Analysis of how nursing staff in Far North Queensland manage people who are victims of Irukandji syndrome

Thesis submitted by

Jennifer Joan Sando

RN, RM, NICC, Dip. Teach (Nursing) (USyd), MHPEd (UNSW)
Grad Dip Business (Admin Mgt) (UniSA),
Grad Cert Public Sector Mgt (Flinders)

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Statement of Access

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Declaration

I declare that this thesis is my own work and has not been submitted in any form for another degree or diploma at any university or other institution of tertiary education. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

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Statement on the Contribution of Others

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Declaration on Ethics

The research presented and reported in this thesis was conducted within the guidelines for research ethics outlined in the *National Statement on Ethics Conduct in Research Involving Humans* (1999), the *Joint NHMRC/AVCC Statement and Guidelines on Research Practice* (1997), the *James Cook University Policy on Experimentation Ethic:, Standard Practices and Guidelines* (1997), and the *James Cook University Statement and Guidelines on Research Practice* (2001). The proposed research methodology received clearance from the James Cook University Experimentation Ethics Review Committee (approval number H2225).

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Glossary of Terms

Advanced Beginner: Advanced beginners are those who can demonstrate marginally acceptable performance, those who have coped with enough real situations to note the recurring meaningful situational components.

Advanced Practice Nurse: "Advanced practice nursing defines a level of nursing practice that utilizes extended and expanded skills, experience and knowledge in assessment, planning, implementation, diagnosis and evaluation of the care required" (RCNA, 2002, p.1). The College believes that the basis of advanced practice is the high degree of knowledge, skill and ability applied and advanced practice then forms the basis for the nurse practitioner (NP) role.

Competent: Competence develops when the person begins to see his or her actions in terms of long-range goals or plans of which he or she is consciously aware.

Expert: Te exert performer no longer relies on rules or guidelines to connect his or her understanding of the situation to an appropriate action. The expert, with a substantial body of experience, now has an intuitive grasp of each situation and focuses on the accurate region of the problem without wasteful consideration of alternative solutions. (Benner, 1984).

Irukandji syndrome: Irukandji Syndrome is the name of a collection of systemic symptoms following envenomation by the Irukandji jellyfish. The symptoms vary from minor (eg. Redness, goosebumps) to serious (eg. Cardiac dysfunction and pulmonary oedema).

Marine envenomation: A sting from a jellyfish or stinging hydroid, or introduction of a marine venom by puncture of the victim's skin: puncture wounds can be caused by fish barbs (e.g. stingrays, stonefish), other barbs (e.g. cone shell), or bites (e.g. sea snakes, blue-ringed octopus). The definition does not include poisoning where venom is swallowed (e.g. seafood and shellfish poisoning).

Novice: The person with no experience of the situations in which they are expected to perform. Novices are taught context-free rules to guide action in respect to different attributes.

Nurse Practitioner: A nurse practitioner is a registered nurse educated to function autonomously and collaboratively in an advanced and expanded clinical role. It is grounded in the nursing profession's values, knowledge, theories and practice and provides innovative and flexible health care delivery that complements other health care providers. Section 77(3) of the *Nursing Act 1992* allows QNC to authorise a person to practise nursing in another area of nursing. This section of the Act is used to authorise eligible registered nurses to practise as nurse practitioners in Queensland (QNC, 2006).

Proficient: The proficient performer perceives situations as wholes rather than in terms of aspects, and performance is guided by maxims. The perspective is not thought out but presents itself based on experience and recent events.

RIPRN: Rural and Isolated Practice – Registered Nurse (RIPRN) course. The course prepares Registered Nurses to apply for endorsement by the Queensland Nursing Council to practice under the provisions of the Health (Drugs and Poisons) Regulation, 1996.

Abstract

Background:

Every year in tropical areas of Australia, in addition to the people who live there, many others visit to experience nature at its best. In tropical Far North Queensland, tourists often come to holiday during the summer period when their own region of residence is cold and uninviting. As a consequence, they are keen to swim in the ocean and partake of other water activities. In these warm tropical waters, however, lurk a number of creatures which can cause unpleasant physical effects. One of these marine animals is a very small creature, the Irukandji jellyfish, which is usually invisible to the swimmer but causes a very painful systemic reaction in those who are stung. The body's response to the sting is called 'Irukandji syndrome'. However, in spite of the pervasiveness of the Irukandji and other similar animals in tropical waters during the summer months, very little is written about the nursing management of patients with Irukandji syndrome although there is some literature on the medical management. This study aimed to redress this gap in the nursing evidence-base and provide a framework for expert emergency nurses to better manage the patient with Irukandji syndrome.

Objectives:

The objectives of this study were to:

1. Document and analyse information gathered about the condition of patients with Irukandji syndrome;
2. Assess the nursing management of patients with Irukandji syndrome; and
3. Develop clinical practice guidelines to support the clinical management of patients with IS by advanced practice nurses working in ED settings.

Framework:

The overarching theoretical frameworks for the study were Pragmatism and Reflective Practice. The research design, a concurrent mixed methods approach embedded within a Case Study, was selected as the most appropriate way to conduct the study and generate relevant qualitative and quantitative data. In this study, the use of a concurrent nested design meant that I was able to use the seasonal aspects of a jellyfish 'season' to collect both quantitative and qualitative data during observational episodes or chart audit processes. This design was chosen to allow description and exploration of aspects of a quantitative study, with added depth and richness provided by the qualitative component of the study which included reflection by both participants and researcher.

This study was undertaken between 2005 and 2007 over two summer seasons, in a regional hospital Emergency Department (ED) in Far North Queensland. Seventeen (17) advanced practice registered nurses were recruited into the study and agreed to participate in one or more of the twenty three (23) observational episodes within the ED. Quantitative data were analysed using SPSS version 16.0, generating both descriptive and inferential statistics. Qualitative data was managed using an Excel spreadsheet to undertake content analysis and the Delphi technique was employed to generate clinical guidelines.

Findings:

The participants were advanced practice ED nurses who regularly use their knowledge, skills and abilities to manage the variety of patients who transit through the ED. The participants were clinically able to manage the patients with Irukandji syndrome, but were limited in their capacity to respond quickly to the patient's needs,

especially their need for pain relief, because of policy frameworks requiring the initiation of appropriate pain relief by medical officers only. Using the Delphi technique, clinical guidelines were developed and it is envisaged these will support a change in the existing policy so as to allow appropriately qualified ED nurses to initiate pain management for these patients in the future. Secondary and unexpected findings suggested that expert nurses in ED appear to provide clinical care based on decisions which are not overtly evident; that is, little documentation existed in patients' charts to show the intellectual nursing assessment processes used to arrive at a clinical decision.

Conclusions:

Expert ED nurses may have the capacity to use advanced clinical knowledge and skills when managing patients who had been diagnosed with Irukandji syndrome, however they have been hindered by policy frameworks which need to be addressed and amended. In this study, the nurses understood their scope of practice but did not always document all components of their clinical care in a transparent way although the care they delivered to the patients was of a very high standard.

Chapter One

Introduction

1.1 Introduction:

Six years ago, while diving on the Great Barrier Reef at least twelve hours by boat from the mainland, someone I was diving with was stung by "something" that made them very ill and in severe pain. The boat crew did their very best to make the person comfortable but were unable to alleviate her pain. Aero-medical retrieval of the person was requested by boat crew but deemed to be unnecessary by health personnel in the city, so we had a very distressing and uncomfortable overnight boat trip back to the mainland. I reflected at length about the situation and the apparent inability to alleviate the person's pain and on return to work, I began to ask questions of colleagues about the possible causes of the pain and distress. This study is the final piece in the puzzle that began on that diving trip – it is the completion of a journey that began when my diving companion was affected by something unknown and frightening that was eventually diagnosed as Irukandji syndrome.

This chapter introduces a number of key concepts that will be discussed within the thesis. Importantly it describes the study context and the role of the emergency nurse in Far North Queensland, and links the notion of advanced practice nursing to the possibility for an expanded scope of practice for nurses managing patients with Irukandji syndrome (IS) in an Emergency Department (ED). The chapter also introduces IS, and provides an

overview of the theoretical framework and study design, along with an outline of the organisation of the thesis.

Marine envenomation (i.e. being injected with venom) can occur following stings from a number of animals such as box jellyfish, stingrays, and blue-ringed octopus. The most recent published statistics regarding numbers of patients receiving care in Far North Queensland following marine envenomation (Huynh et al., 2003) showed that between July 1, 2001 and June 30, 2002, 116 people had symptoms consistent with the syndrome resulting from a sting by the Irukandji jellyfish. This jellyfish is a member of the box jellyfish family as described in detail in Chapter 2 of the thesis. Of these 116 people, 89 (76.7%) were stung at a location along the mainland shore, 26 (22%) were offshore from Cairns, while one patient did not have the location recorded in their charts. Sixty-seven of the 116 patients (58%) were male and their average age was 26.5 years (Huynh et al. 2003).

In order to gain a clearer picture of the Irukandji jellyfish and its habits, I consulted with Dr Jamie Seymour, an internationally-recognised expert in marine ecology, at the School of Marine & Tropical Biology at James Cook University in Cairns. Irukandji syndrome (IS) is the name of a collection of systemic symptoms following envenomation by the Irukandji jellyfish, a small marine animal with a transparent bell, 1.5 – 2.5cm in diameter, and almost invisible in the water (See Appendix A1). When the jellyfish comes in contact with an individual, there is an initial skin envenomation followed by a characteristic time delay before the onset of severe systemic symptoms. Far North Queensland has the

dubious honour of having the most number of people nationally present to ED annually due to a sting by an Irukandji jellyfish.

Anecdotal information suggests that the most distressing part of the sting from the Irukandji jellyfish is the pain over the body site as well as the profound effects on other body systems such as generalised muscle pain, nausea and vomiting, and headache (J. Seymour, personal communication, May 27, 2005). As has been well documented in the media, periodicals and nursing journals, waiting times in the ED are often excessive, leading to exacerbation of clinical conditions (Coglan & Corry, 2007; Derlet & Richards, 2000; Helps, 1997; Wiman & Wikbladm, 2004). This could be extrapolated to patients who have been diagnosed with IS, with the excessive waiting time potentially leading to further systemic issues such as cardiac and respiratory problems (Derlet & Richards, 2000; Fry & Holdgate, 2002; Fry, Ryan & Alexander, 2004; Horrocks et al., 2002; Nairn, Whotten, Marshal, Roberts & Swann, 2004; Spurlock, 1999; Unknown, 2005a; Williams & Sen, 2000). Yet despite the serious potential risks associated with this painful syndrome, the time taken for a medical officer to see the patient who presents with the symptoms of IS, or the time before the nurse receives approval to administer narcotic pain relief to the patient, has not been documented to date.

Managing a condition such as Irukandji syndrome is a good example of where nurses can take on an expanded role to improve the situation for the patient. Broad State guidelines for the management of IS were developed by CRC Reef on behalf of the Queensland Government Irukandji Jellyfish Response Taskforce in 2002, but nothing comprehensive

has been published in recent times, most likely due to lack of funding. Because Far North Queensland hospitals treat the majority of patients diagnosed with Irukandji syndrome each year, there have been locally developed management guidelines designed to support the multidisciplinary team care for this condition. These guidelines support the status quo where medical staff drives the decisions regarding care of the patients even though there is scope for expansion of practice for advanced practice ED nurses to use their knowledge and expertise to more effectively care for the patient with IS.

The patient diagnosed with IS need urgent treatment of their pain and one way to ensure this occurs is to introduce specific clinical guidelines designed for experienced nurses with knowledge and skills at an advanced level, who care for these patients. With the exception of one paper written in late 2006 (Greenland, et al., 2006), no literature exists that guides nurses' clinical practice when managing patients with Irukandji syndrome. This study contributes to this current knowledge gap and has resulted in the development of a set of guidelines that can be used by advanced practice nurses in emergency departments in areas where marine stings by jellyfish causing IS are possible. The guidelines could also be used to provide early treatment for people stung at the reef or at locations remote to the emergency department such as appropriately trained staff in the tourism industry, who are often the first people called upon to manage the envenomated patient.

The development of advanced practice nurses is not a new concept as Australia has been implementing advanced practice nursing models since the mid-1990s. While Queensland

has been slower to consider such models, recent issues within both acute and general practice areas of the health sector have led to alternative models of care being considered (Gardner, 2005; Livingstone, 2005). One such model is the advanced practice nursing model. This is in keeping with the World Health Organisation (WHO) position on 'structural and skill imbalances' which proposes that "(I)n the face of workforce shortages…(e)fficient delivery of quality health services requires an interdisciplinary approach with optimal utilization of skills and appropriate task sharing among health workers" (WHO, 2007, p.15). While this initiative was originally introduced to help overcome the impact of the current global shortage of health professions, it is also relevant to other areas where upskilling is suitable such as general practice environments and primary health care centres and EDs.

Advanced practice nurses however, are not identifiable in nursing career frameworks in their own right. Within Australia, each State and Territory has its own registration body that regulates practice for both registered and enrolled nurses. In Queensland, the Queensland Nursing Council (QNC) provides this role and has developed Scope of Nursing Practice Guidelines for Registered Nurses to assist in the translation of legislation into practice. With changes in the Queensland healthcare environment, the scope of practice for both registered and enrolled nurses has, however, changed to require increasingly advanced levels of practice.

To provide guidance for individual nurses, the profession, consumers, and health care organisations, the QNC developed the *Scope of Nursing Practice Decision Making*

Framework following extensive consultation with the nursing profession across all clinical settings, geographic locations and nursing designations, and which provides a framework for:

- nursing practice within diverse contexts;
- expanding practice for RNs;
- delegation among nurses and advancing practice for ENs;
- delegation for unregulated care providers; and
- role relationships (QNC, 2008).

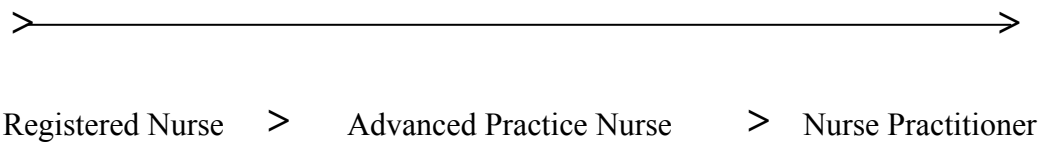
Since 1999, the QNC has supported two major changes to the formal scope of practice of Queensland nurses. Firstly, acceptance that nurses working in rural and remote areas were required to undertake more medical responsibilities due to the lack of available medical support, led to the development and endorsement of the Rural and Isolated Practice – Registered Nurse (RIPRN) course. Following legislative review, the *Health (Drugs and Poisons) Regulation 1996* (Queensland Government, 2001) was amended to make provision for Registered Nurses with an appropriate endorsement from the QNC to fulfill the role responsibilities specified. It was also necessary to have an amendment of the *Nursing Act 1992* (Queensland Government, 1992) passed to support this change in practice.

Secondly, the Nurse Practitioner (NP) role which was originally developed to support primary health care models in rural settings, where the nurse was the only health professional available, was formally supported with legislative changes to become an

integral part of the career structure for nurses in Queensland. In recent years the NP has been able to practice not only in rural and remote settings, but also in the acute care sector (Gardner & Gardner, 2005). The NP role is an expanded form of advanced practice nursing which is controlled by legislation and professional regulation. The Queensland government saw this change as a positive outcome to support role development and expedited the legislative changes to support the acceptance of the NP role. A framework developed by the QNC governs the registration and practice of this advanced level of practice.

While the NP role has been formally endorsed, a number of other advanced practice roles that exist internationally are less clear and are not regulated by formal frameworks. Pearson and Peels (2002a; 2002b) explain how the terms 'nurse practitioner', 'nurse specialist' and 'advanced nursing practice' are "frequently used interchangeably in some countries" (p. S5). To circumvent confusion, particularly in regard to the NP role, the term ***Advanced Practice*** has been chosen to represent the level of practice of the nurses in this study. The Royal College of Nursing (RCNA) (2002) believes that the basis of advanced practice is the high degree of knowledge, skill and ability applied to nursing care, and that advanced practice then forms the basis for the nurse practitioner (NP) role as pictured in the following figure (See Figure 1).

Figure 1.1: The Nursing Practice Continuum



The advanced practice nursing model identifies nurses who have been practicing at an advanced level of clinical practice within a specialist area. It aims to provide a framework to enable further enhancement of skills based on this expert knowledge base and problem-solving skills. Benner (1984) described the advanced level of practice under the heading of "expert" in her important work. By extending the practice level of nurses in a number of environments (including acute care and general practice), a flow-on effect may occur for medical officers and patients. For example, with advanced practice nurses being able to assess patients and make clinical judgements about appropriate management at a higher level, medical officers will be able to spend increased time with complex, critically ill patients while less urgent patients are being seen and cared for holistically by nursing staff. It will also mean that patients are seen by a health professional earlier and their pain and other symptoms managed more rapidly and effectively.

A number of international research studies on the advanced practice role of nurses have shown that patients feel very comfortable and safe being cared for by nurses and their health outcomes are comparable to those from medical staff. These studies have been conducted for example, in the United Kingdom (Beales, 1997; Byrne, Richardson, Brundson & Patel, 2000; Horrocks, Anderson & Salisbury, 2002; Tye & Ross, 2000); the United States of America (Rhee & Dermeyer, 1995) and China (Twinn, Thompson, Lopez, Lee & Shiu, 2005). For example, Horrocks et al. (2002) describe environments where advanced practitioners were shown to effectively manage general outcomes such as pain control and self-care activities and Brown and Grimes (1995), in a meta-analysis, demonstrated positive patient outcomes such as greater patient compliance with treatment

regimes. This is also supported by nurses and patients in the general practice environment (Unknown, 2005b) and in the report on the Nurse Practitioner trial in Queensland. All groups surveyed regarding this role expressed positive feelings towards care provided by nursing staff in advanced practice roles. One medical practitioner stated that "the Nurse Practitioner had more confidence than the junior registrars not on the training program" (Queensland Health, 2003, p. 27).

However, nurses who work permanently in an emergency department (ED) have a unique role that cannot be compared to that of nurses working in other specialist areas of an acute in-patient facility. In the United States, where most literature about ED nurses is written, a typical ED exhibits the following picture: unlimited patient load; patients of both genders who span all age groups and have virtually any condition or illness; patients who need nursing and medical treatment without delay and in an unscheduled manner; and as the ED is usually 'open-plan' in layout, the actions and care provision are constantly under scrutiny of other health professionals as well as the patients and their friends and relatives (Schriver, Talmadge, Chuong & Hedges, 2003). In the United States, many EDs are staffed by advanced practice nurses (APNs) who have had considerable experience as ED registered nurses before taking up advanced practice roles. Consistent with educational and certification requirements, the vast majority of APNs hold Masters qualifications (Cole et al., 2002).

While the role and responsibilities of the ED nurse in the United States has continued to grow along with the increasing patient demand, issues such as high patient-staff ratios,

increasing reliance on technology, and raised patient expectations regarding the knowledge and skills base of the nurse have created the need for non-nursing personnel to take over some of the complex dedicated tasks (Schriver et al., 2003). To support these role changes for the ED nurse, there are newer efficiencies undertaken by pharmacists and pharmacy technicians, such as development of pre-prepared intravenous medications which are delivered in automated pumps by the pharmacy to the patient's bedside, and automatic opioid/narcotic medication counts which assist in reducing the labour-intensive nature of narcotic medication administration for the nursing staff (Schriver et al., 2003).

Although there has been some literature on the role of the ED nurse in the US, there has been minimal discussion on the role of the ED nurse in Australia (Bernath, 2000; Fry & Holdgate, 2002). However, more recent commentary has been published that contributes to a clearer understanding of the local emergency environment. Fry (2008) identifies that in 2003 the Council of Emergency Nursing Australasia (CENA) released competency standards for ED nurses in order to provide broad practice and performance guidelines. Eight specific domains were identified as being able to "represent the unique characteristics that give shape to the specialty of emergency practice" (Fry, 2008, p. 281). The lack of consistency or national practices for ED nurses has been identified for many years (Russell, Gething & Convery 1997; Whyte & Sellick, 2000) but the issue still exists as a stumbling block to legitimizing their advanced level of practice. Unlike the Nurse Practitioner who has completed a comprehensive process to gain their qualification, the ED nurse is only able to undertake autonomous practice through the use of advanced standing orders endorsed by the facility in which they work.

According to Fry (2008), in Australia there are several significant issues such as overcrowding, staff recruitment and retention, and access to emergency services which undoubtedly affects the ability of each ED nurse to provide high quality patient care. Large urban and regional centres may have hospitals with fully functional designated emergency departments, but in rural and remote settings simple resuscitation equipment is available as part of the outpatient department (OPD) and there is often no resident doctor on site. These centres are supported by nurses who are not necessarily specialists in the ED environment, nor permanently rostered to the OPD, therefore when a patient needs emergency care, the nurse is required to leave the ward where they also work and complete the episode of care in OPD. Many of these nurses are qualified as RIPRN nurses, but unlike their city counterparts, may not have any other postgraduate qualifications such as a Masters degree which is considered necessary in order to be accepted as an advanced practitioner.

Within the ED at Cairns Base Hospital, which is designated as a regional hospital, the conditions for practice are similar to those described in the broader Australian literature where the nurses are challenged by a number of issues that impact on their role. These include the special skills required to work effectively within the triage area; the volume of patients through the department on a daily basis; the need to be able to multi-task while supervising undergraduate and postgraduate nursing, medical and paramedic students; as well as the broad base of clinical skills needed to ensure optimum care provision to patients of both genders, of all age groups and with any acute condition or illness. Technological advancements that would support nursing clinical practice such as

pre-packaged pharmaceuticals and the preparation or presentation of drugs as mentioned earlier, have not yet been implemented in regional EDs in Australia and little if any work is devolved to non-nursing personnel. Nurses within the ED at CBH are constantly challenged to work under the stress of a full waiting room, ambulances backed up waiting to deliver their patients into the ED and a backlog of patients waiting for admission to the acute hospital wards. Thus there is constantly high patient acuity with no 'downtime'.

Many Australian EDs currently have significant issues with understaffing and workloads management – both nursing and medical - and any delay in the patient receiving analgesia may contribute to a worsening of their condition. If advanced practice ED nurses were able to initiate appropriate, policy-endorsed narcotic analgesia, the patient might be better prepared for the transit through the recovery process following trauma or injury. This would certainly apply to patients who suffer from the sting from the Irukandji jellyfish, a health issue unique to tropical environments.

1.2 Purpose of the study:

The purpose of this concurrent nested case study was to contribute to the evidence about the nursing management of Irukandji syndrome, analyse the parameters of advanced nursing practice, and provide a framework for change through the development of clinical guidelines. The study utilised a mixed methods approach within a case study design. The outcome of the study included clinical guidelines for use by advanced practice nurses managing patients diagnosed with IS within an ED setting in a tropical area.

1.3 Study Questions:

The questions used to guide the study were:

- What are the characteristics of patients who have suffered an Irukandji sting, including length of stay, demographics of sting – where geographically did sting occur, where on body did sting occur, - pain assessment including extent and severity of pain, duration between admission and being seen by doctor related to level of pain and the relationship of pain to site of sting and what mode of transport was used to get to hospital? (Conduct retrospective chart audit and observational episodes using field notes tool developed by researcher).
- How do advanced practice registered nurses manage these patients while in the Emergency Department? (Conduct observational episodes within ED observing and documenting care of patients with Irukandji Syndrome. Completed using field notes tool developed by I).
- Can effective clinical guidelines for the management of patients diagnosed with IS be developed to guide the practice of advanced practice nurses? (Use of Delphi technique to design the guidelines).

1.4 Research framework and methodology:

The overarching frameworks for the study were Pragmatism and Reflective Practice. Pragmatism offered a theoretical position for the study because the focus was on the consequences of the research and the importance of the question rather than the specific methods chosen for use (Creswell & Plano-Clark, 2007) and also fit well with the philosophy of nursing in general. The philosophy of pragmatism rejects the practice of

simply repeating what has been done before but rather extolls an interest in advancing knowledge that is generated out of "actions, situations, and consequences rather than antecedent conditions" (Creswell, 2003, p. 11). According to Creswell (2003, p. 11), "instead of methods being important, the problem is most important". This supports the concept that researchers should be able to use any ethical approach available to them to understand the problem, as it is the research question that should guide the choice of method. A pragmatist approach also supports the use of mixed methods to understand a phenomenon without the need for me to align to any one philosophical standpoint (Cherryholmes, 1992; Creswell, 2003; Tashakkori & Teddlie, 1998).

Nursing is a very practical profession which has embraced the need for evidence to assist in moving forward with improved clinical outcomes. It also continues to hold a strong interest in advancing the knowledge and skills of nurses. For me, the underlying premise for this study was to take a real problem, the ED management of the patient diagnosed with IS, and test both the "theoretical knowledge to practice" transfer for ED nursing staff and the consequences of the nurses' knowledge transfer to the patient. Support for knowledge transfer has taken the form of algorithms or flowcharts which have been developed across many disciplines (Grimshaw et al., 1995; Grol, 1992; Jacobi et al., 2002; Rebbeck, Refshauge, & Maher, 2006; Wallin, 2005; Wynaden et al., 2006). These are designed to assist clinicians by providing signposts for care and the signposts should trigger a need on the part of the clinician to regularly reflect on their practice.

The concept of reflection is also linked to the ability of practitioners to select the most appropriate technique or procedure to meet the needs of their patients. Reflective practice is a mechanism whereby a practitioner, in this case the nurse, through reflection on and in their work, can recover, recreate and reconsider their actions. It is a process that moves a learner from one experience into the next with deeper understanding. Schön (1987) describes different levels of reflective practice including: "reflection-on-action" and "reflection-in-action" which are explained more fully in Chapter 5. Reflection is widely promoted amongst the health professions such as nursing, medicine and the allied health professions as an effective form of professional development (Bolton, 2001; Geissler, 2002; Ghaye & Lillyman, 2000; Young, 2002). It is a valuable tool for several reasons: it is a versatile and critical form of learning, assists to contextualise learning, and is applicable to the real world of complex clinical practice (Bolton, 2001; FitzGerald & Chapman, 2000; Heath, 2002). Reflection is an effective way of integrating theory with practice and it supports the tacit knowledge and understanding that comes with experience and expertise. Polyani (1966) believes tacit knowledge is relevant to knowing and "describes two systems functioning within tacit knowledge. The first is a process whereby perceptions of particulars are emphasized, such as feelings. The second system encompasses intuition and imagination" (Billay, Myrick, Luhanga, & Yonge, 2007, p. 148).

According to Hams (2000), experienced nurses practice intuitively by having developed a deeply embedded knowledge base and ability to apply the theory in practice. Nurses who work in advanced practice roles have progressed through Benner's five levels of practice,

from novice to expert, and within an advanced practice context are able to draw on their experience from many previous cases, to reinforce their decision-making. Within the present study, the nurses observed by me in their daily practice of caring for patients diagnosed with IS exhibited evidence of the use of expertise including tacit knowledge and intuition. Clinical decisions were made, without overt problem solving, and based on observable data. The result for the patient in all situations observed was safe, competent practice with a positive outcome. In analysing the activity of the advanced practice nurses in this study, the thoughts of Dreyfus and Dreyfus are relevant: "The experienced performer is no longer aware of features and rules, and his/her performance becomes fluid and flexible and highly proficient. The chess player develops a feel for the game; the language learner becomes fluent; the pilot stops feeling that he/she is flying the plane and simply feels that he/she is flying" (Rolfe, 1997a, p. 94). In this study, reflective practice was used to validate the notion that these advanced practice nurses were indeed using a well developed intuitive framework to make decisions about care provision for their patients.

The research design, a concurrent mixed methods approach embedded within a Case Study, was selected as the most appropriate way to conduct the study and generate relevant qualitative and quantitative data for analysis. Creswell (2003) refers to Stake's (1995) definition of case studies as where "the researcher explores in depth a program, an event, an activity, a process of one or more individuals. The case(s) are bounded by time and activity, and researchers collect detailed information using a variety of data collection procedures over a sustained period of time" (p. 15). The aim of case study methodology

is the precise description or reconstruction of a case which is significant for the research question and the clarification of what else belongs to the case and what methodological approaches its reconstruction requires (Flick, von Kardoff & Steinke, 2004). In this situation, a case study was chosen as the most appropriate means to study the phenomenon and develop the guidelines as IS only occurs in certain areas of the world. The breeding and distribution of the jellyfish that cause IS require specific conditions such as warm water during breeding season and high volumes of rain at the appropriate time in the breeding cycle to flush the animals out to the ocean. These conditions occur specifically in summer in tropical environments where summer rains and specific water and air currents occur simultaneously such as northern Australia, South-east Asia, Hawaii and Florida, USA.

Perhaps the simplest rule for researchers using case study as a methodology is identified by Stake (2000), "Place your best intellect into the thick of what is going on" (p. 445). He comments that the brain work is ostensibly observational but more basically, is reflective. This is supported by Carr and Kemmis (1986) who state:

"…in being ever reflective, the researcher is committed to pondering the impressions, deliberating recollections and records – but not necessarily following the conceptualisations of theorists, actors or audiences" (Denzin & Lincoln, 2000, p. 445). In case study methodology local meanings, foreshadowed meanings and the consequential meanings attributed by the reader are important. It is the role of the case researcher to tease out these meanings using reflection.

The principal benefit of using a mixed methods approach in a case study design is to provide a more complete picture and understanding of the issue being studied than if only one approach was used (Creswell & Plano Clark, 2007). Mixed methods also provide a mechanism where any weaknesses or biases inherent in a single approach (either qualitative or quantitative) are balanced by the other approach (Creswell & Plano Clark, 2007; Flemming, 2007; Giddings & Grant, 2006). In this study, the use of a concurrent nested mixed methods case study design meant that I was able to use the seasonal aspects of a jellyfish 'season' to collect the observational data while continuing to collect data from the chart audit concurrently throughout the season as well as between seasons. The concurrent nested design, which included qualitative data collection and analysis, was chosen to allow description and exploration of aspects of a quantitative study that are unable to be quantified, and added depth and richness to the study by providing more fulsome information about the nursing expertise of the participants. Each of the nurse participants was asked questions about their nursing care using a semi-structured approach at the completion of the episode of care in order to provide depth to the observational episode, and finally, personal journaling was used to contribute to the complete picture of the observational episodes and as part of my learning journey.

