3 9905 1420 Email: scerh@adm.monash.edu.au

Thank you.

Mr Bill Lord
PhD candidate

Department of Community Emergency Health and Paramedic Practice
School or Primary Health Care
Faculty of Medicine, Nursing and Health Sciences
Building H Peninsula Campus
Frankston VIC 3199
Telephone +61 3 9904 4407 Facsimile +61 3 9904 4168
ABN 12 377 614 012 CRICOS provider number 00008C

MONASH University

Consent Form – Year 1 student focus group - Bachelor of Emergency Health (Paramedic)

Title: *Paramedics attitudes and beliefs regarding pain assessment and pain management*
(Reference CF07/0449 - 2007/0139)

NOTE: This consent form will remain with the Monash University researcher for their records

I agree to take part in the Monash University research project specified above. I have had the project explained to me, and I have read the Explanatory Statement, which I keep for my records. I understand that agreeing to take part means that I am willing to:

1. I agree to involved in a focus group
2. I agree to allowing the focus group to be audio-taped

I understand that my participation is voluntary, that I can choose not to participate in part or all of the project, and that I can withdraw at any stage of the project without being penalised or disadvantaged in any way.

I understand that any data that the researcher extracts from the focus group for use in reports or published findings will not, under any circumstances, contain names or identifying characteristics.

Participant's name

Signature

Date