This study was undertaken between 2005 and 2007 over two summer seasons, in a regional hospital Emergency Department (ED) in Far North Queensland. Seventeen (n=17) registered nurses were recruited into the study and agreed to participate in observational episodes within the ED. These nurses met the criteria prescribed, and formally consented to participate. Twenty – three (23) observational episodes of care

which varied between two and six hours were undertaken, and even though several patients remained within the ED for far longer the time was kept the same for all cases. These episodes of care generated both quantitative and qualitative data for analysis. Audits were conducted on a further 164 patients' charts from between 2001 and 2005 with quantitative data collected using specifically designed data collection tools. This data were analysed using SPSS version 16.0, generating both descriptive and inferential statistics. Qualitative data were managed using an Excel spreadsheet to undertake content analysis of the reflective data from both participants and myself, while the Delphi technique was used to generate the clinical guidelines.

1.5 Significance of the study:

While there is a significant body of research regarding advanced nursing practice, the dearth of information and research in the area of nursing management of marine envenomation, especially Irukandji syndrome, is surprising given the number of patients stung by these causative jellyfish each year. Further, while there is significant literature available about advanced practice for nurses, no literature was found that linked the management of IS with the opportunity to develop advanced practice guidelines for nurses.

From this study, a number of positive outcomes are expected that will benefit nurses, patients, medical staff and the health care organisation. Potential outcomes include:

- Improved emergency nursing management of the patient with Irukandji syndrome and better patient outcomes,

- Increased empowerment of appropriately experienced nurses within the ED to effectively manage pain requirements of patients with IS,
- Reduced pressure on medical staff to assess and enact treatment of patients who have been diagnosed with Irukandji syndrome, and
- Increased efficiencies within the emergency department by reducing patient length of stay, and improving patient health outcomes from Irukandji syndrome with the potential for less inpatient management.

The study also has the potential to be useful beyond the acute care setting of a hospital through the development of clinical guidelines to support the management of patients with IS. This outcome will inform other groups who already come into contact with patients with possible IS and has the potential to improve the first aid and pre-hospital management of these patients in the future.

1.6 Organisation of thesis:

The Introductory chapter presents an overview of the genesis of the study with the issue, purpose and objectives of the study explained. The framework and methodology of the study are introduced and the significance of the study to clinical care described.

Chapter Two reviews the current literature in the areas of Irukandji syndrome, the continuum that is nursing practice, the position of practice along the nursing continuum, pain, and the role of clinical guidelines in contributing to the advancement of nursing practice. It demonstrates the paucity of nursing research in the area of IS and highlights

the importance of rapid treatment for the pain manifested by the sting. It also introduces the notion of advanced practice and the links between advanced practice and improved care for patients diagnosed with IS.

Chapter Three discusses the theoretical frameworks and methodological approach underpinning the study. Using pragmatism and reflective practice as the theoretical frameworks, and a mixed methods case study approach to the nursing management of a specific group of patients within the ED, I explored the "case of" patients with Irukandji syndrome; provided the opportunity for the participants to use "reflection-on-action" during an episode of care, and used "reflection-in-action" to evaluate the episode of care from the position of observer. The chapter proceeds to describe the components of recruitment and selection of participant for the observational episodes and the Delphi panel process as well as providing an overview of the Delphi technique generally. The second half of the chapter describes the data analysis process used in the study. Both descriptive and inferential statistics were used to highlight aspects of the quantitative data within the study, while content analysis and the Delphi technique were used to explain the qualitative data. Finally, as in all research, consideration of the ethical implication of the study is discussed and the limitations of the study are identified. These are presented in this chapter and reinforce the importance to me of the safety of the patients and nurses within this study.

Chapter Four describes the quantitative data collection during both the observational episodes and the chart audits and presents the findings of this component of the study.

Quantitative data from the study was analysed using SPSS version 16.0. The results, while principally descriptive citing relevant means, medians and standard deviations for numerical data as well as frequency of occurrence for categorical data, also presents results from non-parametric testing to compare nominal or ordinal variables.

Chapter Five presents the analysis of the qualitative data collected from the reflective processes used by participants and researcher. The data were collected at the termination of each episode of care. Both the nurses (using reflection-on-action) and I (using reflection-in-action) considered the care provided and issues identified, and data were subsequently analysed using content analysis. The process of content analysis was undertaken by analysing the narrative data to identify prominent themes and patterns. The process of the Delphi technique and development of the clinical guidelines are also described in this chapter.

Chapter Six discusses the study findings in relation to the available nursing and other relevant literature and highlights the major findings from the study. It also discusses recommendations for nursing practice within the acute setting, and the nursing management of patients with Irukandji syndrome. Suggestions are also made regarding the first aid and pre-hospital environments and the management of patients with Irukandji syndrome. Recommendations for further research are provided in this concluding chapter as well as a review of the limitations of the study and my reflections regarding the study.

1.7 Summary:

The nursing management of any patient requires a commitment to care by all members of the multidisciplinary health team. Due to the pressure applied to nursing and medical staff within the ED environment, there is an opportunity to explore the current parameters of nursing care with a view to expanding nursing practice to include some aspects that have been previously the domain of the medical officer. This study addressed this issue with the outcome of a set of clinical guidelines to support expert nurses to manage patients with Irukandji syndrome. This study also provided a comprehensive look at a clinical subject that had not previously been addressed in the literature from a nursing perspective, with a view to contributing to the knowledge and skills base of nurses, especially those who care for patients diagnosed with Irukandji syndrome in an ED setting.

Chapter Two

Literature Review

2.1: Introduction:

This chapter provides a comprehensive overview of the literature in relation to the following issues contained within the study. One central issue is the effects of the toxin from jellyfish such as the Irukandji jellyfish (*Carukia barnesi)* on people who are stung while in the water off Far North Queensland. Jellyfish stings may lead to Irukandji syndrome (IS) which is physically and emotionally challenging for those who are stung. A discussion of the nursing and medical management of IS is also presented. Pain, a major feature of IS and central to the nursing management of patients with IS, is discussed as a critical nursing management issue. Nursing as a profession, and the transition of nursing from the traditional service concept to the current state of nursing knowledge and skills, is also discussed. This section of the chapter includes reference to some of the early nursing pioneers who set a powerful platform for the growth of current nursing in the direction of an autonomous and dynamic profession. Finally, the literature describing clinical guidelines and their effectiveness is examined and proposed as a basis for justification of their development within the study.

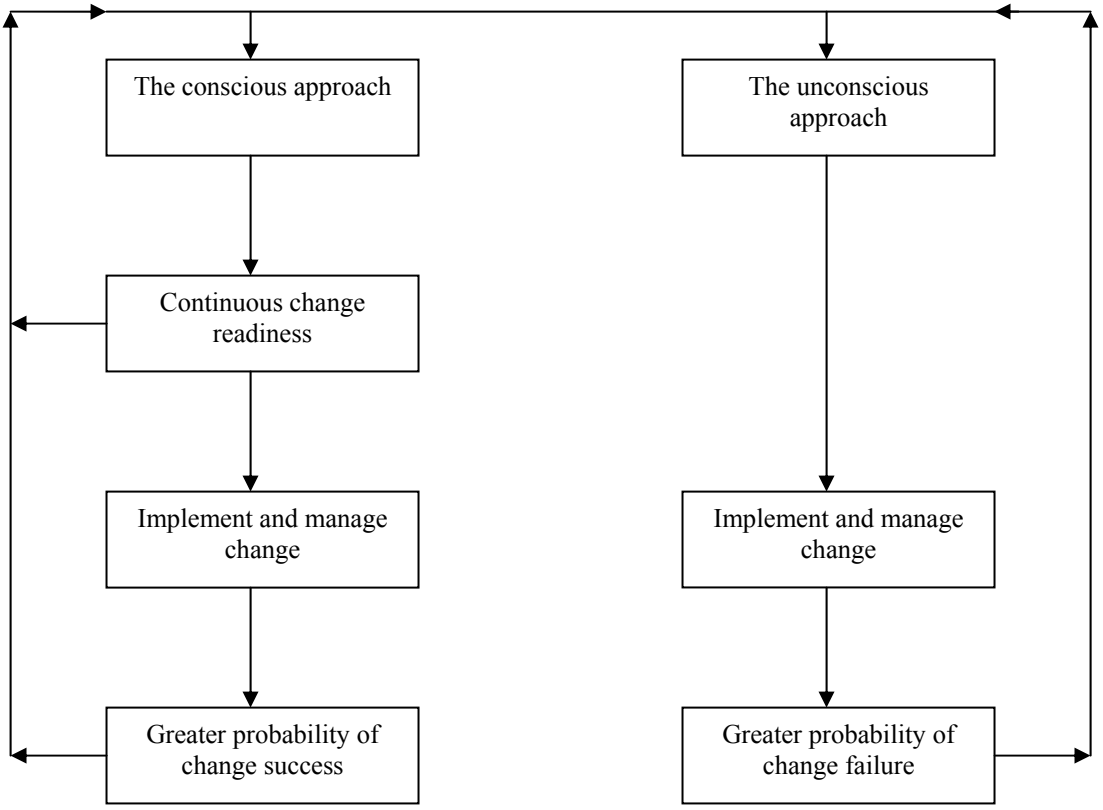
The changing health care landscape as a background to the study:

According to the World Health Organisation, the health care system is in crisis (WHO, 2007). An aging population and increased burden of chronic disease is coupled with staffing shortages caused by an aging workforce, increased casualisation of the

workforce, poor work environments, and less than desirable service conditions (WHO, 2007). It is not surprising that these issues, in conjunction with "a general shortage of qualified nurses…in areas such as … emergency care" (WHO, 2007, p.15), has led to consideration of new models of care in order to continue to provide appropriate care to patients within the health system. Reforms in nursing roles such as advanced practice and nurse practitioner roles can be captured within such a new model of care (Middleton et al., 2007).

However, changes in any system, including health, cannot happen successfully without considerable planning and thought to ensure that the implementation process is embraced by the staff within the clinical team and supported at all levels by the organisation (Armenakis & Harris, 2002; Diefenbach, 2007; Jones, Jimmieson & Griffiths, 2005; Luecke, 2003; Vakola & Nikolaou, 2005). By (2007), developed a model of conscious versus unconscious change management where the conscious approach to managing change has clear decisions being made on how to manage change and the unconscious approach has a lack of awareness of clear decisions being made (Figure 1).

Figure 2.1: Conscious versus unconscious change management



(from By, 2007, p9)

Within the conscious model, change is being considered and enacted for the right reasons leading to a higher probability of increasing the change capacity and success. In this study, the concept of conscious change was used to underpin the design of the study which aimed to develop clinical guidelines that would support and improve nursing management of patients with Irukandji syndrome (IS).

The overall aim of this study was to understand the impact of IS on the practice of nurses within the emergency department (ED) of a large regional hospital and to actively improve patient outcomes through the development of advanced practice guidelines for the delivery of narcotic analgesia to patients admitted to ED with IS.

2.2 Review process:

In conducting this literature review many sources of information have been accessed from databases such as Cinahl, Medline, ProQuest 5000, ERIC, the Cochrane database, National Institute of Clinical Studies (NICS) and the Joanna Briggs Institute; as well as more broadly from the James Cook University (Cairns) library, print and electronic media and national and international libraries. Also included were articles recommended by others and those discovered by manual searching. The literature search relevant to this study was comprehensive to ensure all relevant information was captured and the study framed within a contemporaneous framework.

Each section of the study was systematically approached when searching for the related evidence. No timeframe was set for the literature review because several seminal reference works from the early twentieth century were included to add wisdom and background for later work. This included gathering documentation which was both contemporary and seminal, related to the specific content such as the context of nursing including various models of practice such as advanced nursing practice and nurse practitioner roles; Irukandji syndrome; pain and pain management. While significant information regarding all these topics was easily available, documentation about

Irukandji syndrome was less helpful. There was a logical trail of medically-focused, physiologically based papers; however only one paper, written in 2006 and specifically focused on nursing management of patients with Irukandji syndrome was found to be useful and relevant from the perspective of nursing practices.

When systematically searching the literature the following are examples of search parameters used across major study areas:

- Irukandji jellyfish and Irukandji syndrome:

Irukandji jellyfish; Irukandji syndrome; tropical marine stings; marine injuries; management of Irukandji syndrome; Australian marine injuries; emergency management of jellyfish sting; nursing management; medical management; pre-hospital management; resuscitation

- Pain:

Mechanisms of pain; Gate theory of pain; pain and anxiety; acute pain management; pain assessment; perceptions of pain, both nurses and clients; ethnicity and pain; alternate pain relief methods; measurement of pain; validated pain scales; drug metabolism in different ethnic groups; oligoanalgesia

- Nursing as a Profession:

History of nursing; novice to expert; nursing roles; nursing models; models of care; early nurse researchers; nursing practice; current nursing roles; advanced nursing practice; advanced practice nurses; nurse practitioner; clinical nurse specialist; scope of nursing practice; international nursing practice; nursing in Fiji; Inuit nursing roles; specialty practice and nursing roles; primary health care; health care relationships; medical roles

in specialty areas; expansion of nursing roles; clinical judgement; intuitive practice; reflective practice; critical reflection

- Clinical guidelines:

Clinical guidelines; clinical protocols; specialty practice guidelines; algorithms; flowcharts; best practice guidelines; systematic nursing assessment; validated instruments

The first section of this review now moves to discuss the various types of jellyfish and outline the features of Irukandji syndrome, before discussing the medical and nursing management of IS.

2.3 Irukandji jellyfish:

To understand Irukandji syndrome (IS), it is first necessary to understand the biology of the animals which cause it. Currently there appears to be at least ten (10) jellyfish that cause the same signs and symptoms only one of which is truly the Irukandji jellyfish (*Carukia barnesi).* Due to the questionable origin of all jellyfish stings, the title Irukandji syndrome is not an accurate representation of the causative animal which means there may be room for changes to the nomenclature of either the animals or the syndrome (Little & Seymour, 2003).

The cubozoans (Class Cubozoa) or box jellyfish are the most dangerous group of jellyfish and *Chironex fleckeri,* the major Australian box jellyfish, has been the attributed cause of approximately 70 fatal jellyfish stings in Australian tropical waters (Currie & Jacups,

2005). There are two families of cubozoans – the chirodropids (including *Chironex fleckeri*) and the carybdeids (including *Carukia barnesi* or Irukandji jellyfish). The carybdeids generally have only one tentacle arising from each corner of the bell, while the chirodropoids have many tentacles in each corner (CRC Reef Research Centre, 2005).

The life history of *Carukia barnesi* and other Australian Irukandji-like stingers is unknown. The jellyfish that generally cause IS are usually found at the water's edge while the Irukandji jellyfish (*Carukia barnesi)* itself has been identified around offshore reefs as well as at the water's edge (CRC Reef Research Centre, 2005). Incidents of non-specific jellyfish stings in North Queensland and the Northern Territory have been documented in the literature for many years but until 2002, little evidence of events similar to Irukandji syndrome had been documented elsewhere. In 2003, three cases of marine envenomation causing the same symptom complex were documented in South Florida in the USA (Grady & Burnett, 2003); and an article published in the Medical Journal of Australia in 2004 (Macrokanis, Hall, & Mein) reported the findings of a prospective audit of 111 patients between 1 January 2001 and 1 July 2003 in northern Western Australia, which indicated there were 88 patients diagnosed with Irukandji syndrome. In 2006, dePender, Winkel and Ligthelm reported a case that had occurred in Thailand in 2001 that was strikingly similar to those documented in North Queensland. Clearly, the number of reported cases of IS is quite low in the research literature, and of those that are reported seem to indicate that the largest numbers of IS cases to date have occurred in Australia. While the number of patients outside Australian waters diagnosed with IS appears to be small, it is argued that IS should always be considered as part of the

differential diagnosis if a person becomes ill following swimming in tropical waters (dePender et al, 2006; Hadok, 1997; Little, Pereira, Carrette & Seymour, 2006) because the outcome of untreated IS can seriously affect the patient's cardiac status leading to long term problems or even death.

Carukia barnesi, the Irukandji jellyfish, is a small marine animal which has a transparent bell, is 1.5 – 2.5cm in diameter, and is almost invisible in the water. When it comes in contact with an individual there is an initial skin envenomation followed by a characteristic time delay of between 20 and 30 minutes before the onset of severe systemic symptoms such as generalised muscle pain, headache, raised pulse and blood pressure and cardiac complications. Together, these comprise what is referred to as Irukandji syndrome (Fenner & Carney, 1999; Little, Mulcahy, & Wenck, 2001; Little et al., 2003; Taylor, Pereira, Seymour, & Winkel, 2002) which is discussed in depth in section 2.4 of this chapter. The stinging apparatus (nematocysts), located along the tentacles and on the bell (body), contain what is described as "a coiled harpoon" (Gurry, 1992; Mulcahy & Little, 1997). When the tentacle is stimulated by contact with a swimmer, the nematocysts burst open and fire their harpoons. It is postulated that the toxin responsible for severe Irukandji syndrome acts directly on the myocardium as well as mediating the release of catecholamines which may be the trigger for respiratory symptoms (Little et al., 2003).

There is increasing agreement that there is more than one animal which produces Irukandji syndrome. According to Dr Lisa-Ann Gershwin, cited in the Cairns Post

newspaper (Michael, 2007b), of all the animals potentially causing IS, the most lethal caused the death of a man in 2002. This jellyfish was formally named Malo Kingi in 2008 after the man who died from its sting (Unknown, 2008 – see Appendix A2). On New Year's Day 2007 (Michael, 2007b), it was reported that a healthy specimen of the deadly animal was caught in the waters off Mission Beach, North Queensland, Australia, which was considered a breakthrough for scientists as they now had a prime specimen to study. Dr Gershwin indicated that this animal "(is) a wicked, highly venomous, dangerous animal, that drop for drop are the most lethal on the planet (Michael, 2007a, - See Appendix A1 & A2).

Confusion still reigns about the causative animals because the symptoms are similar in each patient who presents after being stung while in the water, even though the environmental conditions may vary from case to case (Bailey, Little, Jelinek, & Wilce, 2003; Fenner & Carney, 1999; Fenner et al., 1988; Little et al., 2001; Little et al., 2003; Taylor et al., 2002), and the name Irukandji syndrome is given to all patients who exhibit the same signs and symptoms. Identification of jellyfish causing IS is therefore critical and requires long-term dedicated funding to capture and analyse live jellyfish specimens so differentiation can occur. This will not only gather identifying data about each specimen, but also provide an opportunity for significant work to be done to develop antivenom.

2.4 **Irukandji syndrome**:

Irukandji Syndrome is the name of a collection of systemic symptoms following envenomation by the Irukandji jellyfish. Local signs and symptoms include minor erythema (i.e. redness), sweating and piloerection (i.e. goosebumps). Following a period of approximately 30 – 40 minutes, more severe symptoms are evident. These include severe backache, muscle pains, chest and abdominal pain, nausea and vomiting, headache, sweating and (rarely), pulmonary oedema (Fenner et al., 1988; Fenner, Williamson, Callanan & Audley, 1986; Little & Mulcahy, 1999). There has also been evidence of severe cardiac dysfunction resulting in longer hospitalisation for some patients (Little et al., 2001; Little et al., 2003). Two deaths occurred in 2001- 2002 in North Queensland. Both men died from intracerebral haemorrhages shortly after developing symptoms of IS. These were the first deaths reported from IS worldwide (CRC Reef Research Centre, 2005; Little et al., 2003; Macrokanis et al., 2004). There is currently no antivenom for this syndrome.

In their regular practice, ED nurses in centres across the north of Australia such as Cairns Base Hospital deal with a vast array of conditions and complaints, including the distressing condition of IS (CRC Reef Research Centre, 2005). The patients are in almost unmanageable pain and for some; this is a life-threatening situation. A study in Western Australia (Macrokanis et al., 2004) found that the majority of patients with IS reported experiencing distress, with 90% requiring opioid analgesia and 17% requiring admission to hospital. The current level of information available on Irukandji syndrome is, however, limited. The majority of articles to date have been written by medical officers and focus

on medical treatment and the physiological responses rather than nursing management. A recent article by Greenland, Hutchinson and Park (2006), however, presented an overview of IS and the current general nursing management of these patients in the intensive care environment. This is included in the following discussion on the management and care of patients with IS.

2.4.1 Management of Irukandji syndrome

2.4.1.1 Pre- hospital management

The management of patients with IS starts at the time of the sting, although some people may be unaware for some time that they have been stung by a jellyfish. This does not assist first aid providers or hospital staff as it is usually difficult to identify the site of the sting as there is often little if any associated site pain (Fenner & Harrison, 2000; Isbister, 2007; Little et al., 2003). Vinegar is documented (ARC, 2005) as the first line of treatment which should be applied liberally and directly to the sting area. The vinegar apparently inactivates the nematocysts and prevents any further injection of toxin into the body. It is important to acknowledge that nematocysts can continue to fire if not inactivated through the application of vinegar. As a result, where pressure immobilisation bandaging was previously recommended, it is currently not considered best practice due to the danger of stimulating unfired nematocysts (ARC, 2005; Seymour et al., 2002). If vinegar is not applied at the time of the sting, it should be applied as soon as possible so that any unfired nematocysts are prevented from firing. As the tentacles may be hard to see with the naked eye, it is always possible that they remain on the skin although the degree of envenomation can be affected by many factors including amount and thickness

of hair, age of jellyfish and length of tentacles in contact with person (Huynh et al., 2003). Therefore, it is better to act as if unfired nematocysts remain on the skin and administer the appropriate and universally accepted first aid – vinegar – to the affected area. The first aid management procedures may be delivered in Far North Queensland by lifesavers who are stationed at most beaches along the coast (Greenland et al., 2006), the local general medical practitioner, or the Queensland Ambulance Service officers who respond to an emergency call. The management response to all patients including those with IS is usually identified in documentation as DRABC, Danger, Response, Airway, Breathing, Circulation sequence (ARC, 2005).

2.4.1.2 In-hospital management

Once the patient arrives at hospital, ongoing monitoring and management of the pain occurs. It is critical during this time that the patient has regular assessment of vital signs (i.e. pulse, respirations, blood pressure, oxygen saturation), testing of Creatinine Kinase and cardiac Troponin enzyme levels in the blood to monitor presence of cardiac dysfunction, and pain assessment for at least four to six hours. This enables nursing and medical staff to thoroughly assess the patient's symptoms and make informed decisions regarding ongoing management and outcomes (See Table 1).

TABLE 2.1: Irukandji Syndrome Symptomatology

Initial Symptoms	**Presenting symptoms**	**Subsequent symptoms**	**Nursing management**
Slight pain over site at time of contact with animal, may have redness, swelling or tentacle marks	**PAIN**: Generalized muscle pain especially in back, mild chest pain, stomach cramps, pins and needles **CATECHOLAMINE RESPONSE (**A group of a natural substances that work as neuro-transmitters and hormones and include epinephrine, norepinephrine, and dopamine.): Nausea & vomiting, headache, tachycardia, increased respiratory rate, piloerection, anxiety	**PAIN**: Ongoing muscle pain all over body **CATECHOLAMINE RESPONSE:** Sweating profusely, pallor or peripheral cyanosis, oliguria, hypertension, pulmonary oedema, peripheral tremor in limbs, cerebral oedema (rare), **CARDIAC CHANGES**: non-specific ECG changes, Troponin leaks and cardiac failure	**FIRST AID**: DRABC, Vinegar to sting site, prevent rubbing, do not wash area **IN HOSPITAL**: Treat the signs and symptoms - pain relief – intravenous mode titrated to pain levels (usually narcotic) - observations – regular monitoring (15 – 30 minutely) of vital signs especially cardiorespiratory and haemodynamic status - appropriate tests – ECG, 6 hourly blood tests, CXR **ONGOING STATUS**: If symptoms settle – 2-6 hours of observation. If symptoms escalate – admission to ICU or CCU and further monitoring eg: cardiac ECHO; anti-hypertensives, analgesia.

(adapted from Greenland, Hutchinson & Park, 2006)

Table One above details the symptomatology of IS from the time of the initial sting to several hours following the sting. Many patients will acknowledge they felt the initial sting, but the time between the sting and the development of systemic symptoms is variable. The recurrence of pain after initial relief is what usually leads the patient to call the ambulance or the doctor, or present to the ED. The symptoms of IS may vary in presentation and severity from patient to patient, but all patients experience some degree of pain. Even with rapid treatment, the symptoms often persist for hours to days, depending on the amount of toxin injected by the jellyfish. A critical element in the effective treatment of IS is correct diagnosis. Little et al. (2006) discussed this in their paper, citing misdiagnosis of IS as a spider bite which lead to considerable anxiety and

incorrect treatment for one patient. With the lack of data about which, and how many, jellyfish cause IS–like symptoms; most treatment is based on assumptions about the causative animal. This can lead to conflicting discussion and treatment such as the 'hot water versus ice pack' debate (Loten et al., 2006), especially during the first aid period. This discussion regarding whether ice packs or heat work better for jellyfish stings has created confusion for the general public. Recent research has been undertaken that shows the application of heat works very well for bluebottle stings however, bluebottles cause a localized reaction only so are very different in nature to the jellyfish that cause IS. It is still agreed that vinegar is the only first aid management necessary for IS so the use of either hot or cold applications is not necessarily helpful. Further research will hopefully lead to information that is clearer for the public and potentially effective antivenom development for this deadly syndrome in the future thus reduce the pain and distress.

2.5 Pain and Irukandji syndrome:

While early theories of pain used very simplistic models of stimulus-response mechanism (for example Descartes), it was not until 1965 that the breakthrough 'Gate Theory' was described by Melzack and Wall (1965). This theory suggested that sensory input from peripheral nerves is transmitted to the spinal cord where it is modulated and then transmitted to the brain for perception. Gates are found at afferent synapses in the spinal cord and brain that are responsible for pain signal transmission. Afferent fibres conduct sensory impulses from the organs (in this case the skin and muscles) to the spinal cord (See Appendix A3). When the gates are open, unrestrained signals from the periphery

travel to the brain where pain is perceived. The pain can be moderated or reduced if the gates are closed (Lord & Ramsden, 2007).

Closure of the pain signal gates can be triggered by stimulation of other sensory nerves, for example, rubbing the injured area gently or even rubbing another area removed from the injury can help to close the gate and reduce the pain at the injury site. Some alternative interventions, such as the Transcutaneous Electrical Nerve Stimulation (TENS) machine, have been in use for a number of years and have effectively assisted with pain relief (Lord & Ramsden, 2007). From a physiological perspective, pain is important as a flag to the person that tissue damage is occurring. Without this trigger, severe and irreparable damage could occur before it was detected. Therefore, it is important that nurses and other health professionals recognise the importance of effective pain assessment and treatment.

Pain can be classified as somatic, visceral or neuropathic in origin. Somatic pain occurs after an injury to the skin, bone, joints or skeletal muscle and is sharp and localized to the injury site. Visceral pain arises from stimulation of receptors located near the surface of the organ. Ischaemia, stretching and pressure activate them and pain is usually described as dull, diffuse and poorly localized. Visceral pain can be referred to other body areas and therefore the patient may complain of pain some distance from the injured area because the afferent fibres from the viscera and skin converge at the same secondary neurons within the spinal cord. Neuropathic pain, either acute or chronic, is caused by injury or

disease that directly affects the nervous system. This form of pain is complex and difficult to treat (Bonica, 1990; Waugh & Grant, 2006).

Pain is something that is very personal and commonly causes people to seek medical help. If the pain is acute in onset, the person may attend an emergency department. For the patient with IS, it is the pain that causes the most distress. Evidence shows that over 60% of people attending the emergency department report pain on arrival (Cordell et al., 2002; Lord & Ramsden, 2007). Pain is defined in a number of ways but the most holistic definition comes from the International Association for the Study of Pain. They define pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" (Merskey, 1979, p. 250). This definition allows flexibility to include the personal perception that may be affected by culture, age, gender, previous pain experience and environmental conditions.

Because of the subjectivity of pain assessment, it is important to acknowledge that pain cannot be assessed in the same perfunctory way that other vital signs can. Nurses and doctors should avoid making their own judgements about the patient's pain and respect the assessment provided by the patient and actively treat the patient. McCaffery and Pasero (1999) have developed a useful definition of pain – "Pain is whatever the experiencing person says it is, existing whenever he [sic] says it does" (p. 7). The subjective nature of the pain experience is also supported by Bourbonnais, Perreault and Bouvette (2004) who stated that "pain is a subjective, multifaceted phenomenon, influenced by many factors such as experience and culture" (p. 2). Pain can be acute or

chronic and is usually associated with disease or injury. Chronic pain is usually more debilitating and may not respond to standard analgesic interventions.

McCaffery and Pasero's (1999) definition of pain suggests that patients are in control of the pain management plan and while this may be the ideal situation, many studies have been undertaken reviewing the success of pain management and the attitudes of both patients and staff to the experience of pain (Albrecht, Cook, Riley & Andreoni, 1992; Baer, Davitz & Lieb, 1970; Dudley & Holm, 1984; Fontana, 2008; Harrison, 1991). The findings from some of these studies indicate that patients do not always receive the appropriate type or dosage of analgesia due to a number of issues identified in various clinical situations, such as lack of knowledge about pharmacokinetics (Cohen, 1980; Donovan, Dillon & McGuire, 1987; Lander 1990; Marks & Sachar, 1973; Mather & Mackie, 1983); lack of consistency in prescribing (Bondestam et al., 1987; Cohen, 1980; Marks & Sachar, 1973; Streltzer & Wade, 1981); the perception that young children cannot feel pain (McGrath & Unruh, 1987); and, the nursing goal that suggests patients should receive pain medication to relieve pain just sufficient for them to function (Cohen, 1980). Bell (2000) cites studies conducted to assess nurses' perception of patients' pain. In these studies, there is general consensus that most nurses estimate the pain being experienced as less that the patient does (Field, 1996; Seers, 1987). However, alternate studies have also found that nurses rated the patient's pain higher than the patient (Burge et al., 1986); and others that found the pain scores were fairly similar between the nurses and the patients (Choiniere, Melzack, Girad, Rondeau & Paquin, 1990; Zalon, 1993). This inconsistency supports the need for development and implementation of clinical guidelines that will prompt advanced practice nurses to regularly check pain status with

the patient with a view to actively and accurately treating the pain as described or rated by the patient, using the suggested endorsed process.

Patients' attitudes also play a role in pain management. Attitudinal reasons for inadequate pain relief include:

- wanting the nurse to wait until they themselves voiced they had pain while still regularly grading their pain at the extreme right of a visual analogue scale (Carr, 1990),
- believing the nurse was too busy to ask for pain relief (Carr, 1997a), and
- not wanting to bother the nurse at night (Closs, Bowles & Everitt, 1997).

Camp (1988) also identified that adult patients do not always provide optimal pain information to the nurses due to limitations in medical knowledge, while paediatric patients are limited by language, experience of pain, fear and cognitive immaturity (Eisen & Amiel, 2007; Harrison, 1991; Lavigne, Schulein & Hahn, 1986; Thompson & Varru, 1986).

Much has also been written about the attitudes and beliefs of nurses about patients' pain and how that contributes significantly to the issue of pain management of patients in hospitals. Bell (2000) states that "(i)nternationally, research has indicated that nurses' attitudes towards pain assessment and management may be compounding the problem" (p. 65), but she acknowledges that the research-based body of knowledge needs to be consolidated so that nurses can be seen as professional practitioners in pain control. Fontana (2008) conducted a benchmark study on chronic pain and nurses' attitudes to

pain management specifically using advanced practice registered nurses. The data indicated that nurses were making decisions regarding pain relief based on what was in the best interest of the patient, the best interest of the staff, and the best interest of society.

Situations also arose where the nurses made decisions to treat or not treat patients' pain based on personal experiences or what had worked for them in similar situations. For example, fear of causing or exacerbating addiction had an effect on the advanced practice nurses' decisions regarding pain medication administration (Fontana, 2008). Nurses in the study were also driven to protect themselves as health care providers which meant they made decisions based on fear of litigation and in relation to being held accountable. Fontana (2008) also argued that "(C)linicians allowed the ethic of the organization to determine their practice" (p. 33) and as a result, the protocols in place within the organization were used rigidly for the purpose of pain management.

The most confronting concept raised by Bell (2000) in her research was that the previous studies conducted by Scott (1992) and Thorn (1997) reported that nurses frequently do not believe what the patient states about his/her pain. Thorn's (1997) research showed that 60% of the qualified nurses surveyed were opposed to the view that every patient had the right to a pain-free existence. According to Bell (2000) "(T)his supports the argument that complete pain relief may not be a major goal for nurses" (p. 69). While there may be perceived justifications for this attitude, it further reinforces the need to have a framework that supports both patients to feel comfortable being open about their pain,

and nurses to value subjective opinions about an individual's pain status. This will achieve optimum pain management having removed the potential for judgmental decisions being made by nurses or doctors.

In order to assist patients to manage pain, it is necessary for nurses to effectively assess the pain as reported by the patient. Management begins with comprehensive questioning of the patient regarding the pain. Lord and Ramsden (2007, p.182) suggest the use of a mnemonic, PQRST (See Table 2), to assist when assessing a patient with pain. They argue that questions will elicit maximum information if they are open-ended questions that begin with, 'for example', 'how', 'when', 'where', 'why' and 'what' (Lord & Ramsden, 2007).

Table 2.2: PQRST mnemonic

P: What **provoked** the pain? What makes it worse? Does it occur during exercise or at rest? Does anything such as inspiration change the intensity of the pain?

Q: Quality – how do you describe the pain? Is it dull, shooting, sharp, crushing?

R: Region, radiation and relief – what region of the body is the pain, are there any patterns of radiation and is there anything that relieves the pain?

S: Severity – using a validated pain scale can the patient rate their pain severity.

T: Time of onset and duration. This would also include description of any medications that might have been administered prior to arrival at hospital.

(Adapted from Lord & Ramsden, 2007)

A number of pain scales are also available to assist the nurse to assess pain (Crellin, Sullivan, Babl, O'Sullivan & Hutchinson, 2007) including simple scales such as the Verbal rating Scale (VRS), Visual Analogue Scale (VAS), and Numeric Rating Scale (NRS) (Wong & Baker, 1988) (See Appendix B). While the use of a scale is helpful, according to Harrison (1991), there are a number of factors that lead to inaccurate and biased estimates of the patient's pain. While it could be argued that the wide variety of tools is inherently problematic, a bigger issue is that even a robust tool such as the Visual Analogue Scale will be used by a number of nurses who each bring a different interpretation to the assessment. This can contribute to divergent interpretations and subsequent unreliable scores. Bourbonnais et al. (2003) also believe that any tools used to objectify this subjective experience are only accurate to the extent that the practitioners document exactly what patients say. Bird (2003) described a number of barriers that prevented accurate pain assessment including the under-reporting of pain by the patient because of the fear of addiction to opiates, lack of time among health care staff, lack of empathy, and lack of appropriate education among health care staff. Bird (2003) believed that this leads to assumptions by staff about the patient that detrimentally impacts on the provision of effective analgesia.

Under-medication of patients by nurses has also been raised as a negative outcome for the patient in a number of studies (Carr, 1990; Carr, 1997b; Owen, McMillan & Rogowski, 1990; Short, Burnett, Egbertt & Lehland, 1990). While the Carr studies (1990; 1997b) utilised small samples, they did concur with other studies that found patients were

receiving significantly less analgesia per dose than ordered. For example, Owen et al.'s Australian study (1990) showed that 77% of the study population were prescribed analgesics to be administered 'on demand', '3-4 hourly'. The mean rate of administration was 2.7 injections in the first 24 hours after surgery where these patients could have received 6-8 injections (and received 100% of the prescription). Post-operatively, only 25% of this group reported effective pain relief and over 50% reported they had pain for most or all of the time. Carr (1997b) also found that even when the post-operative dosages varied, the nurse always chose to administer the dose at the lower end of the range.

To avoid the possibility of making an incorrect determination about the pain, it is recommended that no single objective assessment strategy be used in isolation (Lord & Ramsden, 2007). If possible, multiple strategies should be used to avoid limitations that may occur, based on language barriers, cultural differences, or other variables. This is particularly important if using a validated pain scale because each scale may lack sensitivity and potentially lead to a misunderstanding of pain (Ho, Spence & Murphy, 1996; Williamson & Hoggart, 2005).

One ongoing issue of concern when managing patients with pain is oligoanalgesia, or the under-treatment of pain. Studies have identified poor management of pain as widespread (Fosnocht, Swanson & Barton, 2005; Heins et al., 2006; Hogan, 2005; Jantos, Paris, Menegazzi & Yealy, 1996; McCallum, 2003; Miner, Biros, Trainor, Hubbard & Beltram, 2006; Neighbor, Honner & Kohn, 2004; Tanabe & Buschmann, 2000) and it is suggested

that one reason for this is ethnicity and the subsequent lack of understanding of questions being asked of the patient (Fosnocht et al., 2005; Jantos et al., 1996).

An increasing number of studies have reviewed the genetics of drug metabolism including the role of ethnic differences in drug responsiveness. There appears to be some consensus that there are indeed differences in the way a number of medications are metabolised by various ethnic groups. Chung (2004) studied many groups of drugs including Diazepam, Haloperidol, Caffeine, Codeine and Morphine and there were clearly identified differences in drug responses based on racial grouping. With the analgesics, she found while both Asian and Caucasian men transform Codeine and Morphine similarly, Asian men experience significantly weaker effects from the drugs. She also reported that Morphine cleared faster in Asian men. These findings are supported by other studies (Bjornsson et al., 2003; Kim, Johnson & Derendorf, 2004; Lin, Anderson & Poland, 1995; Lou, YC, 1990; Wood, 2001) that have also identified other factors that impact on pain relief. For example, there are intrinsic factors that impact on pain experience such as gender, body weight, and the presence of disease, as well as extrinsic factors such as food and dietary issues that affect systemic availability, and the use/presence of other drugs.

Kim et al. (2004) also suggested that the use of Chinese medicinal herbs can cause the different expression of drug-metabolising enzymes, enzyme induction and enzyme inhibition. While looking at the four pharmacokinetic phases – absorption, distribution, metabolism and excretion, Kim et al. (2004) further proposed differences within the

broader Asian grouping, specifically Chinese, Korean and Japanese, which may contribute to the variations in metabolic activity of certain drugs. As Codeine, a principal metabolite of Morphine, was also one of the drugs in the study by Kim et al. (2004), I was interested in this specific finding as patients of Asian origin are frequently treated for IS at the local facility. Codeine is converted through O-demethylation to Morphine, and several studies (Tseng, Wang, Lai, Lai & Huang, 1996; Yue, Svensson, Alm, Sjoqvist & Sawe, 1989; Yue, Svensson, Sjoqvist & Sawe, 1991) have shown remarkable ethnic differences in Codeine metabolism. Tseng et al. (1996) showed that Chinese people produced less morphine from codeine and exhibited reduced sensitivity to the pharmacological effects of morphine, and the apparent codeine clearance and its partial metabolic clearance by O-demethylation were significantly greater in Caucasians than in Chinese. Chinese people also metabolised Codeine less than both Japanese and Koreans whereas the latter two groups did not differ in their overall metabolic pattern of codeine. Kim et al. (2004) believes that because significant differences may exist among East Asians, the consequences of one ethnic group cannot be directly applied to another, even though they are geographically close. This means that the effectiveness of a particular pain medication might vary between ethnic groups, which have significant implications for pain management.

Evidence also exists to support the timely initiation of narcotic pain relief by advanced practice nurses based on the time from admission to initial analgesia. A number of recent studies (Arendts & Fry, 2006; Boyd & Stuart, 2005; Forero et al., 2008; Hwang, Richardson, Sonuyi & Morrison, 2006; Kaplan, Sison & Platt, 2008) have all identified

significant wait times between admission to the ED and time to analgesia administration. These studies have represented management of children and adults, and both acute and chronic presentations and all concede that both oligoanalgesia and lack of timeliness of analgesia are evident to the disadvantage of the patient. Issues that are also identified within these studies that can be the catalyst for lack of timeliness; for example

- patient volume at any time within the ED (Arendts & Fry, 2006; Forero et al., 2008; Hwang et al., 2006; Kollek, 2002; Rupp & Delaney, 2004);
- demographic factors such as age, communication ability and gender (Arendts & Fry, 2006; Forero et al., 2008; Hwang et al., 2006); and
- clinical factors such as triage code applied at entry to department, diagnosis, pain assessment processes and fear of causing dependence (Arendts & Fry, 2006; Boyd & Stuart, 2005; Forero et al., 2008; Hwang et al., 2006).

The following section moves on to discuss the nursing and medical management of patients with IS and how nursing roles have developed to the level where advanced practice has an important place in clinical care delivery.

2.6 Nursing and medical management

As previously identified, IS is a phenomenon associated with tropical waters because they are warm and rich in nutrients needed for the Irukandji jellyfish to grow and breed. The majority of patients who experience this condition are thought to be tourists who find the tropical waters irresistible. Even though there is a plethora of information in the form of posters, signs using internationally recognised symbols, multi-lingual brochures given to

tourists when they enter the country or come to this geographic area, and regular promotions on hotel televisions, there is still a perception that it is safe to swim in the ocean in Far North Queensland during the summer months. For tourists who are stung, it also raises the issue of accessing emergency services when feeling unwell. This access must be gained using a language (English) that may be difficult for them, and with few personal support systems in place to assist them. If one considers IS as a condition that is normally difficult to manage, it is clear that patients for whom English is a second or alien language, will present as a more complex management problem when compared to patients whose first language is English.

The first hurdle tourists must overcome following a jellyfish sting is how, and who, to access for assistance. The most common access point for immediate treatment is the lifesaver at the beach, who can apply liberal amounts of vinegar to the sting site and then call for an ambulance. It is also common for tourists to believe their symptoms are not serious and hence they return to their accommodation with or without lifesaver assistance, and anecdotally it appears that it is the concierge or other hotel staff who are then required to render assistance when the patient's condition eventually deteriorates. For hospitality staff, their first point of contact will be the Queensland Ambulance Service whose officers are able to administer certain levels of pain relief such as Nitrous Oxide (inhalational) or Morphine (intravenous), before transporting the patient to hospital. A small percentage of people who have been stung by a jellyfish will use private means to access medical and nursing assistance.

Current guidelines are available and designed to support both nursing and medical staff who manage patients with IS. These are centred on resuscitation, stabilisation (including analgesia and hypertension management), investigations, maintenance and discharge (Queensland Irukandji Taskforce, 2007). These guidelines have been primarily designed as a task/checklist for inexperienced medical staff with links to the statewide Poisons Information Centre, and while it is important to value any documents that have been developed and put in place to support practice, treatment guidelines and protocols need to be developed based on current evidence that can be used to underpin ongoing practice review and protocol change. This includes the opportunity to expand the scope of practice of advanced practice nurses to initiate early and effective pain relief, and to support the practice of the multi-disciplinary team. To achieve this step, it is important to recognise the advances nurses have made through history to gain acceptance as professionals and achieve recognition as important members of the clinical team. Further, it is also important that the ongoing development and expansion of the nursing scope of practice be acknowledged, especially in areas such as advanced practice nurses and nurse practitioners. These roles have demonstrated the efficacy of advanced roles for nurses and the positive impact on patient outcomes (Easton, Griffen, Woodman & Read, 2004; Tsepov, Organ, Evans & Fox, 2007).

2.7 Nursing as a profession:

2.7.1 Historical perspectives

Nursing in the 21st century has moved a significant distance from the Crimean War and the practice of Florence Nightingale. Pearson and Taylor (1996), in their study of nursing

in colonial Victoria between 1840 and 1870, reported that nurses' roles included domestic duties, medical interventions, and direct care to hospital patients. This is in stark contrast to more recent accounts of nursing. For example, recent discussions that have occurred since the year 2000, both nationally and internationally relay concepts of advanced practice and nurse practitioner (NP) roles. Roles such as these have allowed the profession to move away from the traditional view of nursing as a profession subordinate to medicine (Ceci, 2004; Lublin & Gething, 1992; McParland et al., 2000), and this is of significance given this study's intent to develop guidelines for advanced practice.

The following model suggests my concept of the continuum along which nursing has progressed from novice practitioner to experienced Nurse Practitioner (NP).

For the nurse to progress along the continuum, they will pass through the levels as described by Benner (1984) as Novice, Advanced Beginner, Competent, Proficient, Expert. Once established at this level, knowledge and skills can be further developed by experience and post-graduate study to the level of advanced practice. These stages of Benner's model are defined within the thesis glossary of terms while a definition of the advanced practice nurse is also provided in section 2.7.2 within this chapter.

Prior to these recent role changes for nurses, two nurses who wrote prolifically about nursing practice as linked to research and evidence-based practice, were Florence

Nightingale and Virginia Henderson. The impact of these two pioneers is discussed below. Nursing practice has many facets but from the days of Florence Nightingale the role of evidence to underpin practice has played an important part. According to McDonald (2001), from the time Nightingale returned from the Crimean War in 1856 until her death, Nightingale's work clearly reflected her use of an evidence-based framework. McDonald (2001) cites Nightingale's push to achieve systematic data collection to track rates of disease and mortality, and to identify problems so they could be dealt with promptly; her research into the differential mortality among population subgroups and her work to provide evidence that it was better to be cared for by trained persons instead of untrained carers, as examples of opportunities created by Nightingale to make positive change through evidence.

Nightingale's work set the foundation for much of the work subsequently undertaken by nurses to raise the profile of evidence-based practice in nursing. It also helped to increase the contribution of nurse authors to the evidence-based debate. In recent years there has been a resurgence of the move to create a scientific base for nursing and, like Nightingale; nurses have embraced not only evidence-based practice but also the extension of practice boundaries. Instead of practicing in an interdependent role only, nurses are exploring opportunities to be accepted as independent practitioners (Cummings & McLaren, 2005; Donnelly, 2004; Gardner & Gardner, 2005; Hegney, 1997; Twinn, Thompson, Lopez, Lee, & Shiu, 2005)

Virginia Henderson, on the other hand, embraced nursing practice and wrote actively about the principles and practice of nursing. In her texts, Miss Henderson described basic nursing care as "helping the patient with …activities or providing conditions under which he [sic] can perform them unaided" (Halloran, 1996, p. 24). The 14 activities or situations reflected the activities of daily living and underpinned nursing curricula for many years. While she envisioned the practice of nursing as independent of physicians, Henderson believed that many nurses' and physicians' functions overlapped. She emphasised the art of nursing (Marriner, 1986). Henderson's position supports nurses working both independently and interdependently within the team to deliver holistic care. While the majority of the work undertaken by both doctors and nurses within the ED does indeed overlap, this study identifies opportunities for advanced practice nurses to make independent decisions about the management of patients with IS based on departmentally-endorsed clinical guidelines. The art of the decision is based on the science of evidence which underpins the clinical guidelines.

For some time, there has been a difference of opinion between doctors and nurses as to the role of the nurse. Nolan and Hazelton (1995) identified role conceptions that helped form the nurse identity:

1. the traditional *service* conception upholds nursing as a sentimental calling and suggests a primary devotion to the patient;
2. the *professional* role conception promotes responsibility to the principles of the nursing profession, such as autonomy, specialised knowledge, professional identity and recognition and an ethical code of practice; and

3. the *bureaucratic* role conception which is based in a primary loyalty to the organisation and its rules and regulations (pp. 13-14).

Further it is suggested that "these three types of role conceptions taken in combination generate a multi-dimensional view of the role expectations experienced by nurses as they practice" (Nolan & Hazelton, 1995, p. 14). This has been a difficult concept to market to the medical profession as historically the role has been perceived as 'the doctor's handmaiden' and 'feminine and devoted carer' (Ehrenreich & English, 1973; Summers, 1994) or as Coull (2006, p. 51) states "…can we please get back to basics and have trained nurses to nurse and trained doctors to doctor" . Panja (2006, p. 52) extends this perception by saying that "nurses …are arguably better that doctors at protocol driven decision making. Doctors, however, manage risk as part of their core training – making the diagnosis and managing it thereafter – which nurses historically have not. Perhaps… medical educators need to work out a way that nurses can be fast-tracked into becoming doctors". Consequently while the work of Benner (1984) was significant as a catalyst for a societal shift in the role of the nurse, there is still some way to go to convert medical opinion about the benefit of advancing practice roles for nurses.

Benner wrote in 1984 about the transition process for nurses from novice to expert using competencies and strategies that preserve and extend both knowledge and skills. Benner (1984) describes the expert nurse as one "…with an enormous background of experience …an intuitive grasp of each situation and (the ability to zero in) on the accurate region of the problem without wasteful consideration of a large range of unfruitful, alternative

diagnoses and solutions. (T)he expert operates from a deep understanding of the total situation" (p. 32). While this was visionary at the time, it is conceivable that Benner did not realise that a further move would occur that took nurses' roles beyond that of 'expert' to higher practice levels. Terms such as *advanced practice nurse* and *nurse practitioner* are used for these higher practice levels today (Borbasi, 1999; Pearson & Peels, 2002a, 2002b, 2002c) .

2.7.2 Current nursing roles

Another consideration regarding the advanced practice role is whether it exceeds the accepted Scope of Practice for registered nurses. Currently within Australia, each State and Territory has its own registration body which regulates practice for both registered and enrolled nurses. In Queensland, the Queensland Nursing Council (QNC) provides this role and has developed Scope of Nursing Practice Guidelines for Registered Nurses to assist in the translation of legislation into practice. The QNC was established in 1993 as an independent statutory authority accountable directly to Parliament through the Minister for Health and is responsible for administering the *Nursing Act 1992*. The objective of the Act is to make provision for ensuring safe and competent nursing practice. Council also influences the development of nursing in the public's interest and assures the quality of nursing education and practice. Council develops implements and monitors standards which are essential for the protection of consumers (QNC, 2008).

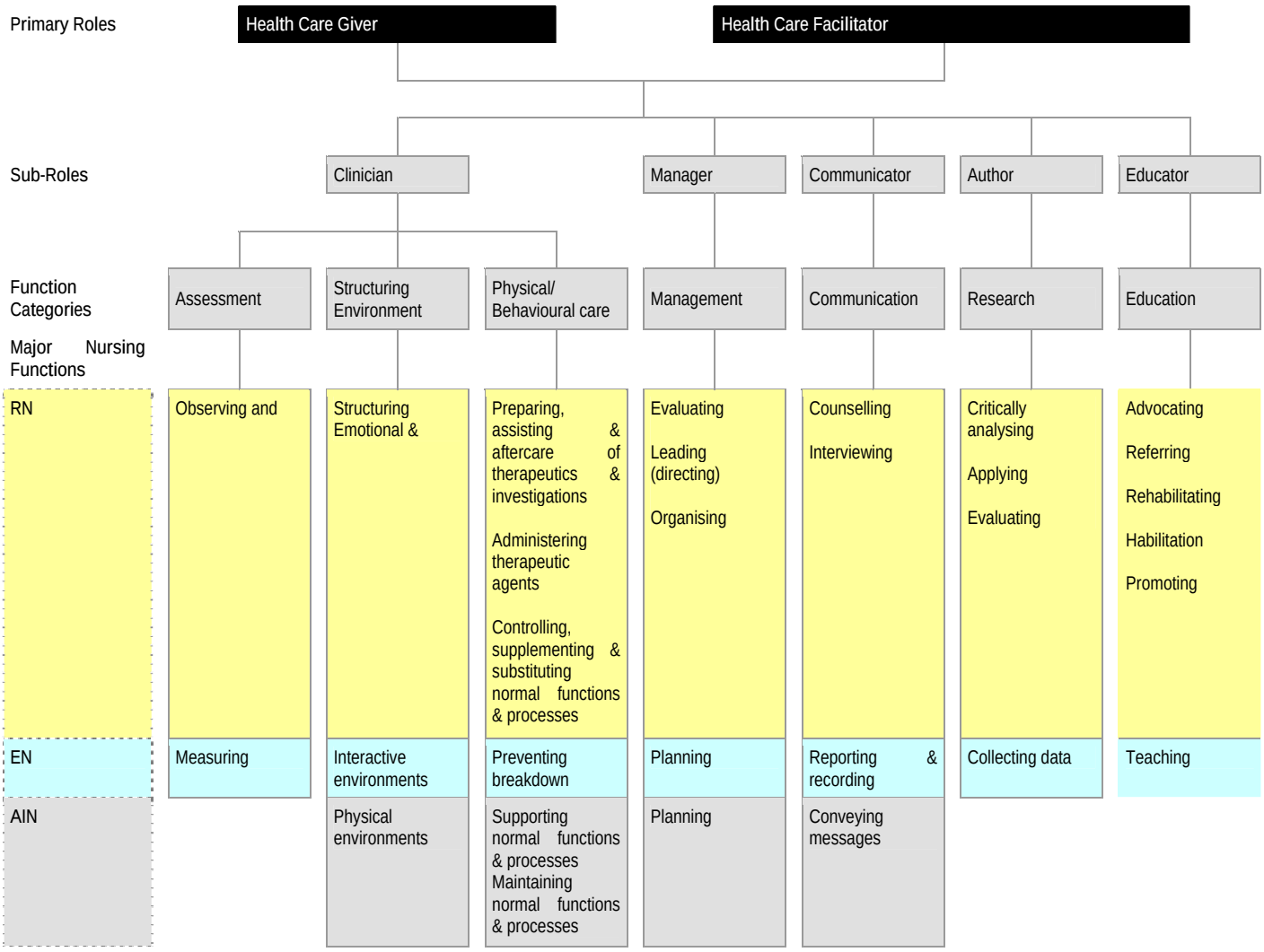
With changes in the health care environment, the scope of practice for both registered and enrolled nurses has changed to require increasingly advanced levels of practice. The

scope of nursing practice is defined as "that which nurses and midwives are educated, authorised and competent to perform" (QNC, 2008, p. 3). The QNC developed the *Scope of Nursing Practice Decision Making Framework* following extensive consultation with the nursing profession, to provide guidance for individual nurses, the profession, consumers and health care organisations. It was designed to provide a framework for

- nursing practice within diverse contexts;
- expanding practice for RNs;
- delegation among nurses and advancing practice for ENs;
- delegation for unregulated care providers; and
- role relationships (QNC, 2008).

The nursing roles and functions are represented diagrammatically below in Figure 2 where the primary and secondary roles and the major nursing functions for all levels of practitioner are identified.

Figure 2.2: QNC Nursing roles and functions model



McMillan, M, Little, P, Baker, H, Bujak, E and Johnson, R (1996), Different Perspectives on the Roles and Functions Framework. Adapted from of Andersen, B.M. (1991), Nursing Roles and Functions Model: Intervention.

Each year, when nurses and midwives renew their licenses, they must reflect on their practice and sign a declaration that they continue to practice competently and safely. This process supports the professional requirement for competence development and ongoing learning. Council randomly audits nurses and midwives to ensure they can provide evidence to support their declaration. Any improper practice or any concerns staff have

about a nurse can be discussed with staff from the QNC and information and support gained regarding any actions that might need to be taken.

The QNC nursing roles and functions are supported by the Australian Nursing and Midwifery Council (ANMC) Competency Standards for the registered nurse (2005) which reinforce that registered nurses are responsible and accountable, professionally and legally, for determining their scope of practice. The Australian Nursing Federation (ANF) has also developed nationally endorsed Competency Standards for the Advanced Registered Nurse which guides the practice of nurses who are practicing at an advanced level (ANF, 2005). In September 2005, the QNC developed practice guidelines for the NP and has accredited a number of NP curricula within the tertiary environment.

2.7.3 Advanced practice nursing

I recognise a current move towards expanding the practice of registered nurses in Australia through an advanced practice model. However many nurses have been unable to generate enough support to change their role conception from the service and/or bureaucratic position to one where a professional conception is embedded and accepted by nurses and other health professionals (Nolan & Hazelton, 1995). There is a current frenzy of activity, within both nursing and the State and Federal governments, to redress the older model of practice and thus embrace a more professional, autonomous model of nursing. For example, recent Australian Federal government policy demonstrates a growing commitment to an extended role for nurses in general practice areas through both funding boosts for more positions and upgrading of qualifications, and potential

penalties for general practitioners who do not use the knowledge and skills of their practice nurses and elect to undertake procedures themselves (Halcomb, Davidson, Griffiths & Daly, 2008a; RCNA, 2008c). At a State Government level, NP education in Queensland has been funded for the last few years through scholarship provision (Unknown, Nursing Review, 2005e), although recurrent added funding is still required for the establishment of postgraduate NP positions. No such dedicated funding or identified clinical positions are provided as yet in Queensland to develop the knowledge and skills of advanced practice nurses which I believe is a significant deficit in the current nursing career ladder.

With the increased burden of chronic disease and workforce shortages, there is a drive to grow the primary health care sector, of which practice nurses are a major player (Halcomb et al., 2008b), as well as implement support roles such as the NP or advanced practice nurse within the acute and community sectors to assist in managing heavier workloads of both nurses and doctors.

The international movement, which has seen the development of many levels of advanced practice for nursing often uses a number of terms that, confusingly, have similar meanings. Although a lot has been written about these changing roles from the mid-1990s, the terminology can be confusing. Pearson and Peels (2002a, 2002b) explain how the terms *nurse practitioner*, *nurse specialist* and *advanced nursing practice* are "frequently used interchangeably in some countries" (p. S5). To circumvent confusion, the term *advanced practice* has been chosen to represent the level of practice of the

nurses in this study. According to the Royal College of Nursing, Australia (2002), "advanced practice nursing defines a level of nursing practice that utilizes extended and expanded skills, experience and knowledge in assessment, planning, implementation, diagnosis and evaluation of the care required" (RCNA, p.1). The College believes that the basis of advanced practice is the high degree of knowledge, skill and ability applied and advanced practice then forms the basis for the NP role. This description supports the concept of the career path for nurses where the advanced practice nurse with expanded knowledge and skills can aspire to the NP role following completion of further targeted post-graduate studies. This links to the diagrammatic representation of nursing on a continuum where the advanced practice nurse is the conduit between expert practice and the NP role.

Advanced practice has been evident in nursing for many years, however it was not until the 1990s that nurses began formally accepting tasks previously undertaken only by medical staff (Pearson & Peels, 2002a). This was primarily a response to the changing needs of health care, workforce pressures, access to health delivery systems, and the drop in numbers of medical officers within the public health care system (Angus, Kelley, Aschmitz, White & Popovich, 2000; Brooks, Lapsley & Butt, 2003; Coombs, Chaboyer & Sole, 2007). For example, in intensive care units, advanced practice nurses with appropriate education and skills, are weaning patients off ventilators, and in women's health areas, midwives are successfully undertaking episiotomies on patients when appropriate (Capstick & Harley, 2004; Crocker, 2002; De, 2004; Fulbrook et al., 2004; Mayerhofer et al., 2002; Shorten & Shorten, 2002; Upton et al., 2002; Webster, 2000;

Wu, Williams, Hundley, Connolly, & Visco, 2005). These additional skills are just a natural extension of nurses' practice rather than formal academic advancement. In rural and remote settings, the role of the nurse has been developed due to the lack of doctors practicing in these geographically isolated areas and this has created confusion for people regarding the roles and responsibilities associated with different but similar titles. It is difficult to find a definition that clearly elucidates the advanced practice nurse who is central to this project so the subsequent discussion has been included to assist with the development of a definition.

A number of attributes such as clinical skills, research, teaching, consultancy and leadership have been identified as typical characteristics of advanced practice (Pearson & Peels, 2002b). Cattini and Knowles (1999) call these "x-factor attributes" (p. 507) in which the advanced practice nurse has expert skills, recognises changing professional boundaries, is working across boundaries, and has the capacity to bring about change. The advanced practice nurse appears similar to the role of clinical nurse specialist (CNS) in the United Kingdom. Several authors (Ball & Cox, 2003a, 2003b; Bousfield, 1997; Pearson & Peels, 2002a, 2002b) refer to the description of advanced practice by the United Kingdom Central Council for Nursing and Midwifery (UKCC) (1997) as providing a clear bridge between the role of the CNS in the United Kingdom to the Australian concept of advanced practice. The UKCC states that "*advanced* practice is engaged by nurses who participate in direct patient care, are already at the specialist level of practice and have successfully completed advanced education" (p. 3). Bousfield's description of a CNS also reflects the advanced practice nurse within this project. It says

a CNS is "(An) expert practitioner who strive(s) to be in positions where they influence patient care and utilize advanced knowledge, expertise and leadership skill in a multi-disciplinary environment" (1997, p. 245).

The lack of clarity and confusion around the role definition for advanced nursing practice has even permeated the medical ranks in recent years. Lumby (2005), in a media article, provided a very clear insight into how the advanced practice nursing models were perceived by medical officers. She stated that in a meeting several years ago a rural doctor summed up the fear behind the contempt (for the advanced roles). "We'll have to watch them", he said. "They'll breed like rabbits" (p.21). She further identified that the education and training of nurses had escalated since nursing moved into the tertiary sector in 1984, providing a springboard for nurses in all contexts to be able to take on "onerous decision-making and leadership roles in our very complex health system" (p. 21).

In spite of the knowledge and skills development, nursing still has to fight against more than 100 years of control and direction by medicine. Lumby stated that "(o)ur areas of clinical specialty were mandated by the type of medicine practiced and our education was determined and designed by doctors (and) (s)ince 1984 this master/servant relationship between doctors and nurses has been unravelling" (2005, p. 21). This domination is no more evident than in the development of the NP role in Australia.

The NP role is an expanded form of advanced practice nursing which is regulated by legislation and professional regulation. Pearson and Peels (2002a) suggest the NP

"represents the view in nursing that nurses in specific contexts may need to extend their traditional role …outside services that have been previously seen to be outside the legitimate domain of nursing" (p. S7). The NP role was originally developed to support primary health care models in rural settings, where the nurse may be the only health professional available, but in recent years the NP has been able to practice not only in rural and remote settings, but also in the acute care sector (Gardner & Gardner, 2005). A number of NP trials have been undertaken to validate this role across settings (ACT Government, 2002; Hegney, 1997; O'Keefe & Gardner, 2003/2004; Reid, 2001).

In recent years, the media coverage of nurses and their roles has focused on the NP role which has contributed to the lack of clarity and understanding around the advanced practice model. As identified with the continuum model used earlier, it is argued that the advanced practice role is the conduit between the generalist RN and the NP role. Since the investigations into practice issues in Queensland Health within the Forster Report (2005), the Queensland State Government has taken steps to introduce NPs into more mainstream practice areas where it is anticipated they will undertake some of the simpler medical officer roles and responsibilities including minor procedures such as setting simple fractures, suturing wounds and diagnosing non-life threatening conditions such as urinary tract infections.

This process of role development is not supported by medical practitioners generally. In a media release from the Australian Medical Association (AMA) Limited (Livingstone, 2005), the AMA is pushing for Federal Government funds to increase the number of

general practice nurses instead of funding the independent nurse practitioner positions. AMACGP Chair, Dr Rod Pearce said "a move to independent nurse practitioners would dumb down the Australian health system" (Livingstone, 2005, p. 5). He further stated that "(T)he right way to go is to have the nurses complement and assist the work of the GP, not have nurses become a substitute for GPs" (Livingstone, 2005, p. 5).

The Chair of the Council of Deans of Nursing and Midwifery at the time, Professor Kim Usher responded quickly to this statement, articulately refuting such a comment. Dr Usher provided examples of studies undertaken between 1997 and 2004 that clearly identified how appropriately prepared nurses working in diverse advanced practice roles were able to perform as well as doctors (Usher, 2005). Dr Usher also identified that in countries where Nurse Practitioner roles have been working for a number of years, the primary health care model is more widely available, which is certainly something the Queensland government saw as a positive outcome of the legislative changes to support the Rural and Isolated Practice – Registered Nurse (RIPRN) course in 1999. For a number of years, nurses working in rural and remote areas of Queensland were practicing without local, on-site medical support and this led to some incidents where the nurse was unable to provide optimum health service to the clients. In collaboration with the Queensland Nursing Council (QNC), staff within the Queensland Health Department successfully lobbied for changes to legislation that supported the development of three endorsements to support advanced practice of nurses working within rural and remote settings (Queensland Government, 2001; Queensland Health, 2002; Queensland Health & RFDS, 2003).

Following legislative review, the *Health (Drugs and Poisons) Regulation 1996* (Queensland Government, 2001) was amended to make provision for Registered Nurses with an appropriate endorsement from the QNC, to administer and supply a range of medications listed in three Drug Therapy Protocols (DTPs) (Queensland Health, 2002). These are:

- Immunisation Program;
- Isolated Practice Areas and Rural Hospitals; and
- Sexual and Reproductive Health Program.

To assist health professionals to adjust to these changes, the terminology needed to be clear. The following definitions were included in the *Health (Drugs and Poisons) Regulation 1996* to aid clarity for all staff particularly nurses and doctors:

Administer – "for a controlled or restricted drug or a poison, means give a person a single treatment dose of the drug or poison" (Queensland Government, 2001, p. 213).

Supply – "for a controlled or restricted drug or a poison, does not include administering, dispensing or prescribing the drug or poison but does include offer to supply" (Queensland Government, 2001, p. 223).

It was also necessary to have an amendment of the *Nursing Act 1992* (Queensland Government, 1992) passed to support this change in practice. Section 77(3) of the *Nursing Act 1992* now makes provision for QNC to "…[authorize an individual]*to practice nursing in another area of nursing if the person is the holder of a qualification recognized by the council*" (p. 46). Any nurse wishing to be authorized needed to

undertake a course accredited by the QNC which led to the development of the Rural and Isolated Practice – Registered Nurse course developed by nurses for nurses. Using the QNC *Scope of Practice Framework for Nurses & Midwives*, a comprehensive curriculum based on 12 competency standards and associated performance criteria was developed to allow each individual nurse to demonstrate their competence in use of the relevant DTP. The performance criteria reflected the attributes expected of a competent DTP-endorsed nurse and are consistent with contemporary practice and health care standards (QNC, 2008).

In view of the above, the negative response from medical officers about any advanced practice nursing role is considered to be misplaced as these nurses are clearly not using their knowledge, skills and expertise to take over medical roles and responsibilities. With the advanced practice model in mind, I argue that it is timely to evaluate the nursing management of patients with Irukandji syndrome with a view to developing clinical practice guidelines that will provide an expanded framework for nurses in the acute setting.

While there is significant evidence to support the expansion of nursing roles to more advanced levels, it should be asked if this is the right path down which to proceed. Much of the progress nurses are making is dependent on the availability of appropriate frameworks to support practice. Underpinning the use of frameworks is the concept of competence, and Cowan, Norman and Coopamah, (2007) identify the difficulty in gaining consensus on the definition of competence with regard to nursing practice. Citing

many authors, Cowan et al. (2007, p. 25) isolate the main issue as whether competence has a behavioural basis (perceived as performance), or a psychological construct incorporating both cognitive and affective components, which is far more difficult to measure. Watson (2002) however has voiced concerns that the drive for competence may lead to mediocrity as nurses strive no further that the minimum standards set down for the practice level.

Ball and Cox (2004a, 2004b) identified in their research (which combined a number of roles used internationally such as NP, CNS and clinical nurse consultant (CNC)), a number of constraints which may retard the development and acceptance of advanced practice roles. They cite several authors who identify the major areas of contention as "the supposed medical orientation of NPs and the difficulties experienced in evaluating the impact of indirect caregivers such as the CNS and CNC" (Ball & Cox, 2004a, p. 357). They further identify conflict, resistance, gender bias and lack of credibility on the part of the advanced practice nurse as relevant constraints to success in the role (Ball & Cox, 2004b).

Conflict between advanced practice nurses and medical staff has also been identified in the literature in terms of 'turf' or 'territory' issues (Ball & Cox, 2004b, p.15), and was claimed to be specifically noticeable when doctors believed they were not in control of a situation. However, resistance to expansion of role responsibilities was an issue predominantly initiated by other nursing staff who felt the advanced roles were not productive, while medical staff was resistant to any changes or innovations. Gender bias

generated by both male nurses and male doctors was raised by both male and female advanced practitioners. For one male practitioner, there was a positive bias and he believed he had "a lot of doors open to me that are not open to women" (Ball & Cox, 2004b, p.17).

Irrespective of the constraints, a constant theme regarding the advanced practice roles has been credibility (Ball & Cox, 2004a, 2004b; Richmond & Becker, 2005; Stenner & Courtenay, 2008). Without credibility, it has been suggested the advanced practice nurse will not succeed (Ball & Cox, 2003b), and negotiation therefore needs to occur between the three key groups (i.e. nurses, doctors and hospital managers) to ensure success. Each advanced practice nurse it is argued (Ball & Cox 2003b), must negotiate with other nurses, doctors and hospital managers. Richmond and Becker (2005) add seven other characteristics to this that need be demonstrated in order for the advanced practice role to succeed: clarity of vision, commitment, communication, collaboration, contributions, confidence and complexity. This is a daunting list for any nurse to ensure they possess, especially if the organisation is not resourced nor have appropriate infrastructure to support the role. Many organisations will be focused on throughput and short term clinical outcomes to judge the impact of the role (Byers & Brunnell, 1998), which may not be met within short time frames. As a result, the advanced practice roles may incorrectly be perceived as neither invaluable nor ineffective. In this situation, the employment of more junior nursing staff may be seen as an acceptable alternative rather than continue to spend money on more expensive, experienced, advanced practice nurses.

From an academic point of view, Arslanian-Engoren, Hicks, Whall and Algase (2005) believe that a major issue for the development of high quality advanced practice nursing is under-preparedness. Arslanian-Engoren et al. (2005) propose that advanced practice curricula do not provide the student with the necessary advanced skills and knowledge and this reduces the unique and holistic approach to delivery of patient care. Further, they believe the advanced practice nurse must remember to include all components of the patient's health needs including family and environmental needs which may require a reconceptualisation of practice beyond the current focus of nursing practice, which is still in many cases framed within a medical model. Coombs et al. (2007) concur that while advanced practice roles have been increasing in Australia, they "do not necessarily have the robust preparation and licensure structure as evidenced by those in the United States" (p. 85). Coombs et al. (2007) also state that an advanced degree is an essential component of preparation for advanced practice. This is not a consistent requirement within Australia which again reinforces the lack of consistency in process and practice frameworks.

Consistency of advanced practice has also proved to be a stumbling block for nurses in the United Kingdom where advanced practice nurses have been used to deliver care to critical care patients within a community care framework (called outreach programs). Several studies in the United Kingdom have reviewed the effectiveness of these critical care outreach programs and the results have been mixed (Esmonde et al., 2006; McDonnell et al., 2007). While there have been a number of different models of program, many are nurse-led (Ball, 2002; Esmonde et al., 2006; McDonnell et al., 2007). The problems identified with the outreach services across the country relate to the lack of

consistency of operational processes and practices. McDonnell et al. (2007) believe the diversity in service provision may reflect "an explicit decision within hospitals to focus on particular elements of activity based on local needs" (p. 217). These outreach programs require the nurses to be practicing at an advanced level but without the supportive evidence-based clinical practice frameworks. The programs are often developed in response to specific local needs. For example one program may be designed to use critical care staff as support for staff on general wards when caring for cardiac patients; an alternate model may involve the follow-up of patients discharged from hospital to home. Each of these examples requires a very different model of practice and needs different infrastructure to sustain them. This makes it almost impossible to create a consistent framework for advanced nursing practice, and evaluation also becomes difficult due to the inherent differences in models and funding.

In contemplating how to approach the expansion of ED nursing practice, it is important to consider the progression of any nurse through different levels of practice. When Patricia Benner published her influential text *From Novice to Expert* (Benner, 1984), it had a significant impact on nursing and nurses. Benner, who based her work on the work of Dreyfus, Dreyfus and Athanasiou (1977), suggested there were five levels of practice. These began at the novice or beginner level, where the nurse functioned in a task-driven, context-free environment, through to the expert, who acted intuitively from a deep understanding of the total situation. These two levels are the end points of a continuum through which the nurse will transit during her/his professional life and relies on the development of expertise in clinical practice which usually occurs through experience of

similar situations which have previously been successful (Benner, 1984). Benner (1984) argued that each expert nurse had her/his own portfolio of experiences which constituted personal knowledge and she referred to this knowledge as "know-how" and distinguished between knowing *how* to do something as opposed to knowing *that* something is the case. So, the inexperienced (novice) nurse might have academic knowledge without much *know-how* while the experienced (expert) nurse would have a combination of *knowing how* and *knowing that*.

According to Rolfe (1997a), experience as spoken about by Benner is not just a passive process as it needs to be processed if it is to contribute to personal knowledge. One way of successfully distilling work and experience is through reflection. Rolfe (1997a) stated that, "Benner referred to nursing actions based on personal tacit knowledge as 'intuitive grasp', a process by which the nurse just seems to know the right thing to do in any given situation" (p. 94). The process that governs clinical decision making requires sound clinical judgements. According to Oliver and Butler (2004), while nurses do make clinical judgements, it is not known how this occurs, although they recognise the role of clinical knowledge, critical reflection, past experience and intuition as all contributing to making appropriate judgements.

Rolfe (1997b) has boldly suggested that there is another dimension beyond Benner's continuum. He believed that there is reflection-on-action which is inherent in the expert nurse's role which allows conversion of experiences into personal knowledge and experience, by reflecting on an episode of care afterwards and making intuitive changes

to practice. However, reflection-*in*-action is described by Schön (1987) as reflection that occurs at the same time as practice which allows the more advanced practitioner to reflect contemporaneously on the situation at hand, and consider the options and consequences of decisions. This occurs far more quickly that the retrospective reflection-on-action process and forms the basis for what Rolfe (1997a) calls the reflexive practitioner.

Polanyi (1966) wrote at length about personal knowledge generated from reflection which he termed tacit knowledge. Reflecting on this concept of tacit knowledge where intuition plays such an important part, Polanyi described two systems functioning within tacit knowledge: firstly, the process whereby perceptions of particulars are emphasized, such as feelings; and secondly, a system which encompassed intuition and imagination. "According to Polanyi (1966) when we use our intuition, we filter information initially triggered by the imagination, thus leading to the integration of all information and/or knowledge to solve the problem" (Billay et al., 2007, p. 148).

In the ED, expert or reflective nurses make practice seem effortless and the advanced practice nurse clearly draws on the above-mentioned traits to guide their clinical judgements. While these nurses can act and react instinctively or intuitively, their reflection is not necessarily undertaken at the same time. If, as Rolfe believes, the expert nurse can perform required actions without conscious thought, it is imperative for the reflexive nurse to identify the importance of continued concentration on tasks as they arise so as to go beyond expertise and focus their attention on each individual patient and

the uniqueness of each clinical situation. This is the next dimension Rolfe (1997a) believes has evolved from the work of Benner.

By using the theory of reflective practice to support the work of the subjects in this study, there was an acknowledgement that even within the 'advanced practice' domain, there were different ways that each nurse along the practice continuum assessed and reacted to the clinical needs of the patients in her/his care. Any nurse in the ED who met the criteria to participate in the study was identified as an expert in the ED area, but whether they were reflective or reflexive was harder to determine. To support the nurses and to provide challenging and thought-provoking questions to encourage the development of a reflexive capacity, this study aimed to develop clinical guidelines to guide the practice of advanced practice nurses in the ED when caring for patients with IS.

2.8 Clinical guidelines

With a view to developing a tool for advanced practice nurses that could be transferred from one nursing practice environment to another, the most appealing option was that of clinical guidelines (Andrusyszyn, Cragg, & Humbert, 2001; Kane & Lurie, 1992; Lia-Hoagberg, Schaffer, & Strohschein, 1999; Lohri-Posey, 2003). I propose that once tested, the guidelines could be used in other areas where patients with Irukandji syndrome are admitted, such as Intensive Care or medical wards specialising in respiratory or cardiac care. Adaptation of clinical guidelines across contexts is supported by Tu et al. (1989) and Shahar, Miksch and Johnson (1998), who claim that "clinical guidelines can be

viewed as reusable skeletal plans that need to be refined by a reactive planner over significant time periods when applied to a particular patient" (pp. 2-3).

The key word to consider when reflecting on the advanced practice role and the need for clinical guidelines is 'guide'. As advanced practice role titles are often used interchangeably, for example NP, advanced practice nurse, advanced clinical practice nurse and advanced practitioner, so too are there are a number of phrases to describe documents such as clinical guidelines, clinical protocols, algorithms, and flow-charts. Carryer, Gardner, Dunn and Gardner (2007), in researching the NP role, were critical of protocols for being "restrictive" and "inhibiting the development and utilization of capability" (p. 108). These concerns may be extrapolated to any advanced practice support documents. According to Byers (1998), any process changes such as implementation of advanced practitioners (APN) should be based on a best practice framework. Byers' definition of best practice reflects "a combination of evidence-based practice, clinician's judgement, and patient preference" (pp. 298-299) and according to Byers this "implies that an APN…uses practice guidelines as recommendations only and personalizes care to each patient after assessment of the patient's condition and preferences (p. 299). This would suggest that the inflexibility of total compliance would be an unrealistic goal. Carryer et al. (2007) did indeed make the distinction between multidisciplinary guidelines that aim to *support* practice, and discipline-specific protocols designed to *control* practice. Nonetheless, this paper was critical of protocols that limited the "most valuable aspects of NP practice (flexibility, responsiveness, and increased workforce capacity)" (p. 109). This is an important factor to consider when developing

clinical guidelines. In this study, the aim was to develop a set of guidelines to support nurses to deliver holistic care to patients with IS, which indicates *support* for a role extension. In other words, in this case the guidelines were not designed to restrict but to expand practice in a manner that would enable more rapid attention to the immediate needs of the patient in acute pain.

Several studies have reflected how the poor compliance with clinical guidelines creates problems for the patient and reduces the value of the guidelines. Cabana et al. (1999) reported that a variety of barriers such as lack of familiarity with the guidelines, disagreement with the guidelines, and doctor – led issues such as lack of confidence in the ability to implement guidelines, interfered with the usefulness of clinical guidelines. Mertens et al. (2003), supported by Cabana et al. (1999) and Browman (2000), proposed that the only reliable way to encourage compliance with clinical care was from adverse patient comments about their experience coupled with evidence of poor compliance with guidelines. It is argued that the lack of compliance is also related to guidelines leading to "cookbook medicine and de-skilling" (Berg, 1997, p. 1084), however this argument must be balanced by the suggestion that judicious use of guidelines or protocols has the potential for the creation of a forum for discussion and the acquisition of new competencies through new learning (Berg, 1997).

Osborne and Webster (2005) described seven clinical practice tools that could be used for similar purposes and their definition of clinical guidelines as an algorithm reflected the visual format that nurses often favour. According to these authors, algorithms are:

> "clinical guidelines prepared in a flowchart format, typically describing the process and decisions, allowing for alternate pathways, involved in addressing a specific condition" (p. 184).

According to Field and Lohr (1992), clinical guidelines are systematically developed statements to assist practitioners with decision-making about appropriate healthcare in specific circumstances. While this sounds a simple task, Grilli, Magrini, Penne, Mura and Liberati (2000) evaluated over 400 guidelines produced by professional specialty organisations between 1988 and 1998, and found only 5% satisfactory, based on the following criteria:

- Description of stakeholder involvement in the development of the guidelines;
- Strategy for identifying evidence; and
- Grading of recommendations (p. 103).

The development of clinical guidelines is a time-consuming process that uses research evidence as well as "incorporating the consensus views of experts" (Raine, Sanderson, & Black, 2005, p. 615). This supports the assumption that the views of a number of experts are more valid and reliable than an individual's judgement. Raine et al. (2005) added that "formal or structured methods for developing a consensus have advantages over informal committees" (p. 631). How guidelines are developed varies but according to Raine et al. (2005), there are three common methods:

- Nominal group technique – where about 10 people are usually selected to identify the questions to be covered, express their views in private, then discuss areas of

disagreement. Following the discussion, the people again express views in private, which the authors collate and analyse to gain a group viewpoint.

- Delphi technique – involves two or more rounds of postal questionnaires which allow the participation of experts who are geographically dispersed and avoids the risk of undue influence being exerted by any individuals. Mead and Moseley (2001) further describe the Delphi technique as including selection of the expert panel, formulation of the question(s); generation of statements, reduction and categorisation of statements, rating of the statements and analysis and iteration; and
- A hybrid of the two – pioneered by RAND, which uses a postal questionnaire for the first round of comment and a meeting for the second round.

In this study, I used a modified version of the Delphi technique where a number of experts were contacted either electronically or on a one-to-one basis for feedback on the developing guidelines. This process maintained the key principles of the Delphi technique including anonymity of each expert participant and low risk of undue influence being exerted by any participant.

Osborne and Webster (2005) cited a number of sources which quoted key qualities that are required for guidelines to be effective (Field & Lohr, 1992; National Health and Medical Research Council, 1999a; Scottish Intercollegiate Guidelines Network (SIGN), 2001). The qualities included validity, reproducibility, representativeness, flexibility, adaptability, cost-effectiveness, applicability, reliability and usefulness (p. 185). By using

internationally accepted appraisal parameters such as those provided in the Appraisal of Guidelines Research and Evaluation (AGREE) Instrument (AGREE Collaboration, 2001), the above qualities should be met. This provides further support for the distribution of the clinical guidelines for patients who have received an Irukandji sting beyond the acute care environment of the Emergency Department, for example, in Intensive Care or Respiratory Units.

The AGREE instrument was designed to provide a framework for assessing the quality of clinical practice guidelines both in terms of the quality of the reporting and the quality of some aspects of the recommendations. It was designed based on theoretical assumptions, not empirical evidence, and provides a framework for assessing the quality of clinical practice guidelines (AGREE, 2001). The assessment is designed to adequately address the potential biases of guideline development and provide internally and externally valid recommendations regarding the feasibility of implementation. They are not designed to measure the impact of the guideline on patient outcomes. The AGREE guidelines identify 23 criteria organized in six domains as described in Table 3. These domains are identified to capture separate dimensions of guideline quality.

Table 2.3: AGREE Instrument

Domain	Criteria	Dimension
Scope and Purpose	Items 1- 3	Relate to overall aim of guideline, specific clinical questions and target patient population
Stakeholder involvement	Items 4 – 7	Focus on extent to which the guideline represents the views of the intended users
Rigour of development	Items 8 – 14	Relate to the process used to gather and synthesise the evidence, the methods to formulate the recommendations and to update them
Clarity and presentation	Items 15 – 18	Deal with the language and the format of the guidelines
Applicability	Items 19 – 21	Relate to the likely organizational, behavioural and cost implications of implementing the guidelines
Editorial independence	Items 22 – 23	Concerned with the independence of the recommendations and acknowledgement of possible conflict of interest from the group who developed the guidelines

Importantly, clinical guidelines for nursing practice do not replace the diagnosis and management of the patient by medical officers. Rather, the guidelines are used in conjunction with clinical expertise and sound judgement of the entire healthcare team and have the potential to free up the medical officer to attend to other unstable or critically ill patients. The introduction of any practice tools must, however, be undertaken in conjunction with education of staff with clearly stated implementation and evaluation strategies. An education program will allow for an assessment of previous knowledge and skills to take place followed by educational input regarding the tool.

As discussed above, clinical guidelines or protocols have been used in a number of settings where advanced nursing practice has been implemented. In Fiji, for example, where an NP program was introduced in 1999, clinical protocols were developed by a

multidisciplinary team to support the nurses' practice and were linked closely to the NP curriculum (Usher & Lindsay, 2003; Usher, Rabuka, Nadakuitavuki, Tollefson, & Luck, 2004).

In Australia, the implementation of NP programs has also led to the development of clear guidelines/protocols. For example in NSW, guidelines were developed in 1998 to support the legislative changes necessary to support the extended roles of nurses (Offready, 2000) and in Queensland, the Primary Clinical Care Manual (Queensland Health & Royal Flying Doctor Service, 2003) provides the guidelines for advanced practice nurses with Rural and Isolated Practice for Registered Nurses (RIPRN) Course endorsement with the Queensland Nursing Council. Outpost nurses who function as primary care providers in Canada's underserved northern communities also share practice domains and competencies with NPs. Research conducted by Tarlier, Johnson and Whyte (2003) reinforced that these advanced roles could not be undertaken without competencies which the participants in the research indicated were fundamental to outpost practice.

While this study focuses on advanced practice nurses, clinical guidelines have an important role to play in supporting nursing practice across all career levels. They provide a systematically developed framework for nursing practice that will improve both the quality and process of care and patient outcomes but they should not be seen as tools to replace medical decisions or critical thinking processes.

2.9 Chapter summary:

Irukandji syndrome is a painful and debilitating condition that affects people who have been exposed to the potent toxins of a tropical marine stinger. It can be treated successfully; however the pain generated by the toxin is severe and, if not treated adequately, may exacerbate the condition and lead to slow recovery. Nurses who are employed with an ED in Northern Australia often have specialist skills in the area of marine envenomations. Many of them practice at an advanced level in the ED and these nurses work in collaboration with medical staff on an ongoing basis. They have the capacity to make sound clinical decisions especially when provided with endorsed clinical guidelines to support practice. These guidelines are designed to acknowledge the importance of pain from IS for patients and their recovery. The guidelines are also testament to the impact of patients' ethnicity on their ability to respond appropriately and expectedly to appropriate pain relief.

The development of clinical guidelines for managing IS requires deliberate effort to design, test and evaluate them as objectively as possible, in order for the guidelines to be adopted as an integral part of clinical practice for both nurses and doctors within the ED in Northern Australia and wherever marine stings occur. Case study methodology and the use of a pragmatic reflective framework provided a sound and appropriate platform from which to proceed and these are discussed in the following chapter.

Chapter Three

Theoretical Framework, Design and Methods

3.1 Introduction:

This chapter describes the approach adopted and provides an outline of the theoretical framework Pragmatism and Reflective Practice. My ontological and epistemological position is also visited followed by an overview of the research design. The research used a concurrent mixed methods approach embedded within a Case Study (see Table 1) and the rationale for use of this design is explained. Data collection and analysis is explained, and how the participants in the study were recruited is described. Finally, the application of ethical principles to the study is addressed.

Using the frameworks and methods identified provides a sound basis for the primary outcome of this research study, the design of clinical guidelines that will assist experienced nurses working in the emergency department (ED) environment to use their expert assessment skills and decision-making capability to initiate early pain management intervention. The time saved by the establishment of a nurse-initiated pain relief regime may be a critical factor in achieving optimal outcomes for the patient suffering Irukandji syndrome earlier than currently experienced under a more traditional model of medical officer- initiated pain protocol.

Together**,** the theoretical framework, design, and data collection methods provide a means to explore the practice management of patients with Irukandji syndrome (IS) and develop clinical guidelines. These guidelines will be used in the future to support the

practice of expert nurses who have the knowledge and skills to develop their practice to an advanced level within the ED.

Table 3.1: **Diagrammatic representation of the theoretical framework and research design used to underpin the study.**

Section	**Approach**
Theoretical Framework	Pragmatism Reflective Practice
Methods	Case Study using Mixed Methods approach
Data Collection Techniques	Participant Observations Retrospective Chart Audits Delphi Technique
Outcomes	Clinical Guidelines

3.2 Theoretical Framework:

This study, informed by a pragmatic approach using a reflective practice lens, incorporates mixed methods within a case study approach. Several thematic questions guided the selection of the framework and approach chosen. The questions or challenges used to guide the study included:

- What are the characteristics of patients who have suffered an Irukandji sting, including length of stay, demographics of sting for example: where

geographically did sting occur, where on body did sting occur, pain assessment including extent and severity of pain, use of narcotic pain relief, time taken between seeing a doctor and initiation of pain relief and the relationship of pain to site of sting and transport modes? (Conducted a retrospective chart audit).

- How do experienced registered nurses manage these patients while in the Emergency Department? How do nurses feel about the care delivered to patients with Irukandji syndrome? (Conduct of observational episodes within ED observing and documenting care of patients with Irukandji Syndrome. Undertaken using data collection tool developed by me).
- Can a set of clinical guidelines be developed to support the management of patients with Irukandji syndrome by experienced nurses? (Use of Delphi technique to design the guidelines).

A theoretical framework provides a way of looking at, and constructing an understanding of the world. Importantly, it must be congruent with the purpose of the research and support the selection of a particular methodology and method to fulfill the purpose of answering the research question (Crotty, 1998). Not only does the theoretical framework give direction to me by underpinning the methods to assist with data collection and analysis, it also allows findings and any underlying assumptions buried within the selected methodology to be identified and understood (Crotty, 1998).

All research is underpinned by a set of beliefs that define the nature of reality, the nature of the relationship between what is to be known and myself and finally, the

methodological question about how this knowledge is to be known (Guba & Lincoln, 1994). The nature of reality for pragmatists lies in processes where change occurs 'at every turn of events' (Maxcy, 2003). For pragmatists, theory is joined with practice, ideas operate as instruments and through intelligence, and humans are capable of shaping experience (Maxcy, 2003). This study has captured both qualitative and quantitative research approaches, and offers an appropriate framework as it has been suggested as a safe haven between the two camps (Howe, 1988; Tashakkori & Teddlie, 1998) and a device for the settling of battles between research purists and more practical-minded scientists (Maxcy, 2003). Pragmatism seeks to link theory to practice through the process of linking reflection to action outcomes that result from manipulating material and social factors within a particular context (Greenwood & Levin, 2003).

Reflective practice similarly allows a clinician to *reflect–on* their actions retrospectively and/or *reflect–in* their actions at the time of a situation, to allow for a reframing of care decisions "to enable a better outcome" for the patient (Usher, Foster, & Stewart, 2008, p. 278). Greenwood (1993) adds another dimension to the notion of reflective practice, the idea of *reflection-before-action*, which she believes has been undervalued by Schön's emphasis on reflection-in-and-on-action. If nurses were using a proactive reflective process, Greenwood (1993) suggested many errors made by nurses could have been avoided. Irrespective of which form of reflection is used, it is suggested that the pragmatic view identified above is where theory is joined with practice and where we are capable of shaping (and changing) experience. Reflective practice has been used to inform nursing practice for some time and linked to pragmatism it provides a robust

framework on which to further empower expert nurses to expand and critically evaluate their practice.

Within the chapter, each component of the framework, the method, design, data collection processes and associated issues are described.

3.2.1 Pragmatism:

Nursing is a very practical profession which has embraced evidence-based practice frameworks to assist in moving forward with improved clinical outcomes. According to Acreman (2007), the nature of nursing is to nurture and protect. In an article focused on cancer nursing, she quotes *The Concise Oxford Dictionary* (Thompson, 1995) definition of the word *nutrition* as one that can describe the nursing profession. The definition reads: "To feed and protect; to support and encourage; to train or educate; to feed and cherish". According to Acreman (2007) this "describes all the aspects of a nurse who is concerned with the provision of the fundamentals of care" (p. 7).

There is some consistency among authors regarding what the nature of nursing is and one theme that is found is that nursing has and continues to change (Carr, 2008; Lucero & Sousa, 2006; Pharris & Endo, 2007). Lucero and Sousa (2006) also reflect a nursing environment which promotes and contributes to a healthy healthcare system. Nurses help make this happen by using advanced patient safety practices, consistently high quality care and being actively involved in nursing. Carr (2008), specifically looking at changes in nursing education, identified that the nature of nursing has both expanded and contracted over years and this is reflected in nursing curriculum changes.

Donnelly (2004) focused on the advanced practice nurse which has particular relevance within this study. It was discovered in this research that advanced practice nurses are leaders in developing nursing practice. They do this through the ability to influence clinical and policy decisions; developing their nursing practice; teaching and consultation; and participating in nursing research. Donnelly (2004) emphasises the importance of experience in the development of advanced practice roles, a premise which also underpins this study. While practitioners and researchers continue to hold strong interests in advancing knowledge and skills of nurses, it is important to find practical and valid ways of achieving this.

Practicality is also central to the pragmatic framework. Pragmatism is epistemologically situated with a practical worldview looking for "what works" to address research questions (Creswell & Plano Clark, 2007, p. 24) therefore is highly suitable for this study. The philosophy of pragmatism rejects the practice of simply repeating what has been done before and has an interest in advancing knowledge by that is generated out of "actions, situations, and consequences rather than antecedent conditions" (Creswell, 2003). According to Creswell (2003, p. 11), "instead of methods being important, the problem is most important". This supports the concept that researchers should be able to use any approaches available to them to understand the problem, and therefore supports the use of mixed methods without having to align to any one philosophical standpoint (Cherryholmes, 1992; Creswell, 2003; Tashakkori & Teddlie, 1998).

Pragmatism as a philosophical movement can be traced back to the 19th century with the early writings of Peirce (b1839, d1914); James (b1842, d1910) and Dewey (b1859, d1952). More recently in the late 20th century, Rorty is credited with being the driver of a revival of pragmatism in the United States of America as a way of studying philosophy (Warms & Schroeder, 1999). According to Holmes (2007) pragmatism is a reaction against both metaphysics and the largely traditional schools in which issues such as truth and meaning are dealt with at an abstract level. Pragmatists wanted to develop their concepts within the real world and it is suggested by some authors (Holmes, 2007; Ikiugu & Schultz, 2006) that like Darwinian Theory, pragmatism should be considered to be dynamic and evolving like a biological system.

Pragmatism is a method of evaluating philosophical problems by tracking the practical consequences of each question. The pragmatic maxim is that truth and meaning can be discovered by testing the propositions against the consequences of that proposition. William James (1907, p. 112) stated "(T)he question is not, 'is it true?' but '*(W)hat difference* would it make if it is true?" Nursing still suffers from the dilemma of 'is it an art or a science' (Benner, 1984; Bevis, 1989; Gendron, 1994; Idczak, 2007), so a pragmatic reflective framework better situates nursing research to answer the questions important to the discipline.

The ostensive nature of pragmatism requires the pragmatist go out and find an example of what he/she is trying to define, identify the characteristics of this "thing" and then test the propositions. Pragmatically - focused research is seen as an important contribution to an

improvement in current ways of doing things and reflects a concern with applications and solutions to problems (Patton, 1990). Pragmatists believe that the only criterion for knowledge is usefulness. If it is not useful, it cancels knowledge out, but if is it useful, it counts as knowledge. Within the pragmatic philosophy it is advocated that researchers adopt a wider stance, that is, it is acceptable to use many approaches to examining a problem. Creswell (2003, p. 12) identified that pragmatist researchers "have a freedom of choice…to choose the methods, techniques, and procedures…that best meet their needs". This point of view supports the idea that pragmatists focus on doing what works rather that blindly following a specific philosophy.

For this study, the underlying objective was to take a real problem, the ED management of the patient with IS, and test both the "theoretical knowledge to practice" transfer for ED nursing staff and the consequences of that knowledge transfer to patient care. There have been algorithms and flowcharts developed in countless areas across disciplines (Grimshaw et al., 1995; Grol, 1992; Jacobi et al., 2002; Rebbeck, Refshauge, & Maher, 2006; Wallin, 2005; Wynaden et al., 2006), and indeed a flowchart for managing patients with Irukandji syndrome currently exists within the ED at Cairns Base Hospital (See Appendix C). It has however been designed for new junior medical staff with an (unspoken) expectation that there is a process flow-on to other clinicians. The flow sheet is designed with medically orientated prompts such as what medical action to initiate at any point in the pathway. With the exception of one recent paper aimed at an intensive care environment (Greenland et al., 2006), there has been no evident work undertaken to support ED nurses with the management of patients with IS. These patients can be

critically ill and pose a very real clinical challenge even to expert nurses, thus using pragmatic and reflective frameworks will assist I to develop clinical guidelines. It is hoped they will be useful, flexible and add to the knowledge and skills base for all nurses within an emergent environment while continuing to challenge each nurse to transform his/her practice through reflection.

It has been critically important for me to be able to explain to both clinicians and managers alike, the rationale for the current study and need for development of clinical guidelines to support practice. The use of pragmatism to underpin the study provided a very sound, practical platform from which to proceed. While the guidelines within this study have been designed for experienced nurses, it has still been important to incorporate medical staff in any discussions about the study, with the pragmatic reality being change "at every turn of events" (Maxcy, 2003, p. 63).

3.2.2 Reflective practice:

Reflection as a concept is also linked to choice. By using reflection, the practitioner is able to identify an opportunity to reconsider the most appropriate technique or procedure to meet the needs of their patients and choose to change the care approach if required. Reflective practice is a mechanism whereby a practitioner, in this case the nurse, through reflection on and in their work, can recover, recreate and reconsider their actions. It is a process that moves a learner from one experience into the next with deeper understanding. Schön (1987) described different levels of reflective practice including: *reflection-on-action* and *reflection-in-action*. Reflection-on-action is a retrospective

assessment of what has been done with the opportunity for the nurse to continue to improve his/her practice. Reflection-in-action is more commonly used by more advanced practitioners who have the capacity to pause while immersed within a care episode, where they create an opportunity to reframe the care plan to improve the health outcome for the patient. These models of reflection provide the nurse with an opportunity to choose the methods and practice that best meets the patient's and their own needs. This is also how a pragmatist intellectually frames a problem which reinforces the appropriateness of the use of pragmatism to underpin this study based in nursing practice. Greenwood (1993) challenged Schön's work in terms of putting the espoused theory into practice and offered a further level of reflection, *reflection-before-action*. She suggested that errors made by nurses could be avoided if the nurse had stopped to think about what they were planning to do and how they were planning to do it.

Greenwood (1993) also proposed that the theories which underpin reflective professional activity are difficult to articulate as they are 'embedded' in the activity itself. This is seen as inconsistent and simply asking professionals about their practice is likely, in Greenwood's view, to lead to descriptions of 'espoused theory' rather than actual 'theories in use'. Hannigan (2008) supports Schön's position on reflection and counters Greenwood's position saying "reflection-on-action need not only involve 'simply asking' practitioners what they did. Experiential activities, such as role play, can be useful strategies to aid accessing of embedded theories" (p. 281). Even though Greenwood's position has been challenged, it is still consistent with pragmatic and reflective frameworks, and in fact adds a level of review that makes the frameworks more robust.

Through the use of the clinical guidelines developed within this study, this proactive dimension is effectively integrated.

Reflection provides the vital link between the different learning experiences, assisting practitioners to make sense of their learning and their experiences in the workplace (Sugerman, Doherty, Garvey, & Gass, 2000). Dewey was the first to establish the relationship between reflection and experience (Sugerman et al., 2000), and he defined reflection as an "active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of grounds that support it and the further conclusions to which it tends" (Dewey, 1933 p. 9). Reflection is therefore a conscientious and rational thought process, which relies on evidence as its basis for justification. Further alignment of reflection with pragmatic philosophy occurs because both are practically orientated, with ongoing improvement in practice being the ultimate goal.

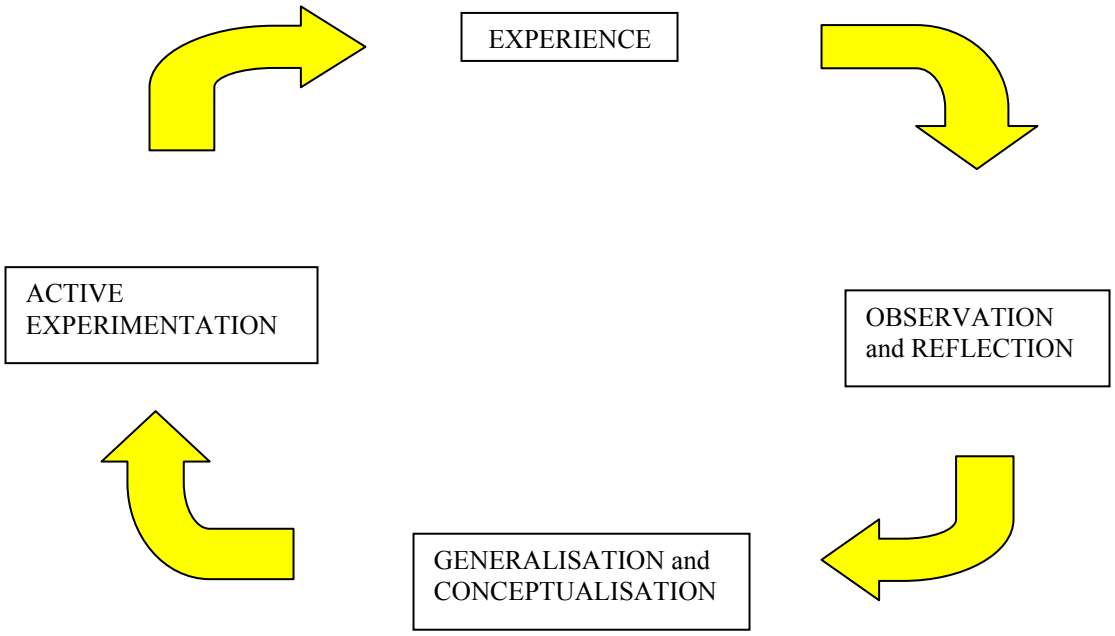
Reflection is widely promoted amongst the health professions such as nursing, medicine and the allied health professions as an effective form of professional development (Bolton, 2001; Geissler, 2002; Ghaye & Lillyman, 2000; Young, 2002). It is a valuable tool for several reasons: it is a versatile and critical form of learning; it assists to contextualise learning and is applicable to the real world of complex clinical practice (Bolton, 2001; FitzGerald & Chapman, 2000; Heath, 2002). Reflection is an effective way of integrating theory with practice and it supports the tacit knowledge and understanding that comes with experience and expertise. Polyani (1966) believed tacit

knowledge is relevant to knowing and "describes two systems functioning within tacit knowledge which have previously been described (Billay et al., 2007).

According to Hams (2000), experienced nurses practice intuitively by having developed a deeply embedded knowledge base and ability to apply the theory in practice. Nurses who work in advanced practice roles have progressed through Benner's five levels of practice, from novice to expert, and within an advanced practice context, are able to draw on many previous cases to reinforce their decision-making. Rolfe (1997a), as previously discussed, took Benner's model one step further and described 'expertise' which he argued "is concerned with working intuitively, with responding to practice situations holistically from a body of personal, tacit knowledge" (p. 94).

Schön's (1983) work on reflection, both reflection-in-action and reflection-on-action mirrors the process used by both the nurses within this study as well as myself. Schön describes a reflective cycle (Figure 1) which was also alluded to by Benner in her work (1984).

Figure 3.1: Schön's reflective cycle



This cycle can reflect either mode of reflection with the same process occurring within the person either during a care episode or at the completion of one. The skill and speed of the reflection cycle is dependent on the expertise of the person and the outcome will reflect both the experience and willingness to take a risk – the active experimentation phase. The following table places both myself and the participants in the study within Schön's model.

Table 3.2: Application of Schön's reflective cycle of the study.

CYCLE COMPONENT	INTERPRETATION	ED NURSES IN STUDY	RESEARCHER
Experience	This changes the level of reflection, and capacity to reflect. The less experienced the person, the lower the level of reflection from the lowest level – reflecting on technical matters, to the highest level where the reflection involves moral, ethical and political components (Van Manen, 1997)	The participants were identified as "expert" ED nurses with considerable experience within the ED environment.	As an experienced general nurse I was able to use critical thinking, predictive and decision making skills within a generalist context. With no recent ED experience I was more reliant on the participant's perceptions of aspects of the care episode.
Observation and Reflection	Person focuses interactively on the outcomes of the action and the action itself (reflection –on-action), and/or reflects on the event during the event using their level of experience and expertise as the catalyst for thinking on one's feet and changing one's response to the situation minute-by-minute	The behaviour exhibited during the observational episodes indicated use of critical reflection both "on-action" and 'in-action" allowing highly responsive and flexible practice	Both reflection "in-action" and "on-action" were undertaken during the observational episodes. With no ED experience, it was difficult to reflect "in-action" at a high level and only after the episode was I able to consider aspects of care with a view to change.
Generalisation and Conceptualisation	In parallel with the level of experience is the ability of the person to transfer intellectualized reflective data into practice changes. The less experienced the person, the less likely they are to synthesise old and new data and apply new concepts to alternate situations.	The participants were clearly able to use their previous experiences with similar patients and generalise to others with a similar diagnosis. The were able to translate their knowledge and skills into complex conceptual frameworks of care	In the initial episodes of care, I found myself checking and rechecking data collection sheets to ensure I was gathering everything necessary for the research. I expected to see some commonalities, but I also was surprised by how similar the presentations were.
Active experimentation	The more experienced the person, the more capacity he/she has to synthesise, test, validate and internalize new knowledge. Validation and internalization show the highest level of reflection and can be measured as changes in behaviour and/or changes in the affect or perspective of the person. The experienced person will embrace active experimentation of their new knowledge and skills as a normal integral part of their work (Boud, Keogh, & Walker, 1985).	It became clear that the participant was making judgments regarding care needs and processes from the patient's initial appearance at the Triage desk. Care plans were put in place without evidence of overt planning for the individual case.	After approximately 10 episodes, I was less dependent on the data sheet and more immersed in the relationship between the participant and the patient. The "automatic" nature of the response was evident and this challenged my need to see problem solving and reflection-in-action occurring.

For me, personal reflection has also been an integral part of the study and has helped locate me within the project. Position-taking is a critical element in any research because it identifies one's reflections regarding their world-view and helps situate both the study and self. My personal view regarding the likely critical thinking and decision making processes of the participants was in conflict with that seen during the observational episodes. Using pragmatic and reflective frameworks allowed me to acknowledge and internalise the dilemma and form a platform for not only the development of the clinical guidelines, but the discussions that will occur with the ED nurses regarding the findings of the study.

As I hold a management position within the organisation, my personal reflections have reinforced that the approach taken within the study will have significant benefits organizationally as well as within the ED. By choosing a practical issue to research; by situating the research and myself within an environment where theory and practice are inextricably linked; by using both quantitative and qualitative approaches; and through the use of a strong reflective component within the study, the outcomes of the study will be transferable to any clinically-focused environment.

The pragmatic maxim that truth and meaning can be discovered by testing the proposition against its consequences is able to be shown not only because a pragmatic approach has been used, but also because reflection has been considered equally important to frame the study. I have tested the proposition that the nursing care of patients with marine stings can be enhanced by expanding the parameters of the scope of practice. Only through

reflection of both participants and researcher can it be shown that James question (1907): "(*W)hat difference* would it make if it is true?" can be answered. Without identification of what was missing from the care scenario, achieved during reflection, could key pieces of the puzzle be included overtly within the guidelines. Inclusion of critical thinking milestones into the guidelines not only reinforces a pragmatic philosophy, but also empowers nurses to work *with* the health team to improve patient outcomes. Empowerment of staff by others can be achieved through emancipatory reflection on the part of the manager (Taylor, 2000). As a manager, I hope to be able to fulfill this goal by raising the awareness of both participants and others in a non-judgmental way, and providing supportive guidelines that reduce the likelihood of oppressive regulation of scope of practice based on historical frameworks or power imbalances.

3.3 The researcher - my position:

In most scenarios, social and professional, there is a difference between the 'ideal' and the 'real' situation. One thing that has a significant impact on the behaviour of an individual in any given scenario is the culture of the environment in which the scenario takes place. An ED is a high-pressure environment where nurses are consistently exposed to the 'real' world of illness and adversity, and they are required to acknowledge and then move on from their biases to ensure appropriate and optimal care is provided.

When this study was first conceived, and with me not being an emergency nurse, inherent subjectivity was brought to the research. Subjectivity "is an integral part of your way of thinking that is conditioned by your educational background, discipline, philosophy, experience and skills" (Kumar, 1996, p. 6). I believed the practices and processes that

were to be observed would be affected by my presence and my clinical 'outsider' status. It was anticipated the participating nurses would behave differently, presenting the 'ideal ED nurse' clinical behaviour, and potentially "distort and misread" the verbal and non-verbal data presented (Fine, Weis, Weseen, & Wong, 2003). It was important for me to observe the nurses in a neutral and non-judgmental way to avoid atypical behaviours (Polit & Beck, 2004) that emanated from their perception of critical appraisal. As reflective practice underpins this study, it was significant for me to practice reflective techniques myself to develop insight into her own prejudices and preferences (DeMarco, Campbell, & Wuest, 1993; Horsfall, 1997). Knowing and understanding my own situatedness allowed insight into the realities of the participants in the study (King, 1994).

Any bias is an obstacle to nursing research and my ability to gather data. Assumptions made about the world of the ED nurse and what I could learn from the observational episodes and chart audits that were undertaken, could have contributed to epistemological bias due to the juxtaposition of quantitative and qualitative research processes. According to Polit and Beck (2004), quantitative researchers who present a hard line, purist view would interpret the situation and the use of both qualitative and quantitative techniques as irreconcilable, but I believe the two complement each other in terms of my ability to link the theoretical frameworks to data analysis and discussion.

Kumar (1966) believes the use of quantitative techniques brings objectivity to the data but Janesick (2000) disagrees believing this to be a myth, and she was critical of quantitative researchers as not being willing to accept that ideology can guide and/or shape a study. I believed that the initial reflections regarding my position contributed to a

balanced process within the study, and in conjunction with ongoing reflection and the use of mixed methods to enrich the data; any ethical dilemmas were dealt with fairly and quickly.

3.4 Design: Collective case study using a concurrent nested mixed methods approach:

3.4.1 Collective Case Study:

The term case study has a variety of meanings in both research and clinical context. A case study research approach enables a detailed examination of a unit within a real life and contemporary context to be undertaken using multiple data sources (Schneider, Elliott, G, LoBiondo-Wood & Haber, 2003). Early writings about case study identified it as an empirical methodology. Yin (2003) defined case study as:

"…an empirical enquiry that investigates a contemporary phenomenon within its real life context, when the boundaries between phenomenon and context are not clearly evident and in which multiple sources of evidence are used" (p. 13). The case may be a person, group, process, community, society or any other unit of social life and the approach is generally observational and contextual and according to Kumar (1996), it provides an opportunity for extensive analysis of many specific details often overlooked by other methods (p. 99).

In later work, Yin (2003) commented that case study is the preferred strategy for 'how' and 'why' questions, "when the investigator has little control over events and when the focus is on a contemporary phenomenon within the real life context" (p. 1). This suggests a primarily qualitative approach but can use a full range of data collection strategies such

as interviews, field notes, participant observation and document analysis. Case study therefore can use qualitative data to complement quantitative studies through differentiation, and can offer explanations to help in the interpretation of statistical relationships (Flick et al., 2004).

Defining the Case:

Creswell (2003) referred to Stake's (1995) definition of case studies as where "the researcher explores in depth a program, an event, an activity, a process of one or more individuals. The case(s) are bounded by time and activity, and researchers collect detailed information using a variety of data collection procedures over a sustained period of time" (p. 15). The aim of case study is the precise description or reconstruction of a case which is significant for the research question and the clarification of what else belongs to the case and what methodological approaches its reconstruction requires (Flick et al., 2004). This is consistent with the ontological position of pragmatism where the reality is that I test hypotheses and provide multiple perspectives on these. Epistemologically, both case study and pragmatism are practical ways of identifying "what works" to answer the research question.

Yin (1993) categorised research using three strategies. He identified that 'how' and 'why' questions were explanatory in nature and do lend themselves to the case study design. The two alternate strategies are very different. For example, exploratory research usually focuses on the 'what' question and descriptive research has as its premise the use of 'who' and 'where' to guide it. An added dimension was provided by Stake (as cited in Denzin and Lincoln, 2000) who described three types of case study.

Firstly, INTRINSIC case study if the study is undertaken primarily because the researcher wants a better understanding of this particular case. It does not represent other cases, nor does it illustrate a particular problem. The case is of interest in its own right.

Secondly, INSTRUMENTAL case study is chosen if a particular case is examined to provide insight into an issue or to draw a generalisation from an issue. The case itself is of secondary interest and the primary reason to use the method is to facilitate understanding of something else. The case may be typical of other cases or not.

Finally, COLLECTIVE case study is selected where the researcher may jointly study a number of cases in order to investigate a phenomenon, population or general condition. It is often seen as an extension of the instrumental case study method to several cases. Individual cases may or may not be known in advance to have common traits but they are selected because it is believed that understanding them will lead to better understanding, and possibly better theorising, about a larger group of cases (p. 437).

This study could realistically fit into any of the above categories due to the nature of the study; however I chose to situate it as a collective case study with a number of cases being physically observed within the ED and a large number of cases being assessed via chart auditing processes. As these patients exhibit a clearly defined and validated set of signs and symptoms, it is reasonable to extrapolate data analysis and discussion to a far wider group of cases of marine sting patients, and also improve the clinical care provided by nurses working in the ED of tropically situated care environments.

Irrespective of the methodology used in research, validity is still important and in the area of qualitative research, has to do with description and explanation and whether or not the explanation fits the description. In addition, qualitative researchers believe there is no one "correct" interpretation of the data and research. To assist, Lincoln and Guba (1985) suggested the researcher may cross check work using member checks and audit trails. The qualitative researcher needs to decide how to implement the member check (for example when and who of the participant group will read the field notes and transcripts), and implicit in the use of the member check is the assumption that the three key factors of validity, generalisability and reliability have been adhered to in the research (Janesick, 1994). This has created considerable controversy within the health and educational sectors because this trinity is the benchmark for quantitative research but is not always so easily applied within the qualitative framework including case study format.

Denmoyer (1990) refuted the traditional idea of researchers in education and human services who are concerned with individuals and the meaning on their lives having to show generalisability in research. If the researcher persists with meeting the traditional view, it limits the ability to reframe the role of social science in education or human services. He also believes that meeting the requirement of reliability in the traditional sense of replicability is pointless with case study methodology because the values of case study lies in its uniqueness and this view is supported by the history of case study research in anthropology, education and sociology (p. 394).

Yin (2003) contended that case study research is "remarkably hard" despite paradoxically, being traditionally labelled "soft" research. The richness of data obtained

through the adoption of multiple perspectives is a great strength of this method. Perhaps the simplest rule for researchers using case study as the methodology is identified by Stake (2000) "Place your best intellect into the thick of what is going on" (p. 445). He commented that the brain work is ostensibly observational but more basically, it is reflective. This was supported by Carr and Kemmis (1986) who stated:

"…in being ever reflective, the researcher is committed to pondering the impressions, deliberating recollections and records – but not necessarily following the conceptualisations of theorists, actors or audiences" (Denzin & Lincoln, 2000, p. 445).

In case study methodology local meanings, foreshadowed meanings and the consequential meanings attributed by the reader are important. It is the role of the case researcher to tease out these meanings using reflection. Qualitative case study research is characterised by the researcher spending extended time on site, personally in contact with activities and operations of the case, reflecting and revising meanings of what is going on. There were many opportunities for me to be "in the thick of things' during this study as described by Stake (2000).

3.4.2 Mixed methods:

Quantitative and qualitative methods of research are now widely accepted as complementary for studying and explaining human phenomena (Happ, DeVito Dabbs, Tate, Hricik, & Erlen, 2006). The term mixed methods is defined broadly by Tashakkori and Teddlie (2003) as "research designs using qualitative and quantitative data collection and analysis techniques in either parallel or sequential phases" (p. 11).

There is also discussion in the literature as to whether mixed methods is a methodology or indeed as the name suggests, a method (Creswell, 2003; Tashakkori & Teddlie, 1998); and Creswell and Plano Clark (2007) offered a definition for each as clarification. For the purposes of this study, I have elected to see the mixed methods approach as a *method* which "focuses on collecting, analysing, and mixing both quantitative and qualitative data in a single study" (Creswell & Plano Clark, 2007, p. 5) with the understanding that by using both forms of data, a clearer understanding of the research issue will occur. Whichever terminology is used, there is now a significant body of publications dedicated to mixed methods (Creswell & Plano Clark, 2007; Greene & Caracelli, 1997; Tashakkori & Teddlie, 1998) and with increasing discussion, the mixed methods approach will continue to evolve, providing further options to post-positivist researchers. The principal benefit of using a mixed methods approach is to provide a more complete picture and understanding of the issue being studies than if only one approach was used (Creswell & Plano Clark, 2007) .

This also allows the researcher to ask more complete questions within the research which could not be answered by one approach alone (Tashakkori & Teddlie, 1998). Researchers approach their research with a specific worldview which may be to the detriment of the research because the view of the world and the issue is seen through a rigid lens. If one uses mixed methods, the opportunity presents itself to the researcher to consider multiple worldviews (Creswell & Plano Clark, 2007).

Mixed methods also provide a mechanism whereby any weaknesses or biases inherent in a single approach (either qualitative or quantitative) are balanced by the other approach

(Creswell & Plano Clark, 2007; Flemming, 2007; Giddings & Grant, 2006). In nursing and related disciplines, there are many opportunities to use multiple sources of data and a mixed methods approach encourages these sources to be used. This has practical benefits and reflects the 'real' situation where people use multiple ways to solve problems and make decisions. Nurses particularly are comfortable with both numeric and textual forms so when undertaking or using research, both quantitative and qualitative research is understood and embraced.

There is criticism of the use of mixed methods including the fact that it takes time and resources to collect and analyse data and many researchers who elect to use mixed methods are not highly skilled in both arenas (Creswell & Plano Clark, 2007). With any mixed methods study, the researcher must be very familiar with both quantitative and qualitative forms and there is a risk that data in either area may lack integrity or completeness if it is not the most comfortable construct (Giddings & Grant, 2007). While it may be a positive influence for two researchers whose knowledge and skills are complimentary to work together to undertake research, this may also have its drawbacks. There are added costs of using multiple researchers especially regarding the time taken to complete the research, as well as the need for Is to work well together. Diversity can be an asset but also "make it difficult to foster effective communication among team members" (Creswell & Plano Clark, 2007, p. 181). In this study, the problems outlined above were overcome to some degree because I had supervisors with experience in each area.

3.4.3 Characteristics of this study:

The primary objective of this study is to develop clinical guidelines for use by experienced registered nurses within an Emergency Department. While the participant group met specific criteria for inclusion in the study, the target group for the clinical guidelines needs further explanation.

Using the definition of advanced practice nurse from the Glossary of Terms provided within the study, it provides flexibility for managers and decision makers to select appropriate nurses within the ED to participate in the use of the clinical guidelines. It would be anticipated however that any nurse considered for this opportunity would meet the following criteria:

- Have worked in the emergency environment for at least five years;
- Have experience in both triage and resuscitation areas of the department;
- Have undertaken, or be working towards, post graduate qualifications in emergency nursing; and
- Have shown through successful performance appraisal, an ongoing commitment to the development of professional practice and standards within the clinical environment.

In order to achieve the study outcomes, I was the primary instrument for data collection and analysis, which involved fieldwork to collect qualitative and quantitative data from observational episodes, chart audits and use of the Delphi technique to develop the clinical guidelines. As the clinical problem of marine sting injury provides a significant

amount of quantitative data that requires interpretation and analysis, a mixed methods approach seemed appropriate.

This study is essentially a concurrent nested design (Tashakkori & Teddlie, 1998) which has reflected the concurrent collection of both quantitative and qualitative data, with neither one being dominant in priority, however there is a predominant method that has guided the study. In this project the quantitative data is predominant and the qualitative data is nested, or embedded within (Figure 2 and Table 3).

Figure 3.2: **Concurrent nested design**

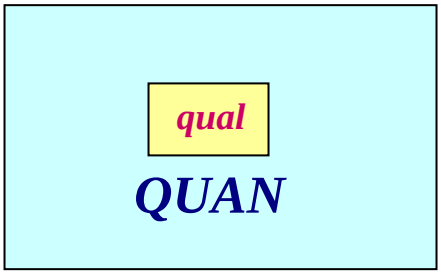


Table 3.3: Concurrent nested design

CRITERIA DESIGN TYPE	Implementation	Priority	Stage of Integration	Theoretical Perspective
Concurrent Nested	Concurrent collection of qualitative and quantitative data	Quantitative or qualitative	Analysis phase	May be present

Tashakkori and Teddlie (2003, pp. 224, 226)

In this study, the use of a concurrent nested design meant that I was able to use the seasonal aspects of a jellyfish 'season' to collect the observational data while continuing to collect data from the chart audit concurrently through the season as well as between seasons. This was particularly helpful for two reasons: Firstly, in following up patients

seen during the observational episodes. I was not able to remain with the patient and nurse throughout the entire ED experience due to shift changes for consenting nurses and duration of stay for the patient, but it allowed for follow up data collection to occur as close as possible to the event. Secondly, it provided optimum time between seasons to collect the remaining data from the large number of charts from the previous six seasons of marine stinger activity.

The concurrent nested design was chosen to allow description and exploration of aspects of a quantitative study that are unable to be quantified, and which will add depth and richness to the study by providing more fulsome information about the nursing expertise of the participants. Morse (1991) noted that the latter point was seen in a study where quantitative data is nested in a qualitative project however I believe that this is relevant to this study as well.

Tashakkori and Teddlie (2003) believe mixed methods designs have strengths that include simultaneous data collection, advantages of both quantitative and qualitative approaches and gaining perspectives from both types of data. The principal limitation of this method relates to the potential difficulty of transforming the data to allow analytic integration. Within this study, the data were analysed separately with the qualitative data used to support the decision-making that underpins the quantitative data collected by the participants, thus adding richness by adding a different level to the study.

3.4.4 Case study and mixed methods:

The purpose of this study is to look at the 'real world' within the environment of an ED, and improve the clinical situation for patients with a marine sting, and the staff caring for them. This is achieved through the combination of case study using a mixed methods

approach underpinned by a pragmatic reflective framework. The development of clinical guidelines is designed as a practical solution to an identified issue and complete research framework selected is an appropriate vehicle to achieve this goal.

The question posed is a real-life question (Gomm, Hammersley, & Foster, 2000), based in a constantly changing environment that has specifically explicit boundaries such as locale, culture and group processes (Stake, 2000) and where expert nurses provide clinical care to patients who have been stung by a marine animal. While the care provided is evidence-based, there is so little written about the nursing management of these patients, that this is seen to be an excellent reason for using case study (Ellis, 2003; Lauder, 1999; McDonnell, Lloyd-Jones, & Read, 2000). This study focused on the particular (Langford, 2001) and is a detailed intensive study of a particular contextual and bounded phenomenon (Luck, Jackson, & Usher, 2006).

While some designs require the use of specific methods to gather the data, case study is a flexible approach to nursing research which allows more variety of method to be used. Luck et al. (2006) suggests that "there is no agreed set of methods for case study. Rather, methods are selected in relation to the nature of the case and the research question" (p. 105). According to Yin (2003), case studies are very broadly considered quantitative or qualitative or both and this provides the opportunity to any researcher to consider a mixed methods approach. Mixed methods is the preferred design when quantitative or qualitative approaches are inadequate by themselves to address the research problem (Creswell & Plano Clark, 2007). This study uses a concurrent nested design which further supports the use of mixed methods to provide a more complete picture of both objective

and subjective data and thus tell the full story. With both numeric and textual data answering the research question, a mixed methods approach is most appropriate.

3.5 Data management:

3.5.1 Data collection methods:

Data were collected in a number of ways including:

- chart audits;
- observational episodes of the nurses within the ED providing care, and
- using the Delphi technique during the formulation of the clinical guidelines.

Data were collected using both observational techniques [over two summer seasons only - 2005/6 and 2006/7], and retrospective (2001 to 2004) and prospective (2005 to 2007) chart audits to collect data from patients seen between 2001 and 2007. The observational episodes documented the nursing care provided by the consenting ED nurses to patients with IS. Each episode lasted between two and six hours for each patient during which time I continued to monitor the nursing care provided as well as the reflections on practice of the nurses in the study. The chart audit and observational data were collected using a pre-designed data collection tool. (See Appendix D1).

3.5.1.1 Chart audits

Data collected from patient charts is classified as secondary data by Johnson and Turner (2003). This is data or information that has been recorded by someone other than the researcher and has been "left behind" (Johnson & Turner, 2003, p. 314). Secondary data

includes *personal documents* such as photographs, letters that have been recorded for personal purposes, *physical data* that has been left behind by people such as fingerprints or soil from articles of clothing, and *official documents* that are recorded by others on behalf of an organisation such as speeches, presentations and financial records (Johnson & Turner, 2003). In this study official documents, patient charts, were used to provide quantitative data initially collected and reported by nurses, doctors and allied health professionals to document the transition of each patient through a care episode. Lincoln and Guba (1985) describe audits in terms of confirmability where the data collected from the sources confirms the findings and interpretations of the researcher. Tashakkori and Teddlie (1998) called this process the "inferential consistency audit" (p. 93). Secondary data are often combined with other data collection methods to contribute to the robust nature of the research. In this study, the chart audit as a collection method has been combined with observational data and the use of the Delphi technique.

During the *chart audit*, data collected included the date and time of attendance at ED, time taken for the patient to be seen by the medical officer, symptomatology, baseline vital signs, administration of medications to control symptoms – type and amount, pain scores using validated tools, duration of stay in ED, outcome for the patient – either discharge or admission, and date of discharge from Cairns Base Hospital. Ethics approval was required (and gained) to access patient charts due to the identifiable nature of individual charts. Data extracted during the audit was however deemed non-identifiable data. According to the *National Statement on Ethical Conduct in Human Research* (NH&MRC, 2007), non-identifiable data is defined as that:

Which have never been labelled with individual identifiers or from which identifiers have been permanently removed, and by means of which no specific individual can be identified. A subset of non-identifiable data are those that can be linked with other data so it can be known that they are about the same data subject, although the person's identity remains unknown. (NH&MRC, 2007, chapter 3.2, p. 32).

3.5.1.2 Observational episodes

According to Creswell (2003), researchers spend considerable time in the natural setting gathering information and one commonly used way to undertake this is through observations where the researcher takes field notes (self-report data) that reflect behaviours and activities of people within the research site. The observer in the naturalistic setting may engage in the role along a continuum from non- participant (complete observer) to complete participant which will reflect the degree of engagement required between the researcher and those being observed.

A general criticism of self-report data is that it is likely to be affected by the person who is reporting, which Tashakkori and Teddlie (1998) called participant reactivity. This is where a person's reaction under pressure will reflect their feelings and beliefs (and biases) where direct questioning will not (p. 105). Observational methods according to these authors, attempt to "reduce these effects by directly observing behaviours rather than asking the individual about them" (p. 105).

As there are many types of data collection (Creswell, 2003; Denzin & Lincoln, 2000; Tashakkori & Teddlie, 2003), it is useful to use a standardized template in which to collect data. This can take the form of a matrix as described in Tashakkori and Teddlie

(2003, pp. 298, 299) or a tool specifically designed by the researcher for the study. The key issue for consideration when collecting data, is whether the data is valid and therefore considered well done and worthy of attention (Johnson & Turner, 2003).

During the *participant observational episodes* where I took the role of complete observer, field notes were collected on the behaviour and activities of each individual nurse at the research site. Separate field note tools that collected quantitative and qualitative data were designed and used by me (Appendices D1 and D2). I recorded the nursing care provided, the assessment, planning, implementation and evaluation of the condition of the client and the management of pain in a semi structured way. Notes were also collected about my perceptions and interpretations of the events seen during these episodes as well as asking the participants about the specific case using semi-structured questions. The questions asked of each participant included the following:

- What are your thoughts about the condition of this patient?
- How did the patient respond to your care?
- What issues if any were raised for you during the episode of care?
- What do you think you could improve with the care of this patient?

Following concurrent collection of the data over two summer seasons of jellyfish activity, data were placed into an Excel spreadsheet as both segregated and combined data and both quantitative and qualitative analysis was conducted.

Written consent was obtained from the participating nurses thus meeting the obligations contained within the *National Statement on Ethical Conduct in Human Research* (NH&MRC, 2007). The introduction to Chapter 2.2 (NH&MRC, 2007) states:

Respect for human beings involves giving due scope to people's capacity to make their own decisions. In the research context, this normally requires that participation be the result of a choice made by participants – commonly known as 'the requirement for consent'. This requirement has the following conditions: consent should be a voluntary choice, and should be based on sufficient information and adequate understanding of both the proposed research and the implications of participation in it (p. 22).

It was also important within the ethics approval process to identify the level of risk for the participating nurses. While it is acknowledged that my presence as the observer, and also my professional role as a manager within the organisation potentially increased the pressure on the participants, this study was deemed to carry a negligible level of risk for the participating nurses. This is defined in section 2.1.7 (NH&MRC, 2007) which states:

Research is 'negligible risk' where there is no foreseeable risk of harm or discomfort; and any foreseeable risk is no more than inconvenience. Where the risk, even if unlikely, is more than inconvenience, the research is not negligible risk (p. 21).

3.5.1.2.1 Recruitment and selection of participants for clinical (observational) phase

The nurses who were observed within the study were formally consented by me having met the criteria for inclusion. All were experienced ED nurses and were recruited following an informational campaign conducted within the ED by myself. Seventeen nurses consented to be observed during the two seasons and when patients were admitted

where no consenting nurses were available; the data from the episode of care was collected as part of the chart audit.

Prior to commencement of the research, potential participants (RN's) who meet the criteria:

- Had worked in the local hospital ED for greater than 24 months;
- Had experience in the triage and resuscitation areas of the department;
- Had experience in the department team leader role;
- Had completed the Marine Stings learning package within the CBH ED (See Appendix E);
- Willing to be involved in this project;

were identified.

I spoke to each of the identified RN's individually to describe the research and their role prior to sending a letter of invitation to participate and an information sheet outlining the project and its objectives (See Appendices F and G). A consent form for the observational episodes was provided with a request to return to me if the nurse agreed to participate in the study (See Appendix H).

3.5.1.3 Characteristics of patients*:*

Prior to the commencement of the study, a data collection tool (see Appendix D1) was developed to capture information about the patients including:

- social facts such as age, gender, and place of origin;

- facts related to the alleged sting such as where on the body was the sting, where geographically did the sting occur (beach or ocean), first aid management, mode of transport to hospital; and
- physiological data to establish baseline parameters such as temperature, pulse, respirations, blood pressure, oxygen saturation and pain levels.

During the data collection, some patients were excluded for the following reasons (see Table 4):

TABLE 3.4: **Exclusion criteria**

Number of patients excluded	
• Box-jellyfish stings	2
• Children < 16 years of age	36

Box Jellyfish stings: The stings from the Box jellyfish *Chironex fleckeri* are quite different from those that cause Irukandji syndrome. While both have systemic effects, the patients stung by the Box jellyfish are dramatically affected almost immediately by the venom and death may occur within a few minutes of tentacle contact (Currie & Jacups, 2005). Due to the emergency nature of the sting, a number of these patients die of cardio - respiratory arrest and if first aid management is available, antivenom is given. Therefore presentation and management is quite different to patients with Irukandji syndrome.

Children under 16 years of age: Children require very specific management due to their physical size and their unpredictable response to health challenges. In developing clinical guidelines for use by expert ED nurses, there is a practical reason to have guidelines that are applied generally across the patient cohort therefore children were excluded.

As this study was specifically about the nursing management of the patients with IS, consent from the patients was not formally required however all patients were informed of the study and provided with an informational brochure to keep. If a patient had been resistant to my presence, their wishes would have been accepted and the data from that episode was gathered during the chart audit process. It is acknowledged that people in acute pain may not be in the best situation to give informal consent to my observing the episode of care. It was therefore important for me to remind them of my presence after they had been administered pain relief and again ascertain their agreement.

Prior to the commencement of the 'season', I visited the ED and initiated discussion with the medical staff about the study. Notices with my contact details were displayed in visible areas within the ED and a daily visit ensured I was visible also. Consideration was given to the risk of the staff being too busy to take the time to contact me. To develop an alternative option, I contacted the Queensland Ambulance Service Communications Operations Unit to discuss whether any support could be provided by them in regard to being a contact point for the study. The QAS were very supportive and following discussions regarding required information, they created a specific SMS text message that would notify me as soon as a call to the QAS occurred.

Consequently, a dual notification system was established. If the patient attended the ED themselves, the nursing or medical staff of the ED would contact me to attend the ED. If the QAS were the initial contact point, the Communications Operations officers from the QAS would send a text message including information on the patient – age, gender and

where on the body is the sting; the geographic location of the sting and the mode of transport to the hospital. It was necessary to receive the age of the patient because children were excluded from the study, therefore I would not attend the ED. As the observational episodes within the study required me to be present from as early as possible after the arrival at hospital, this early warning system was critical to my ability to achieve this. As there was no other identifiable data provided by the text message system, ethical review by both the Health District HREC and James Cook University were happy with this additional mode of communication.

This dual process allowed for situations where the nursing staff were very busy and may not be able to contact me. The SMS text system used by the QAS communications centre worked extremely well and allowed I to arrive at the ED before the patient in many instances. At the commencement of each 'season', I contacted the QAS to confirm reestablishment of the notification system. While patient consent was not ethically required during the observational episodes because it was nursing care being observed, I did inform the patient of the reason for my presence and provided a brochure describing the research being conducted (See Appendix I).

3.5.1.4 Delphi technique

The name Delphi was initially used to characterise a research technique developed in the 1950's by the Rand Corporation (1994). According to Crisp, Pelletier, Duffield, Adams & Nagy (1997) the technique was valued for its potential in avoiding some of the problems associated with group dynamics in unstructured, direct interactions. The Delphi technique was intended for use as a tool of prediction or forecasting or a procedure

involving a panel of anonymous experts to whom information was given to obtain consensus on a particular topic (Rowe, Wright, & Bolger, 1991). Linstone and Turoff (1975) (cited in Crisp, Pelletier, Duffield, Adams and Nagy, 1997) defined the term as: "Delphi may be characterised as a method for structuring a group communication process so that the process is effective in allowing a group of individuals, as a whole, to deal with a complex problem"(p. 2).

Several different types of Delphi have been documented (Duffield, 1998; Rowe et al., 1991; Ruach, 1979; Woudenberg, 1991). The most well documented types of Delphi are:

- The **classical** Delphi is a forum for facts, where a number of unbiased experts use facts to come to a consensus in their predictions of future events. In this model, the panelists are anonymous.
- The **policy** Delphi is a forum for ideas where the panel is made up of lobbyists who interact with other members of the panel to define and differentiate views. This model does not assist in making a decision but acts as a tool for analysing policy issues.
- The **decision** Delphi is a forum for decisions which is different from both other forms of technique. In this model the panel members are not anonymous but their answers are. Secondly the outcome is prepared and supported decisions.

Within this project, a combination of classical and decision Delphi was used to evelop and refine the clinical guidelines for advanced practice ED nurses to provide improved management to patients diagnosed with IS. This was achieved through consensus, while having the experts unknown to each other. McKenna (1994) identifies that modification

of Delphi is well documented and legitimate due to the variation of application of the technique.

For the purposes of this research, the selection of the Delphi technique was based on the dearth of information available in the area of the research topic because according to Schneider et al. (2003), the Delphi technique "is a useful strategy for examining an area with a scant research base" (p. 35). The use of the technique for developing clinical guidelines and determining best practice standards is supported by Bowles (1999) and Mead and Moseley (2001). It is also the chosen method because the individuals with the expertise to assist in the development of the clinical guidelines have diverse backgrounds and experience as well as being geographically well distributed. To bring these people together would be expensive and quite time consuming.

When using the Delphi technique, the collected comments from panelists are collated and reordered for redistribution to the panel. This process continues until consensus is gained with authors suggesting the number of rounds being between 2 and 4 (Beech, 1997; Keeney, Hasson, & McKenna, 2001; McKenna, 1994; Proctor & Hunt, 1994). When I designs the survey questions or diagrams, Sumsion (1998) suggests that the number of rounds may be reduced. In this study, it was envisaged that a maximum of three rounds would be needed before consensus was achieved. While there was data generated in the area of reasoning, the topic for this project generated a more manageable volume of data than other qualitative research projects that also used the Delphi technique, for example Emden and Young's (1987) research which looked at the place of theory development in nursing or Sullivan and Brye's (1983) research in curriculum planning.

While this technique has been used many times within nursing research, a review by Bowles (1999) highlighted fewer publications using the Delphi technique. This appears to be because of the potential problems inherent in using the technique. Crisp, Pelletier, Duffield, Adams and Nagy (1999) identified the enormous potential for bias "associated with the interpretation and organisation of material to be feedback (sic) to participants" (p. 34). Crisp et al (1999) also found that achievement of consensus generated debate ranging from arguments that consensus obtained in Delphi studies is not related to genuine agreement to the notion that consensus is the major goal of the method (p. 117).

The other potential problems of using the Delphi technique include:

- The amount of information generated and the unwieldy nature of the information;
- The formation of the initial questions in round one;
- Bias introduced if the panel is not balanced; and
- The time taken to complete the exercise, especially with a large group. (Proctor & Hunt, 1994).

The potential problems were overcome by the significant planning prior to the first iteration of the guidelines being distributed to the experts. With consideration of data collected from both observational episodes and chart audit process, the individual components incorporated into the guidelines document were clear. Areas and questions for comment by the panel were included in the guidelines document so linkages were able to be made by the experts without effort. Given that the content area was narrow, consideration of balance within the panel was limited. However, there was certainly a

balance between nursing and medical staff as expert groups. As the panel ultimately consisted of 12 people, this was a small enough group to be quite manageable and while there were issues as mentioned above, the size of the group did not contribute to these issues.

The stages of the process include selection of the expert panel, formulation of the question(s); generation of statements, reduction and categorisation of statements, rating of the statements and analysis and iteration (Mead & Moseley, 2001). Crisp et al. (1997) quotes Rowe et al. (1991) in identifying that one of the principles underpinning the method is the belief that "*n* +1 heads is better than one head and that the potential sum of useful information available to the group will be at least as great as, and more usually greater than, that of any particular individual within that set" (p. 235). This would appear to be a reasonable point from which to start, but as Crisp et al. (1997) indicate, disagreement is also found around the decision about the value of *n*. According to several authors (Bowles, 1999; Hasson, Keeney, & McKenna, 2000; Pelletier et al., 2000; Williams & Webb, 1994), the size of the expert panel varies between 10 – 50 members although studies using several hundred panel members have been identified (Duffield, 1988). The decision regarding the size of the panel is based on the background of the panel members. In selecting the panelists there are two main choices: to use a smaller group from a homogenous background or a larger heterogeneous group (Duffield, 1988). As this area of study had a clear limit with limited potential for large numbers of experts, the acceptable size for the group was between 8 – 20 experts.

3.5.1.4.1 Recruitment of participants for Delphi phase

As preparation for the development of the clinical guidelines within this study, an expert panel of 15 people drawn from Medicine, Nursing, Emergency Services and Tropical Biology were initially invited to participate in the Delphi technique rounds. The team comprised Emergency Department physicians (3-4); senior emergency department nursing staff including Nurse Unit Manager, Nurse Educator and Senior Triage nurses; Regional Manager Staff Development Queensland Ambulance Service; Senior Lecturer School of Tropical Biology James Cook University; senior flight staff both Nursing and Medical, from the Royal Flying Doctor Service and Medical Officers external to the local ED with experience in marine animal envenomation. This was seen as a well balanced panel that would approach the topic from a number of angles where the outcome is the same – better quality health care for clients with a marine sting injury.

This group was contacted electronically using a 'blinded' format so that many of the potential bias issues were avoided. The experts were given comprehensive information regarding both the study and the Delphi technique and asked to notify their intention to participate by return email. They were informed the process used would include several rounds to gather data regarding the clinical guidelines tool and advised that prompting to reply by me may occur. During the conduction of the Delphi process of clinical guidelines development, participation by the expert panel continued to be voluntary.

The 'blinded' method enables panel members to participate when convenient for them, avoid pressure applied by other panel members due to the anonymity provided by this method, avoid the potential for bias which could occur if other panelists opinions are

known and promoted; have equal say as potentially more dominant panelists have (Duffield, 1998). Following the first communication via electronic means, 12 of the potential panel responded in the affirmative regarding interest in participation. A comprehensive explanation of both the Delphi technique and the specific study was provided as part of the electronic communication and the potential panelists were asked to confirm their willingness to participate following this information. It was also identified that the study did have approval from both organisational and academic Human Research Ethics Committees (See Appendices J1 and J2).

At the appropriate time following the initial design of the clinical guidelines, the draft document was electronically distributed to the final expert group of 12 as a blinded document. The expert panel was asked to respond within three weeks with comments about the following information:

- The general layout of the guidelines
- The flow of the process
- Answers from their varied perspectives on specific questions situated within the guidelines
- Comments regarding appropriateness and usefulness
- Any issues or information that was missing and not addressed within the guidelines.

Following the prescribed three weeks, a prompt email was sent to the panel with a further one week response time stipulated. At the end of this extended time, I had received three responses, all from panelists outside the organisation. Their feedback was very valuable

and was used when the first modification of the guidelines took place. Despite a further reminder no comments were received from the identified panelists. One panelist did email asking to be excused due to a recent traumatic event that left him unable to concentrate and he felt his capacity to provide good feedback was compromised.

I then consulted with academic supervisory staff and suggested a modification to the Delphi process. A subsequent process was employed that did not compromise the philosophy of the Delphi process and did indeed have a more helpful response. I sought to arrange individual meetings with the locally based "experts" and the day before the pre-arranged meeting, the draft guidelines was sent electronically to each person with covering reminder of how the Delphi process worked and what the purpose of their involvement was. I used a face-to-face meeting to ask for the same information as in the original request, and responses to the guidelines and critique provided was amalgamated with previously acquired comments to form the basis for amendments to the guidelines.

Once the second iteration was complete a further email communication was sent to the first round respondents and they were again asked to either feedback electronically or a meeting could be arranged. Those expert participants who had been individually interviewed and who had provided comment regarding the guidelines did respond to this round of email communication with helpful feedback. Of the remaining group, three further responses were received. In total, of the 12 experts in the group, 10 eventually provided feedback to enable the development of the guidelines to proceed.

The use of the Delphi technique is still seen as a sound option by I to contribute to the validity of the clinical guidelines. The difficulties as they occurred in this study were not anticipated by me and on reflection; the lack of commitment to the process by others is possibly due to the workloads of staff and their reticence to "take work home". While there was 'in-principle' support from specialist medical staff, their lack of response until face-to-face meetings were arranged did trouble me. Historically, (Australian Medical Association, 2005; Lumby, 2005;Unknown, Nursing Review 2005c, 2005d, 2005f) much has been written about the resistance of medical personnel to support the expansion of the scope of practice of nurses and this could have contributed to the reluctance.

The final form of the guidelines has been included with the thesis as a CD Rom attachment (See Appendix K) as well as inclusion of all separate components of the guidelines in hard copy (See Appendices B; K1 to K4).

3.6 Data analysis:

As a concurrent nested mixed methods study, both quantitative and qualitative data were collected during the study. When data are collected concurrently, the quantitative and qualitative components are independent of each other (Creswell & Plano Clark, 2007) although collected during the same timeframe. The data analysis that was applied separated the data and this allowed a variety of analysis methods to be applied.

During the observational episodes I made notations regarding points of clinical care, communication processes and departmental processes as well as gathering reflective data from the participating nurses and self. During each observational episode, information

was recorded on data collection tools designed prior to the commencement of the study (See Appendix D1 for quantitative field notes and Appendix D2 for qualitative field notes).

3.6.1 Quantitative data:

To maximize the description and usefulness of the data, both descriptive and inferential statistics were applied. Quantitative data from the study was analysed using SPSS version 16.0. Descriptive analysis techniques are used to synthesise and describe data and this is a critical step in the organisation of data to discern general trends that may be relevant.

Descriptive analysis techniques such as relevant means, medians and standard deviations for numerical data as well as frequency of occurrence for categorical data were applied within this study to:

- social facts such as age, gender, and place of origin; and
- facts related to the alleged sting such as where on the body was the sting, where geographically did the sting occur (beach or ocean), first aid management, and mode of transport to hospital.

Bivariate descriptive statistics such as cross-tabulation procedures were applied to variables such as gender and pain status; age and gender; narcotics required stratified by gender; and pain and body site.

Inferential statistics are useful for summarising data as well as providing a means for drawing conclusions about a population from the data. Inferential analysis such as chi-squared tests, t-tests, non-parametric Wilcoxon tests and regression analysis were used to

determine the relationships between specific variables. These techniques were used to analyse relationships between variables for example, physiological data such as pulse and blood pressure, and pain levels; relationships between pain extent and severity of pain; duration between admission to ED and being seen by doctor related to level of pain; and the relationship of pain to site of sting and transport modes. Pain was assessed in association with country of origin as well as the site of the sting and whether there were multiple stings were also compared with pain levels.

Quantitative research is intended to test a hypothesis to support or refute it and to do this successfully; numerical statistical analysis is applied to a large group within a population. The intent of the research linked to the literature lead to narrow, focused closed questions that relate variables to one another (Creswell & Plano Clark, 2007). Quantitative research is best suited to experimental or correlational studies and provides little flexibility within the research design. The control applied within quantitative research is to control bias however if the research purpose is descriptive or exploratory, quantitative research may not be appropriate.

Within this study a more complete picture was required than could be provided by quantitative methods alone. I was looking to understand the complete nature of the impact on the patient of Irukandji syndrome, about which little is known (Polit & Beck, 2006). Therefore using quantitative research techniques alone would have significantly narrowed the quality and worth of the study.

Sample size in quantitative research is extremely important (Polit & Beck, 2006). Appropriate sample size allows the researcher to conduct statistical analyses with

confidence; the sampling technique (e.g. a random sample) assures representativeness. The population of people affected by Irukandji syndrome is small worldwide. This study was by default representative, because it included all cases of IS that were registered within the ED during the study period. Therefore while only 186 patients made up the sample size, no larger number was available. To balance the sample size, qualitative data were collected as part of the mixed methods study.

3.6.2 *Qualitative data:*

The qualitative data collected in the study achieved two clear aims : firstly, it allowed the reflective component of the theoretical framework to be realized and incorporated; and, secondly, it offered both myself and the participants an avenue for identification of issues which have helped to unravel and explain the quantitative data collected. This material has therefore assisted with the analysis and interpretation of the data and supports the recommendations arising from the study. The qualitative data were collected at the termination of each episode of care from the 17 participating nurses using reflective techniques. Both the nurses and I reflected on the care provided and issues identified, and data were subsequently analysed using content analysis. During this process, three main themes were identified and guided the presentation of the qualitative findings.

While there is increasing recognition that both quantitative and qualitative research is important, many health professionals are more inclined towards quantitative research (Kumar, 1996). The broad intent of qualitative research is to gather information from participants and allow them to provide personal commentary and perspectives regarding the focus of the study. The questions asked and responses provided are often narrow in

scope but rich in depth, and a criticism of qualitative research is that the design is not rigidly set prior to the research commencing (Creswell, 2003). Because of the emergent nature of the qualitative research, questions and activities may change and be refined as data is collected (Creswell, 2003).

Within this study, semi-structured questions were developed prior to the commencement of the study, and the development of the qualitative themes also required the collation of some of the quantitative data prior to conception. There is no doubt that the qualitative data and results are significant in terms of how nurses practice and also how observers view the practice. Therefore while it is a smaller data component of this study, the qualitative arm is no less important and relevant and contributes greatly to the overall comprehensiveness of the study.

Table 4 provides a diagrammatic representation of the components of this study reflecting on the techniques used and a description of each component.

Table 3.5: Data collection and analysis

DATA TYPE	**TECHNIQUE OF ANALYSIS**	**DESCRIPTION**
Quantitative data	Descriptive Statistics	These attempt to describe systematically a situation, problem, phenomenon, service or program, or provide information about a situation or describes attitudes towards an issue. (Kumar, 1996)
	Inferential Statistics	These are statistical analyses which allow I to interpret data to reflect or support hypotheses. Inferential data relates variables or compares groups (Creswell, 2003), and helps to generalize to the target population (of ALL

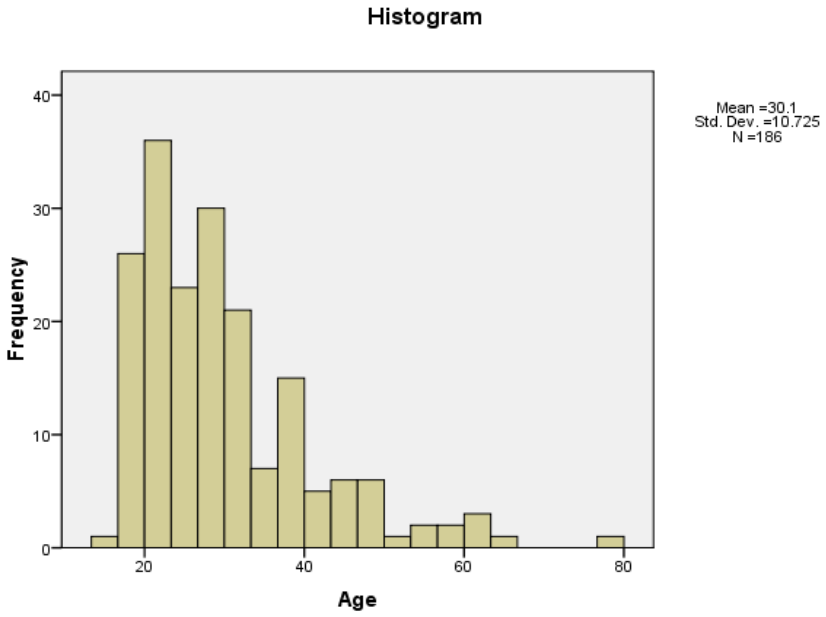
		patients with IS – e.g. including those in the future or in other countries).
Qualitative data	Content Analysis	Classical content analysis comprises techniques for reducing texts to a unit-by-variable matrix and analysing that matrix. I will apply a set of codes to the qualitative data to generate the matrix. Content analysis assumes that the codes of interest have already bed discovered and described. (Denzin & Lincoln, 2000)
	Delphi Technique	This technique is a method for structuring a group communication process so that the process is effective in allowing a group of individuals. As a whole, to deal with a complex problem. (Crisp et al., 1997)

The study was commenced in 2005 with observational data collected in the 2005 to 2006 and 2006 to 2007 seasons. Chart audits were undertaken gathering data from all patients identified in the Emergency Department Information System (EDIS) as having suffered marine sting or injury between 2001 and 2007.

Table 3.6: Study data overview

Data	Number	Comments
Total number of patients stung between January 2001 and June 2007	224	
Number of Observational Episodes between October 2005 and June 2007	23	
Number of Charts audited	163	
Number of patients excluded	38	Reason: Paediatric patients = 36 Box Jellyfish sting = 2
Gender of patients	Males = 109 Females = 77	
Point of Origin of patients	Local (Cairns) = 81 Tourists = 104 Not known = 1	
Ages of patients	Minimum = 16 Maximum = 77	Mean = 30.1 Median = 27.0

Figure 3.3: Age of patients in study



3.7 Ethical considerations:

Prior to commencement of the research project, approval was gained from Human Research Ethics Committees (HREC) of both Cairns Health Service District (CHSD) where the project was conducted, and James Cook University (JCU) (see Appendices J1 and J2). As a framework for submission, I used the National Health and Medical Research Council (NH&MRC) Guidelines (1999a). While Aboriginal and Torres Strait Islander people were not targeted within the project, the key principles within the NHMRC document "*Values and ethics: Guidelines for Ethical Conduct in Aboriginal and Torres Strait Islander Health Research*" (NH&MRC, 1999b) were also addressed.

Letter of invitation, participant information sheet and consent form were developed and approved by both organizational and academic HREC's (Appendices F,G,H). Formal consent from registered nurses was required for the observational episodes only. Prior to the observational section of the study, all registered nurses from the ED, who met the inclusion criteria, were invited to participate. If they agreed to participate they were asked to sign the consent form at this point. It was anticipated that between 5 and 15 episodes of care would be observed but the final number was actually 23 episodes. This did involve episodes provided by the same staff or different staff depending who was on duty when the patient was admitted to the department.

It was important to note that all participants in the research project, including the *experts* who were part of the Delphi panel, were free to consent and/or withdraw consent at any time and as mentioned in all the participant documentation, the anonymity or participants was guaranteed with all data being de-identified by me. All data will be stored by me in the School of Nursing archives for the minimum required period of 5 years from the date of publication. During the conduct of the project, the Ethics Committees of both CHSD and JCU were provided with annual progress reports as well as a final report at the completion of the project.

3.8 Limitations of theoretical framework and case study design:

Generalisation has always been an integral part of scientific research environment and allows I to make an inference or 'generalise' the results of empirical data collected about a sample to the broader population (Yin, 2003)). It is not desirable to use the same thesis when undertaking case study, because the cases are not 'sampling units' but an in-depth

investigation of a single unit, the case, enabling holistic and meaningful analysis (Luck et al., 2006). Cutcliffe and McKenna (1999) have identified that it is inappropriate to apply positivistic principles to interpretative research however researchers will continue to critique case study in the positivist frame.

According to Creswell (2003), because of the unique nature of qualitative research, and the fact that random sampling techniques are seldom used, generalisation is not really the goal of qualitative studies. From the ongoing discussions about the terminology, Lincoln and Guba (2000) (cited in Denzin & Lincoln, 2000) and Tashakkori and Teddlie (2003) proposed that the term 'transferability' could be used instead of generalisability as it is more in keeping with the idea that qualitative findings may have application to other situations. Stake (2000) described the need for case study researchers to describe the particular and that this search for particularity competes with the search for generalisability. In this collective study, the particularity of each case within can indeed be generalised to others due to the very nature of the stings.

In this study, the population under scrutiny is registered nurses caring for patients who have been stung by a marine jellyfish and who require pain relief for the sting. These nurses are expert ED nurses who have at least two years of ED practice behind them, and who have experience in triage, resuscitation and team leader roles within the ED environment, and who have completed specific study regarding the care of patients with this condition. As this is a clinical condition seen across the tropical waters of the world (Barnett, Durrheim, Speare, & Muller, 2005; de Pender et al., 2006; Grady & Burnett, 2003; Harrison, Leggat, Fenner, Durrheim, & Swinbourne, 2004; Macrokanis et al.,

2004) that has a validated set of signs and symptoms, and this study included ALL cases with IS occurring during the study period, I suggest that it is reasonable to generalise from the cases reviewed and included in this local study to other sites where IS may occur. In terms of the qualitative component of the study, and using Stake's (1995) concept of 'particularization' as a guide, the uniqueness of the case(s) and the context are as important to understanding as the quantitative data. Consequently, another (bigger or smaller) ED in another city with other nurses might have different experiences, but this study will provide valuable information about the particularity of the case(s) that will assist in contextualizing the care provision.

While the care for each patient may vary depending on the severity of the sting, the commonalities that can be generalised outweigh the specifics, which are attributed to the patient response to the sting, rather that the sting itself. Stake (2000) further supported this by saying that the collective case study is an instrumental case study extended to several cases. When instrumental case study is used, it provides insight into an issue or allows a generalisation to be drawn**.**

While criticisms of case study will continue, there is much support for case study as a bridge that "offers a flexible, pragmatic yet rigorous approach to research" (Luck et al., 2006, p. 108). In this study, the use of case study was a logical and appropriate way to proceed due to the very nature of the topic and the dearth of information and evidence of nursing management of these patients. Also, the site for the study is a regional centre that is small enough to be defined as a case and large enough to provide the capacity for the

research to be able to be generalised to the broader community within tropical environments where jellyfish envenomations occur.

3. 9 Summary:

This chapter has provided an overview of the theoretical frameworks and methods applied within the study. Both Pragmatism and Reflective Practice are integral to nursing practice at any level due to the very nature of the work of the profession. Patients who require health care are vulnerable and clearly their status is "real", so the nurses' ability to apply a pragmatic lens to each issue is epistemologically aligned to the practice of nursing. Nursing is a practical profession where nurses and their practice continually evolve. Nurses are encouraged to use evidence on which to base their practice and as an integral part of this process; reflection by each nurse is required. Reflecting on theory, practice, reflection-in-action, reflection-on-action and the types of thinking a nurse engages in during moments of practice exemplifies Schön's suggestion that when a practitioner researches their own practice they begin to engage is a spiraling process of continual self education – defamiliarising the familiar, making the ordinary extraordinary and finding new perspectives from which to see everyday activities.

Case study using a mixed methods approach is also described as logical methods to apply to the practical profession of nursing. The specific nature of the study population and the lack of available literature suggested that a mixed methods approach to the data collection would elicit as much information as possible. The chapter proceeded to describe the components of recruitment and selection of participant for the observational episodes and

the Delphi panel process as well as providing an overview of the Delphi technique generally.

The second half of the chapter describes the data analysis process used in the study with both descriptive and inferential statistics used to highlight aspects of the quantitative data within the study and both content analysis and the use of the Delphi technique to explain the qualitative data.

Finally, as in all research, consideration needs to be given to the ethical frameworks and limitations of the study. These were presented in this chapter and reinforce the importance to I of the safety of the patients and nurses within this study.

Chapter four (4) will present the findings from the Quantitative data gathered by me during both the observational episodes and the chart audits.

Chapter Four

Observational Findings – Quantitative Data

4.1 Introduction:

Choosing to live in a tropical environment creates challenges for both local health care providers and the people who live there. Having been a SCUBA diver for many years, I was interested in understanding more about the Irukandji jellyfish and its impact on the activities of the hospital where I work. The jellyfish season falls during the Australian spring and summer seasons between October and May, as this is when the summer rains create perfect conditions for the movement of jellyfish, flushed from their breeding grounds to the open ocean. As long holiday periods occur during this time, the number of people visiting the beaches and going swimming is greater than at other times of the year. However, media messages remind people to swim within the safety nets which are provided at most beaches. If jellyfish are found during the routine dredging of beaches and within protective swimming nets, the beaches are often closed for days at a time. This process of closure has only been occurring within the last three years within the local preventative and first aid program established by Lifesaving Queensland.

During the 2001 to 2002 seasons, 94 people were stung in and around Far North Queensland, many in clusters when multiple jellyfish were found at a particular site. This put enormous workload pressure on the staff in the Emergency Department (ED) of the Cairns Base Hospital (CBH) in Far North Queensland, Australia. At the time, the

minimum period of hospitalization for patients with stings was six hours and because of the potential for resulting cardiac sequelae, they required monitored beds, of which there are only seven within the ED, sited in the resuscitation and cardiac areas. I began to consider alternate ways to manage these patients to allow for more flexibility of care and to free up the high demand on monitored beds. It was relevant to begin by assessing the nursing management of the patients suffering Irukandji syndrome (IS) with a view to developing a framework that would assist both nurses and doctors manage their workloads as well as provide optimum care to the patients.

To capture relevant information, a tool was designed that could be used for both the observational and chart audit components of the study's data collection process. This chapter describes and analyses the quantitative data collected with this tool during data collection. The analysis of the collected data is both descriptive and inferential in nature and uses frequency analysis, chi-squared tests, t-tests, non-parametric Wilcoxon tests and regression analysis to examine the data related to the patients, the environment and the provision of care.

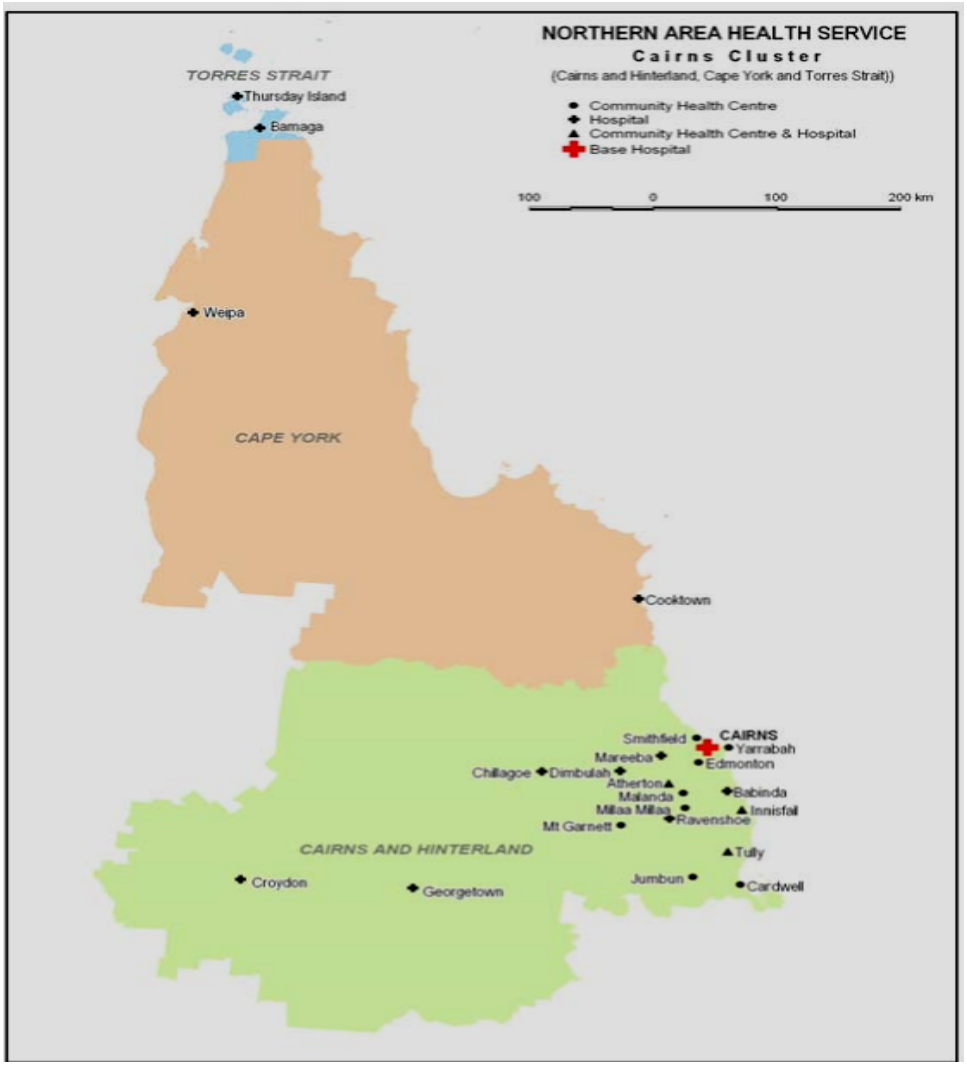
4.1.1 Setting:

Cairns is the largest regional centre in Far North Queensland with a population of approximately 160,000 people (Cairns Regional Council, 2008). The Cairns Base Hospital (CBH) is the only public hospital within Cairns City, with 336 inpatient beds. CBH has two catchments comprising the primary region of the Cairns and Hinterland Health Service District and the secondary region of the wider Far North Queensland Cluster area for which CBH is the major acute facility. The Cairns and Hinterland

Health Service District stretches from the Bloomfield River in the north, to Cardwell in the south and west to Croydon. This is an area of approximately 142,900 square kilometres. Cairns city is the regional centre for the district.

The Cape York Health Service District and the Torres Strait Health Service District together form the secondary catchment for CBH. The Cape York Health Service District comprises the Cape York Peninsula north to the Injinoo Aboriginal Council and south to the Bloomfield River covering an area of about 127,900 square kilometres. The Torres Strait and Northern Peninsula Area Health Service District covers the area north of the Cook Shire on the mainland and the islands situated in the Torres Strait north of the peninsula covering an area of 2438 square kilometres (Figure 1). With these large geographic areas identified, it means the ED may provide services for a geographic area totaling 273,238 square kilometres.

FIGURE 4.1: Map of entire area supported by Emergency Department, Cairns Base Hospital



The Cairns Health Service District population is projected to grow by 21 percent over the next twelve years. The fastest growing area in terms of actual inhabitants is the Cairns sub region with growth concentrated along the coastal strip in the southern corridor (Edmonton and Mount Peter). This is expected to continue over the next 12 years.

In the secondary catchment, the Cape York Health Service District has a projected growth of 8 percent from 2006 to 2021 whilst the Torres Strait Health Service District is projected to grow by 12 percent for the same period. (See Table 1)

TABLE 4.1: **Population trends for each region within the primary and secondary catchments of Cairns Base Hospital**

DISTRICT	2006[1]	2011[2]	2016	2021	GROWTH 2006 to 2021
Cairns & Hinterland	224,501	235,395	253,207	271,516	21%
Cape York	12,625	12,801	13,244	13,644	8%
Torres Strait	10,463	10,461	10,747	11,685	12%
TOTAL	247,589	258,657	277,198	296,845	20%

[1] 2006 Population sourced from Australian Bureau of Statistics 2006 Census Estimated Resident Population
[2] 2011, 2016 and 2021 population projections sourced from Population Information and Forecasting Unit medium series projections

The Emergency Department at Cairns Base Hospital is currently undergoing refurbishment with funding provided by the State Government to double the size of the service by 2010. Currently the ED has 28 beds distributed as follows:

- Three (3) Resuscitation beds – centrally monitored
- Four (4) Cardiac beds – centrally monitored
- Fourteen (14) acute and short stay beds for patients who stay within the unit for 23 hours or less
- Seven (7) specialty beds, for example – paediatric, acute secure mental health and small procedural. (A more comprehensive description of the unit is found in the following chapter).

The activity within the ED continues to increase; with comparative data of people treated in emergency departments across Queensland indicating Cairns is a busy unit.

Interestingly, when compared to one of the largest hospitals in Queensland, Princess Alexandra Hospital, which is almost twice the size of Cairns Base Hospital, the activity in Cairns is significant. (See Table 2)

TABLE 4.2: Hospital snapshot – March quarter 2008

HOSPITAL	HOSPITAL BED NUMBERS	PEOPLE TREATED IN EMERGENCY DEPT
Cairns Base Hospital	336	10,605
Nambour Hospital	352	8,647
Ipswich Hospital	360	11,953
Toowoomba Hospital	300	10,769
Princess Alexandra Hospital	750	11,828

Source: Monthly Activity Collection, Queensland Health MOHRI Report, 2008

4.1.2 Staffing within emergency department at Cairns Base Hospital

Following formal studies of projected community health needs and subsequent ED size projections, staffing will also be increased within the refurbished unit as indicated in Table 3.

TABLE 4.3: Staffing numbers in emergency department at Cairns Base Hospital

STAFF CATEGORY	CURRENT NUMBERS (FTE)	PROJECTED INCREASE IN NUMBERS	TOTAL
Nursing Staff	72.51	14.50	87.01
Medical Staff	28.00	14.00	42.00
Total	100.51	28.50	129.01

An ongoing issue however is the availability of nursing staff to meet the increased workload requirement. There is a national nursing shortage (AHWI, 2008; Dunn, 2004; Fitzgerald, 2007; Queensland Health, 2008) which is not likely to improve within the next five to ten years. One contributing factor to this situation is the aging workforce and in the local area included within this study (Cairns & Hinterland Health Service District), the average age of the nurse is 42 years and the percentage of nursing staff in the 45+ year age cohort is 54.4% (Bannan, 2008). While an aging workforce may not necessarily be a problem, the number of young people entering nursing is reducing thus causing a significant imbalance (Bannan, 2008). This data suggests the workload issues for nursing staff will continue so it is timely to consider the development of strategies that will streamline processes and share responsibility for clinical practices across members of the health team.

While the overarching aim of this study is to develop clinical guidelines for nurses to use to improve the clinical condition of the patients suffering from an Irukandji jellyfish sting, the questions used to guide this quantitative component of the study include:

- What are the characteristics of patients who have suffered an Irukandji sting, including length of stay, demographics of sting – where geographically did sting occur, where on body did sting occur; and
- Pain assessment including extent and severity of pain, duration between admission and being seen by doctor related to level of pain and the relationship of pain to site of sting and transport modes.

4.2 Data description:

The data were broadly categorised into four sections and analysis was undertaken within these as follows:

4.2.1 Geographic location where stings occurred:

The data were divided into two geographic zones:

- Stings occurring at the beaches along the coast both north and south of Cairns to a maximum distance of 30 kilometres; and
- Stings occurring close to off shore islands or further out to sea at the identified reef areas. This included Fitzroy Island which is approximately four kilometres from Cairns city and Green Island which is approximately 35 kilometres from Cairns city.

4.2.2 Pain:

Pain levels were assessed based on either medical notations or information provided directly from the patient to the staff. Because of the different assessment modalities, pain was categorized into three broad categories: mild, moderate and severe level of pain.

Pain was assessed in association with mode of transport, gender, country of origin and time from admission to being seen by a doctor. The site of the sting and whether there were multiple stings were also compared with pain levels.

4.2.3 Country of origin parameters:

Within the study, country of origin was defined as follows:

Australian: All people identifying Australia as their place of birth (including Aboriginal and Torres Strait Islander)

Asian: All people born in China, Japan, Indonesia, Malaysia, Korea and all neighbouring countries

European: All people who came from countries within the European Economic Community, including the United Kingdom and continental Europe

American: All people who identified as from North or South America

These definitions may be contentious but no people from countries that are outside these clusters were registered so no further descriptors were required.

4.2.4 Physiologic data collection:

Routinely all patients, on admission to the ED, have baseline data collected to assist with subsequent decision-making by medical and nursing staff. Patients with IS routinely had the following data collected:

- Temperature, Pulse, Blood Pressure, Respirations
- Oxygen saturation via non-invasive monitor
- Pain level assessment and notation of pain medication taken in relation to current complaint
- Previous history especially in regard to cardiac or respiratory conditions
- Chest X-ray, and
- Electrocardiograph.

Blood was also collected on admission to check specifically for the enzymes of Creatinine Kinase and cardiac Troponin. Troponin I is a contractile protein that is a sensitive and specific marker of myocardial cell injury. It rises in plasma between 2 and 8hrs following critical myocardial ischaemia or necrosis, and remains elevated for one

week (Huynh et al., 2003). The current reference range is <0.7 ug/L (Huynh et al., 2003). Cardiac muscle pain may be severe in some cases but in others, there is severe chest pain/cramps without the accompanying Troponin peak.

Baseline testing for Creatinine Kinase (CK) is not regarded as a reliable indicator for IS because the CK can be raised due to intense muscle spasm/cramps which are certainly experienced by the patient. Troponin I is a far more reliable indicator of myocardial injury/damage caused by the toxin. Because of the potential impact of the toxin on cardiac muscles it was important to review the pulse and blood pressure and assess if any relationships existed between variables such as age and pain level with the vital signs.

In considering the data it is important to identify the normal adult parameters for pulse and blood pressure (BP). The normal parameters were set as follows:

Pulse: 60 – 80 beats per minute;

Blood Pressure: 110/70 – 130/85 mmHg. (In the study, the systolic BP and the diastolic BP were separated for data analysis).

4.3 Results:

4.3.1 Demographic data:

4.3.1.1 Data collection and patient numbers

The results in this chapter refer to the sample of 186 patients who were admitted to the ED of Cairns Base Hospital in far north Queensland during the 2001 to 2007 jellyfish seasons with diagnosed IS. Table 4 shows how the data regarding the 186 patients was collected during the study.

TABLE 4.4: Number of patients/ charts included in study

DATA SET	NUMBER
Number of observational episodes	23
Number of Chart Audits	163
TOTAL	186

During the seasons studied, the numbers of people stung varied. Table 5 and Figure 2 show the breakdown of patient presentations each year between 2001 and 2007. The apparent increasing trend towards more tourists suffering from IS over the time of the study was statistically significant (p=0.012; Chi-square for trend).

TABLE 4.5: Numbers diagnosed with Irukandji syndrome between 2001 and 2007.

YEAR	LOCALS	TOURISTS	TOTAL
2001	23 (52.3%)	21 (47.7%)	**44**
2002	23 (46.0%)	27 (54.0%)	**50**
2003	11 (61.1%)	7 (38.9%)	**19***
2004	7 (43.8%)	9 (56.3%)	**16**
2005	6 (42.9%)	8 (57.1%)	**14**
2006	5 (26.3%)	14 (73.7%)	**19**
2007	7 (29.2%)	17 (70.8%)	**24**
Total	**82 (44.1%)**	**103 (55.9%)**	**186**

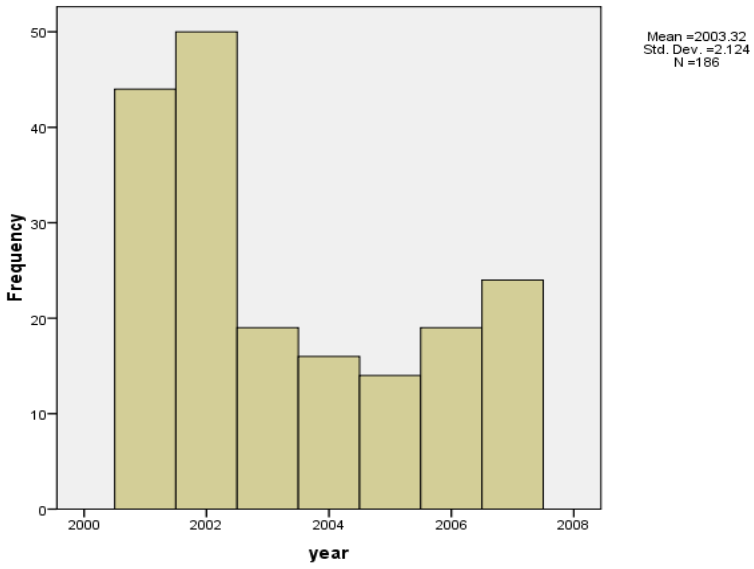
*Origin of one person unknown.

TABLE 4.6: Discharges from emergency department

	FREQUENCY	PERCENT
Yes	171	91.9
No	15	8.1
Total	186	100.0

Not all patients were discharged directly from the ED following treatment for IS. As seen in Table 6, fifteen patients (8.1%) required longer hospitalisation and were transferred from ED to either CBH clinical areas or to The Townsville Hospital (one patient only).

FIGURE 4.2: Number of patients with Irukandji syndrome seen annually



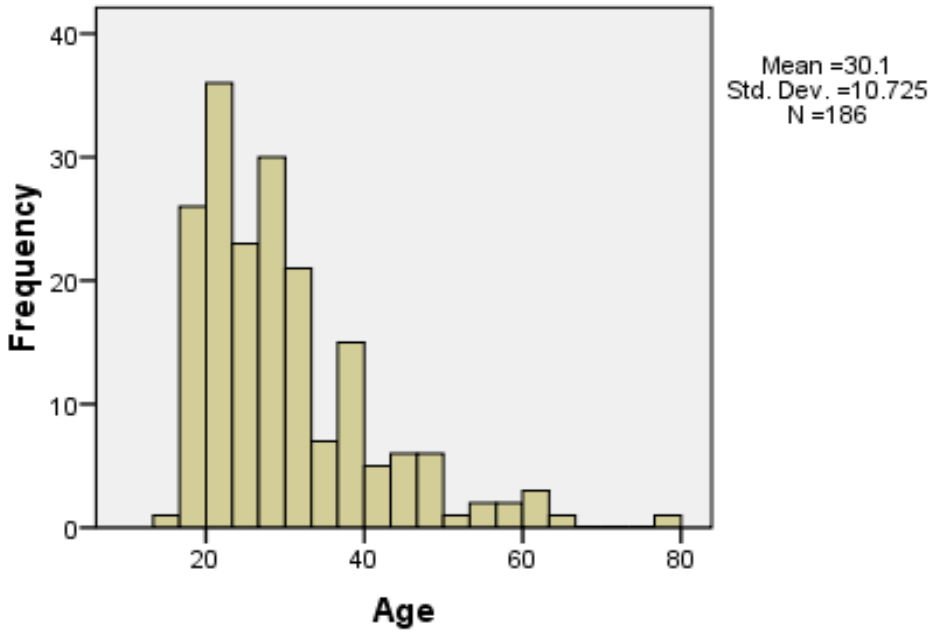
4.3.1.2 Gender and age

Of the sample 58.6% were male (n=186), outnumbering women in all age groups except the 26 to 30 years group where the division was equal across gender. The ages ranged from 16 to 80 with the highest frequency of IS occurring in the age groups 21-25 (26.3%), 31-40 (23.1%) and 26-30 (21.5%) respectively. The median age of patients was 27.0 years (interquartile range = [23, 34.25]; range from 16 to 77 years of age). It is noted that patients under 16 years were excluded from the study. The age group with greatest representation was the 21 to 25 year olds (26.3%) and within that grouping, males were predominant (53.1%) (Table 7 and Figure 3). There was no available data to suggest this was consistent with current tourism trends for age and gender.

TABLE 4.7: Age of patients diagnosed with Irukandji syndrome

AGE RANGE	FREQUENCY	PERCENT (%)	MALE	PERCENT OF MEN IN AGE CATEGORY (%)	FEMALE	PERCENT OF WOMEN IN AGE CATEGORY (%)
16 – 20	27	14.5	16	59.3	11	40.7
21 – 25	49	26.3	26	53.1	23	46.9
26 – 30	40	21.5	20	50.0	20	50.0
31 – 40	43	23.1	28	65.1	15	34.9
41 – 50	17	9.1	12	70.6	5	29.4
51 – 60	5	2.7	4	80.0	1	20.0
61 - 80	5	2.7	3	60.0	2	40.0

FIGURE 4.3: Age histogram



4.3.1.3 Country of origin

The data shows that 55.9% (n=104) of those stung were tourists who resided outside a 30 kilometre radius of Cairns city, and 44.1% (n=82) were local people (Table 8).

TABLE 4.8: **Country of origin**

COUNTRY OF ORIGIN	FREQUENCY	PERCENT
Local	82	44.1
Tourist	104	55.9
Total	186	100.0

4.3.1.4 Geographic location of person when stung

Initial analysis was undertaken to identify whether the patients were stung at the beach or the reef which included the islands offshore from Cairns (Table 9).

TABLE 4.9: Geographic location of person when stung

YEAR	STINGS OCCURRING AT BEACH	PERCENT OF STINGS WITHIN YEAR	STINGS OCCURRNG AT REEF	PERCENT OF STINGS WITHIN YEAR
2001	39	88.6	5	11.4
2002	32	64.0	18	36.0
2003	11	57.9	8	42.1
2004	8	61.5	5	38.5
2005	7	50.0	7	50.0
2006	6	31.6	13	68.4
2007	6	25.0	18	75.0
Total	109		77	

There was a significant time trend towards more stings occurring at the reef ($p<0.001$). Under further analysis, information was revealed regarding whether people who were stung at the beach were stung inside or outside stinger-resistant nets. Of the 109 people stung at the beach, 64 (58.7%) were outside the nets when stung (Table 10).

TABLE 4.10: **Stinger net status**

YEAR	STUNG AT BEACH	NETS IN	PERCENT INSIDE NETS WITHIN YEAR	NETS OUT	PERCENT OUTSIDE NETS WITHIN YEAR
2001	39	21	53.9	18	46.1
2002	32	9	28.1	23	71.9
2003	11	3	27.3	8	72.7
2004	8	3	37.5	5	62.5
2005	7	3	42.9	4	57.1
2006	6	4	66.7	2	33.3
2007	6	2	33.3	4	66.7
Total	109	45	41.3	64	58.7

4.3.1.5 Time of day stings occurred

According to the admission data the largest number of presentations (71.5%) occurred between 1200 and 1900 hours (Table 11). The data also shows that the time from sting to worsening of the condition is predominantly between 11 to 30 minutes (64.5%) (Table 12, Figure 5)

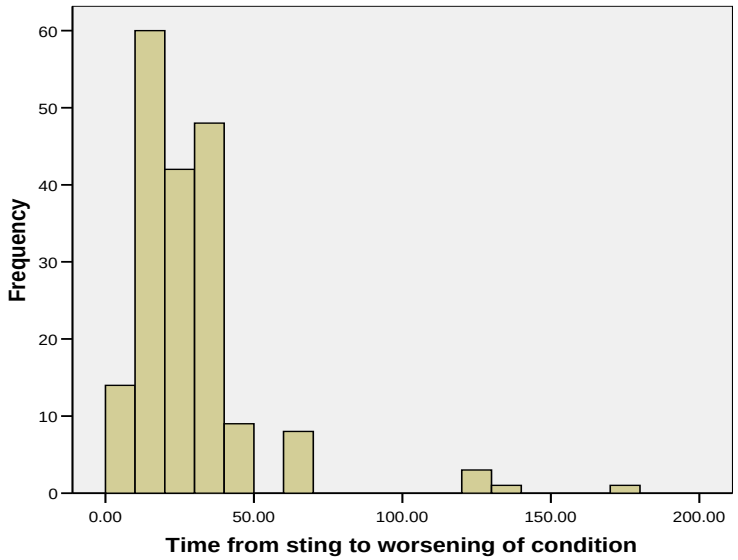
TABLE 4.11: Time of day of admission

TIME OF DAY	NUMBER OF PATIENTS	PERCENT OF WHOLE GROUP	TIME OF DAY	NUMBER OF PATIENTS	PERCENT OF WHOLE GROUP
0001 – 0100	5	2.69	1201 – 1300	13	6.99
0101 – 0200	2	1.08	1301 – 1400	19	10.2
0201 – 0300	0	00.0	1401 – 1500	21	11.3
0301 – 0400	2	1.08	1501 – 1600	16	8.60
0401 – 0500	1	0.54	1601 – 1700	26	14.0
0501 – 0600	0	00.0	1701 – 1800	20	10.8
0601 – 0700	0	00.0	1801 – 1900	18	9.68
0701 – 0800	0	00.0	1901 – 2000	4	2.15
0801 – 0900	3	1.61	2001 – 2100	8	4.30
0901 – 1000	5	2.69	2101 – 2200	6	3.22
1001 – 1100	3	1.61	2201 – 2300	5	2.69
1101 - 1200	7	3.76	2301 - 2400	2	1.08
TOTAL	28	15.0	**TOTAL**	158	85.0

TABLE 4.12: Time to worsening of condition

TIME (IN MINUTES)	NUMBER OF PATIENTS	PERCENT OF WHOLE GROUP
0 – 5	14	7.53
6 – 10	26	14.0
11 – 20	70	37.6
21 – 30	50	26.9
31 – 40	8	4.30
41 – 60	13	6.99
61 – 120	3	1.61
121 – 180	2	1.08
TOTAL	186	100.0

FIGURE 4.4: Histogram of time to worsening of condition



The above data shows the time from being stung to a worsening of condition:

The median time was 20 minutes (Inter-quartile range = [15, 30]; range from 1 to 180 minutes)

4.3.2 Pain, Irukandji syndrome and the patient:

4.3.2.1 Pain and time waiting to see doctor

While the majority of patients (n=146; 78.5%) were seen within 20 minutes of arrival, 16 patients (8.6%) waited longer than 40 minutes with four of these (25%) waiting longer than 60 minutes to have their pain assessed by a doctor and pain relief ordered (See Table 13). Eighty-nine patients (47.85%) were identified as having mild pain, sixty-two (33.3%) with moderate pain and thirty-five (18.8%) with severe pain. There was a significant relationship between the time until a patient was seen by the doctor and the level of pain (p=0.041). The most severe cases took a median of 15 minutes to be seen by the doctor, while moderate cases took about 6 minutes and mild cases a median time of 10 minutes to be seen by the doctor.

TABLE 4.13: Relationship between level of pain and time between entering ED and seeing a doctor

TIME SEEN (IN MINUTES)	PAIN (% OF TIME CATEGORY)			TOTAL (OF WHOLE GROUP)
	MILD	MODERATE	SEVERE	
0 - 5	31 (43.1)	27 (37.5)	14 (19.4)	72 (38.71)
6 – 10	13 (56.5)	4 (17.4)	6 (26.1)	23 (12.4)
11 – 20	25 (49.0)	17 (33.3)	9 (16.6)	51 (27.42)
21 – 30	8 (50.0)	4 (25.0)	4 (25.0)	16 (8.6)
31 – 40	3 (37.5)	4 (50.0)	1 (12.5)	8 (4.3)
41 – 60	5 (41.7)	6 (50.0)	1 (8.3)	12 (6.5)
61 – 90	3 (100.0)	0 (0.0)	0 (0.0)	3 (1.61)
91 - 180	1 (100.0)	0 (0.0)	0 (0.0)	1 (0.54)
TOTAL	89 (47.85)	62 (33.3)	35 (18.8)	186 (100.0)

4.3.2.2 Pain and transport:

Table 14 identifies the numbers of patients and the mode of transport used to get to hospital for the complete study cohort (n=186). The most commonly used mode overall was the QAS land ambulance (n=75, 40.3%).

TABLE 4.14: Mode of transport to hospital

TRANSPORT MODE	FREQUENCY	PERCENT (%)
Self	64	34.4
QAS (Land Ambulance)	75	40.3
EMQ (Helicopter)	46	24.7
RFDS (Fixed wing aircraft)	1	0.5
TOTAL	186	100

TABLE 4.15a: Mild pain and mode of transport per year of study

		2001	2002	2003	2004	2005	2006	2007	TOTAL(% OF MODE)
Transport Mode	Self	12	11	2	1	1	2	2	31 (34.8)
	QAS	9	9	6	3	3	1	9	40 (44.9)
	EMQ	0	3	2	2	1	6	3	17 (19.1)
	RFDS	0	0	0	0	0	1	0	1 (1.1)
	Total (% of year)	21 (23.6)	23 (25.8)	10 (11.2)	6 (6.7)	5 (5.6)	10 (11.2)	14 15.7)	**89**

Within the mild pain group, the majority of patients attended the hospital either by private vehicle or by QAS ambulance. Although the number of patients who were transported by aero-medical retrieval was not the highest within this pain group, 17 (19.1%) is a high number when affiliated with mild pain levels.

TABLE 4.15b: Moderate pain and mode of transport per year of study

		2001	2002	2003	2004	2005	2006	2007	TOTAL(% OF MODE)
Transport Mode	Self	8	6	3	2	1	0	2	22 (34.9)
	QAS	8	5	2	3	3	0	2	23 (36.5)
	EMQ	2	5	1	2	3	2	3	18 (28.6)
	RFDS	0	0	0	0	0	0	0	0 (0.0)
	Total (% of year)	18 (28.6)	16 (25.4)	6 (9.5)	7 (1.1)	7 (1.1)	2 (3.2)	7 (1.1)	**63**

Within this pain group, both 2001 and 2002 registered high percentages (28.6% and 25.4% respectively) across the combined transport modes. As with the mild pain group, most presentations were by private vehicle (34.9%) or QAS ambulance (36.5%).

TABLE 4.15c: Severe pain and mode of transport per year of study

		2001	2002	2003	2004	2005	2006	2007	TOTAL(% OF MODE)
Transport Mode	Self	3	5	1	0	1	1	0	11 (32.35)
	QAS	1	3	0	2	1	3	2	12 (35.3)
	EMQ	1	3	2	1	0	3	1	11 (32.35)
	RFDS	0	0	0	0	0	0	0	0 (0.0)
	Total (% of year)	5 (14.7)	11 (32.35)	3 (8.8)	3 (8.8)	2 (5.9)	7 (20.6)	3 (8.8)	**34**

Within the severe pain group, the transport mode was fairly evenly distributed. The 2002 cohort registered the largest group with severe pain, but this was also the largest group of stings within the study.

4.3.2.3 Pain and gender

According to the data in Table 16, both males and females were most likely to report mild pain levels. Of the total male group (n = 109), 51 patients (46.8%) reported mild pain, and in the female group (n = 77), 38 patients (49.4%) reported mild pain. This number reflected 57.3% and 42.7% respectively for percentage within the pain level. A Chi – square test for independence indicated no significant association between gender and pain levels (p =0.904) (See Table 16).

TABLE 4.16: Relationship of pain level to gender

			PAIN			
			MILD	MODERATE	SEVERE	TOTAL
GENDER	Male	Number	51	37	21	109
		% within Gender	46.8%	33.9%	19.3%	100.0%
		% within Pain level	57.3%	58.7%	61.8%	58.6%
	Female	Number	38	26	13	77
		% within Gender	49.4%	33.8%	16.9%	100.0%
		% within Pain level	42.7%	41.3%	38.2%	41.4%
Total		Number	89	63	34	186
		% within Gender	47.8%	33.9%	18.3%	100.0%
		% within Pain level	100.0%	100.0%	100.0%	100.0%

4.3.2.4 Pain and body site of sting

Within the complete study cohort, the most common sites for stings were upper limbs (n=60 people, 32.3%) and lower limbs (n=50, 26.9%). The majority of the complete cohort suffered mild pain irrespective of the site (n=89, 47.8%) however upper limb stings were responsible for the highest percentages for both moderate and severe pain levels (n=17, 27.0%; n=12, 35.3% respectively within pain level). A Chi-square test for independence indicated a significant association between body site and pain levels (p = 0.040)(See Table 17).

TABLE 4.17: Pain and body site of sting

			BODY SITE				
			HEAD/ FACE /NECK	TORSO	UPPER LIMBS	LOWER LIMBS	TOTAL
PAIN	Mild	Count	10	16	31	32	89
	(0-3)	% within Pain	11.2%	18.0%	34.8%	36.0%	100.0%
		% within Site	27.8%	40.0%	51.7%	65.3%	47.8%
	Moderate	Count	17	16	17	13	63
	(4-7)	% within Pain	27.0%	25.4%	27.0%	20.6%	100.0%
		% within Site	47.2%	40.0%	28.3%	26.5%	33.9%
	Severe	Count	9	8	12	5	34
	(8-10)	% within Pain	26.5%	23.5%	35.3%	14.7%	100.0%
		% within Site	25.0%	20.0%	20.0%	10.0%	18.3%
Total		Count	36	40	60	50	186
		% within Pain	19.4%	21.5%	32.3%	26.9%	100.0%
		% within Site	100.0%	100.0%	100.0%	100.0%	100.0%

4.3.2.5 Narcotic pain relief

In terms of the intravenous narcotics used, three principal drugs were administered to the patients studied. Fentanyl and Morphine were the drugs of choice with occasional use of Pethidine. Of the 186 patients, 106 (57.0%) received intravenous Fentanyl with the highest dosage being 2,400 micrograms delivered to one patient over 24 hours. Twenty-nine patients (15.6%) were given Morphine with a maximum dosage of 40 milligrams over 24 hours to a single patient, and four patients (2.2%) received Pethidine with a maximum dosage of 200 milligrams over 24 hours to a single patient.

TABLE 4.18: Narcotics required stratified by gender

	DOSAGE OF NARCOTICS REQUIRED			
	Median	Range	Mean	Std. Deviation
Male	50.00	2400.00	195.77	336.16
Female	100.00	1800.00	149.60	244.90
Total	72.500	2400.00	176.66	301.87

The mean dosage of intravenous narcotics was 195.77 (SD 336.16) in male and 149.60 (SD 244.90) in female patients. As the standard deviation was very large, further testing using an unpaired Wilcoxon test was conducted to determine if any significant relationship exists between gender and intravenous narcotics. Table 18 shows that the median dosage required by males was 50% less than that required by females in the study although the range was higher for males than females. There was no statistically

significant relationship between gender and the dosage of narcotics required (p=0.739) when median values were compared using a non-parametric Wilcoxon test.

4.3.3 Country of origin:

As tourists are regularly affected by IS it was important to see if there was any relationship between the country of origin and the pain suffered by the patient.

Table 19 shows the frequency of each group.

TABLE 4.19: Country of origin

	FREQUENCY	PERCENT
1 Australian	108	58.1
2 Asian	24	12.9
3 European	47	25.3
4 American	7	3.8
Total	186	100.0

The specific relationship that was assessed was country of origin and time in hospital (See Table 20). Cross tabulation between country of origin and gender was also undertaken (Table 21).

4.3.3.1 Country of origin and time in hospital

In analysing country of origin compared to time spent in hospital, the following data were extracted. In describing the data, it appears that the mean time spent in ED by Asian patients was approximately eight hours longer than the time spent by Australian patients. The minimum time spent in hospital across the complete study cohort was 29 minutes and the maximum time 166 hours.

TABLE 4.20: **Country of origin related to time in hospital**

	COUNTRY OF ORIGIN	N	MEAN	MEDIAN
Time in hospital in hours and minutes	1 Australian	108	13.95	10.65
	2 Asian	24	21.03	11.85
	3 European	47	12.50	9.40
	4 American	7	14.10	5.08

A Kruskal-Wallis Test was conducted to explore the impact of country of origin on time spent in hospital in hours and minutes. Subjects were divided into four groups according to their identified place of birth. While there appeared to be a significant mean difference between group two and the other three groups, there was no statistically significant differences between median scores of the dependent variable (p=0.731).

4.3.3.2 Country of origin and gender

Table 21 reflects the gender breakdown within cultural groups. The predominant group within the male cohort by a considerable margin was Australian. While Australian women also were more prevalent, European women were also a large group within this cohort (p=0.017). Overall, 108 (58.1%) were Australian.

TABLE 4.21: Country of origin and gender

			COUNTRY OF ORIGIN				
			AUSTRALIAN	ASIAN	EUROPEAN	AMERICAN	TOTAL
GENDER	Male	Number	73	13	21	2	109
		% within Gender	67.0%	11.9%	19.3%	1.8%	100.0%
		% within Ethnic background	67.6%	54.2%	44.7%	28.6%	58.6%
	Female	Number	35	11	26	5	77
		% within Gender	45.5%	14.3%	33.8%	6.5%	100.0%
		% within Ethnic background	32.4%	45.8%	55.3%	71.4%	41.4%
Total		Number	108	24	47	7	186
		% within Gender	58.1%	12.9%	25.3%	3.8%	100.0%
		% within Ethnic background	100.0%	100.0%	100.0%	100.0%	100.0%

4.3.4 Physiological data:

Table 22 shows the mean, standard deviation and range of the minimum and maximum recordings for both pulse and blood pressure across the cohort.

TABLE 4.22: Measures of central tendency for pulse and blood pressure

	PULSE (MIN)	PULSE (MAX)	SYSTOLIC BP (MIN)	SYSTOLIC BP (MAX)	DIASTOLIC BP (MIN)	DIASTOLIC BP (MAX)
N	186	186	186	186	186	186
Mean	67.34	88.94	117.59	142.04	67.33	82.56
Standard deviation	13.53	17.46	18.40	21.39	13.86	14.53
Range	80	95	120	116	103	117
Min – Max	40 – 142 bpm		85 – 216 mmHg		35 – 125 mmHg	

Thirty-three patients were hypertensive during their hospitalisation and of these, nineteen (58%) also had an elevated pulse rate or tachycardia. The remaining fourteen patients had hypertension but their pulse rate remained within normal limits. There were fifty-two patients (28.0%) whose pulse was elevated. Nineteen of these (36.5%) also had hypertension during the hospitalisation while the remainder (n=33; 63.5%) had normal blood pressure recordings taken.

Interestingly fourteen of the nineteen patients who had both hypertension and tachycardia (74%) were males and five (26%) were female. Analysis of the country of origin for the nineteen affected showed that nine were Australian (47.4%), two were Asian (10.5%), six were from Europe (31.6%) and two were from America (10.5%).

TABLE 4.23: Level of pain and physiological measurements

		N	MEAN	STANDARD DEVIATION	MINIMUM	MAXIMUM
PULSE MAX	**Mild**	89	81.61	15.18	47	120
	Mod	63	94.56	14.80	66	142
	Severe	34	97.74	19.93	60	142
	Total	186	88.94	17.46	47	142
SYSTOLIC MAX	**Mild**	89	134.60	18.04	105	210
	Mod	63	149.33	22.44	108	216
	Severe	34	148.00	21.49	100	205
	Total	186	142.04	21.39	100	216
DIASTOLIC MAX	**Mild**	89	78.55	13.88	50	125
	Mod	63	86.14	14.56	50	122
	Severe	34	86.41	13.74	60	115
	Total	186	82.56	14.53	50	125

A one-way between-groups analysis of variance was conducted to explore the impact of pain level on specific vital signs of Pulse (maximum), Systolic Blood Pressure (maximum) and Diastolic Blood Pressure (maximum). There were statistically significant differences between patients with mild, moderate and severe levels of pain with respect to their maximal pulse ($p<0.001$), their systolic ($p<0.001$), and their diastolic ($P=0.001$) blood pressure. Post hoc comparisons showed that differences between mild and moderate, and between mild and severe level of pain were all statistically significant ($p<0.05$, respectively); however not between moderate and severe.

4.3.5 Other relational data:

While cardiac Troponin levels are important in the assessment and management of patients diagnosed with IS 150 patients of the complete study cohort (80.6%) did not have a detectable Troponin level. Of the remaining 36 patients, 16 patients (44.4%) had a Troponin level <2.5ug/L; 13 patients (36.1%) had a Troponin level between 5.1 and 10.0ug/L and seven patients (19.4%) had extremely high levels between 10.0 and 41.3ug/L. The two patients with the highest recorded levels exhibited the following picture:

Patient # 18: Male, 31 years old; Stung at beach outside nets on upper arm; highest recorded Blood Pressure 160/90; pain recorded as Moderate; remained in hospital for 121.15 hours.

Patient # 112: Male, 41 years old; stung at reef on lower face; highest recorded Blood Pressure 205/112; pain recorded as severe; remained in hospital 46.45 hours.

The data were also assessed for the following relationships:

(a) Length of stay in hospital (See Figure 5)and time the patient waited to see a doctor (See Figure 6);

(b) Patient's age and their length of stay in hospital.

FIGURE 4.5: Length of stay in hospital

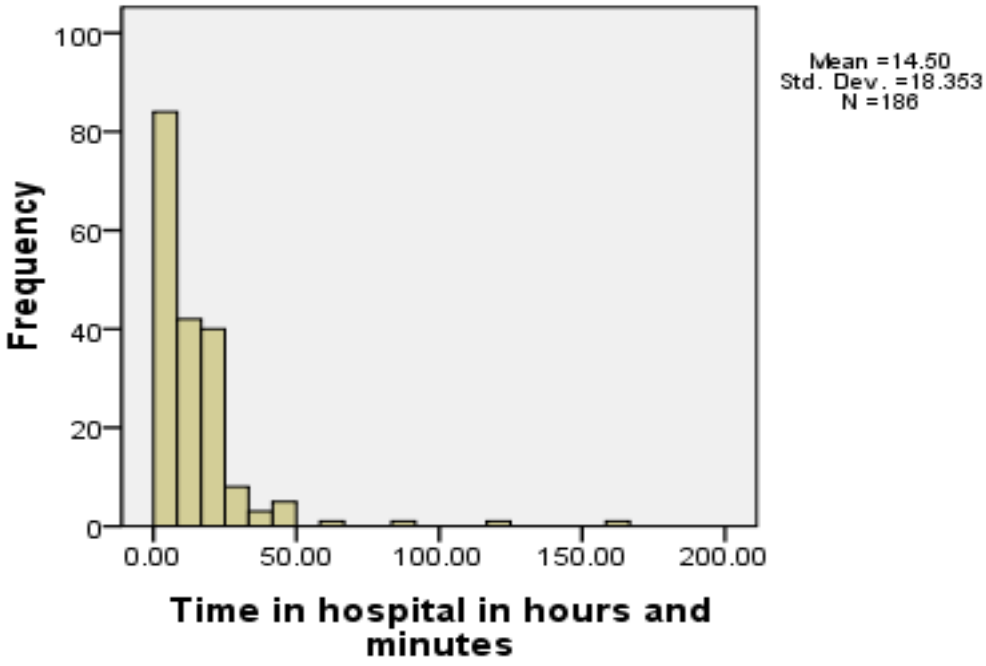
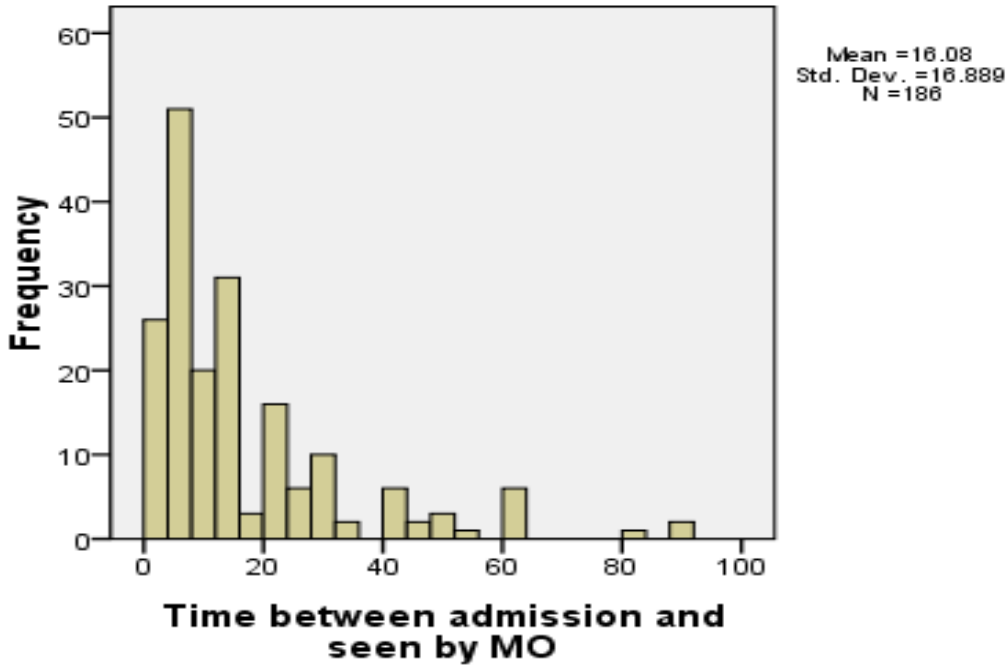


FIGURE 4.6: Time between admission and being seen by doctor



In checking the normality of the three variables, 'length of stay in hospital'; 'time the patient waited to see a doctor'; and 'patient's age', age was very close to being normally distributed (Mean: Median =1.1148; SD: Mean = 0.356; and histogram followed the Gaussian curve).

Both 'time between admission and seen by doctor' and 'time in hospital' were skewed numerical variables. The relationship between these two variables is weak and negative (Spearman rank correlation *rs = -0.08; p= 0.274*). This implies that when 'time between admission and seen by doctor' is longer, the 'time in hospital' is shorter, suggesting that initial assessment of severity works. However, this was not statistically significant. The relationship between age and time in hospital was weak and also not statistically significant (Spearman's rank correlation *rs= -0.02; p= 0.802*).

4.4 Summary:

This chapter has presented the quantitative findings from the study. These findings showed that while a number of relationships between variables under scrutiny showed no statistical significance, there were some relationships which reflect the unusual nature of the situation for the patient with IS. Those which are most noteworthy are:

- the apparent trend towards less numbers of cases but more of those cases are tourists;
- the increasing numbers of people being stung at the reef, or if at the beach, the people were stung outside the stinger-resistant nets;
- the relationship of pain level to body site; and
- the level of pain associated with physiological measurements.

It is particularly important clinically for nursing staff to be aware of the potential for the patient to deteriorate based on factors that can be predicted. For example, with the knowledge that cardio-respiratory sequelae and pain do occur after suffering IS, it is logical to consider monitoring closely for cardio-respiratory symptoms and pain levels using standardised, validated mechanisms. This further reinforces the need to use standard validated tools to capture, and allow reporting on, critical clinical data. The clinical guidelines would successfully achieve this goal as well as optimize the provision of care to the patients diagnosed with IS.

The following chapter documents the data from the qualitative section of the study and provides details of the thematic findings.

Chapter Five

Qualitative observational findings and Delphi process

5.1 Introduction:

This chapter presents the qualitative data collected during the observational episodes undertaken from the 2005/2006 and 2006/2007 seasons of jellyfish activity in far north Queensland, Australia. The majority of the observational data collected was quantitative in nature and thus was reported in the previous chapter. However using *reflection-on-action* (by the participants) and *reflection-in-action* (by me), useful qualitative information was collected during observational episodes and is presented in this chapter.

The qualitative data collected in the study achieved two clear aims for me: firstly, it allowed the reflective component of the theoretical framework to be realized and incorporated; and, secondly, it offered both myself and the participants an avenue for identification of issues which have helped to unravel and explain the quantitative data collected. This material has therefore assisted with the analysis and interpretation of the data and supports the recommendations arising from the study. There is no doubt that the qualitative data and results are significant in terms of how nurses practice and also how observers view the practice. Therefore while a smaller data component of this study, the qualitative arm is no less important and relevant and contributes greatly to the overall comprehensiveness of the study.

As previously identified, 17 advanced practice ED nurses consented to participate in the study and while more than 23 episodes of care of patients diagnosed with Irukandji syndrome (IS) were observed by me, only the data from nurses who consented to participate in the study is included here (n=23). For the other cases, I noted the relevant identifiers for the patient chart and the non-identified quantitative data were collected at a later date as part of the chart audit process outlined in the last chapter.

Observational episodes were conducted for each of the 23 patients and lasted between two and six hours depending on the status of the patient and the presence of the participating nurse. Patient length of stay within the ED occasionally traversed a change of shift and therefore a staff change necessitated me terminating the episode of observation. Where this occurred, the participating nurse was asked the designated questions requiring reflection-on-action prior to the termination of his/her shift so as to maximize the content available for analysis.

5.2 Emergency department layout:

The ED at Cairns Base Hospital was built in 2002 as part of a refurbishment program. A new building was purpose built and the ED was housed within this building, with the specifications designed to maintain a comprehensive service up until 2020. The floor plan (see figure 1) identified four discrete areas as follows:

1: Resuscitation area (3 beds) for acutely ill patients requiring emergency treatment and stabilisation of life-threatening problems. This section was fitted with remote radiographic facilities to allow x-rays to be taken with minimal disruption of the critically ill patient.

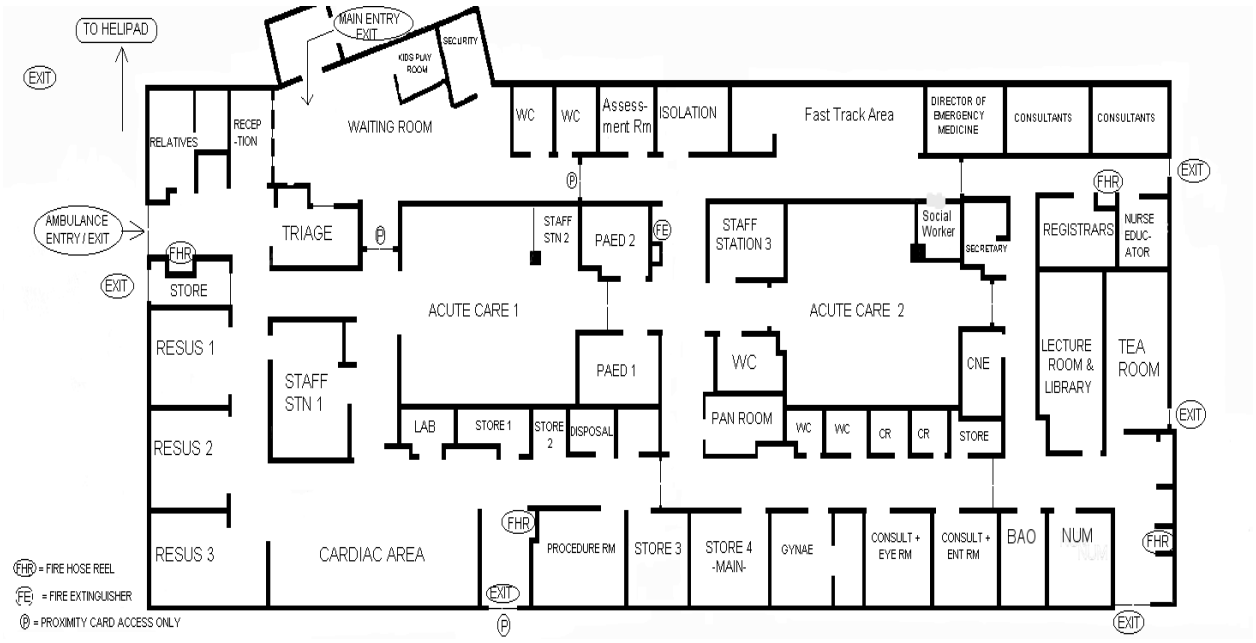
2: Cardiac area (4 beds) for ill patients requiring central monitoring. All patients allocated to this area theoretically will have overt or covert cardiac problems and require to be linked to a cardiac monitoring system linked to a central computerised visual system.

3: Acute ward area 1 (7 beds) where patients who are ill but stable are supported by a dedicated staff and who can be monitored without the centralized system capacity.

4: Acute ward area 2 (7 beds) which was designed as a transition area for patients who could remain within the ED for up to 23 hours, at which time they were either discharged or admitted to the general hospital.

There is also another section that includes two paediatric beds, two acute mental health rooms, and three bed spaces for non-critical treatments such as dressings and plaster application. Disappointingly, within 3 years, the ED has outgrown the demand and because of the recent extreme conditions faced by the staff and patients, the ED is currently being redeveloped to double the capacity. This process will take approximately three years to complete during which time the demand will continue to grow and the staff establishment will need to be increased as identified in Chapter 4.

Figure 5.1: Floor plan of current ED – Cairns Base Hospital.



If the ED is filled to or beyond capacity, it is unfortunate that there is no other public hospital available to support and care for patients within the Cairns area. For the patient with IS, this means they may have to wait to be seen by the doctor although they do at least receive assessment by the nurse allocated to the triage section of the department at the time of arrival. One unfortunate sequelae of this overload situation is the use of the QAS land ambulances to monitor and care for patients while awaiting access to beds within the ED. When this occurs, patients with IS are managed by the QAS officers according to QAS guidelines within the ambulance.

The nearest alternative tertiary referral hospital is in Townsville which is 349 kilometres south from Cairns. By road this takes four hours and by air the trip takes one hour from take-off to landing. The second alternative for patient transfer is Brisbane which is 1733 kilometres from Cairns.

5.3 Notification of Irukandji syndrome patients:

The jellyfish seasons that coincided with the observational episodes within the study were from November to May/June in both 2005/6 and 2006/7. Prior to the initiation of data collection by me, notification systems were established with the staff of the ED (both nursing and medical) and with the Communications Operations section of the Queensland Ambulance Service (QAS). This fulfilled two major functions for me:

(i) If a patient arrived at the hospital by private vehicle, hospital staff was able to notify me and if I was at work, it would only take five minutes to arrive at the ED. If I was at home, there was a short delay as the trip from suburban Cairns to the hospital took approximately 15 minutes; or

(ii) where the patient was in need of transport by either land ambulance, helicopter (EMQ) or fixed wing airplane (RFDS), the Communications Operations section of the QAS would distribute an SMS text message to me identifying required information – gender, age, geographic site of sting and mode of transport- which allowed me to plan the trip to the ED to coincide with the arrival of the patient. Interestingly, in this situation, my arrival within the ED was often the first indication to the staff that a patient with possible IS was on their way. A regular comment on my arrival at the ED was: "*Oh, (my name) is here, there must be a jellyfish sting coming"*.

If the patient arrived at the ED by private vehicle, the call to me was occasionally delayed, especially if the unit was very busy. If the patient arrived by QAS or EMQ, I had prior notice and was usually at the ED before the patient arrived. This allowed for a visual scan of the ED to ascertain the caseloads for staff, and to check whether a participant was assigned to care for the patient with IS. The data collection process

remained the same for me in all instances except that information about the initial interaction between nurse and patient was unobserved if the patient arrived and was assessed before I was called.

5.4 Data management:

In preparing for the observational episodes, I progressed through a number of well documented steps to ensure the qualitative data collected was done so in an optimum manner. It was important to have the data collection tool prepared for the transcription of text that would occur during each episode. These data were primarily reflective on the part of both the participants and myself. This personal view of the episodes of care provided the quotations found (boxed) later in this chapter.

Once collected, I spent time reading through the reflective information and categorising the data under the three identified themes. Due to the relatively small amount of data, major coding activity was not required however it was still important to analyse and group similar data as would occur during the coding process. Following the assignment of data into themes, I proceeded to represent the data in text form within the qualitative findings chapter of this thesis.

Following each episode of care, and after the reflective discussion with each participant, their comments and reflections were available for review which allowed them the opportunity to validate the information. Member checking is an integral component of research and allows validation of the data by participants.

5.5 Synopsis of case observations:

I attended the ED at Cairns Base Hospital to observe and assess the nursing care delivered to patients who were admitted and diagnosed with Irukandji syndrome (IS). The observational episodes were conducted over the two seasons of 2005/6 and 2006/7 and required me to attend the ED during the episode of care for between two and six hours for each case.

Interestingly, the two seasons were quite different in relation to the timing and duration of the season. Table 1 reflects the rainfall for those years and Table 2 indicates the timing and numbers of stings.

Table 5.1: Monthly rainfall over the period of data collection

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2005										8.8	30.2	35.0
2006	339.0	272.4	585.2	634.6	47.4					68.6	28.4	94.6
2007	179.6	686.4	212.6	68.8	146.8							

(Bureau of Meteorology, 2008)

Table 5.2: Numbers of people stung over the period of data collection

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2005												4
2006	5	2	1	5	2					1	0	2
2007	9	6	10									

(Bureau of Meteorology, 2008)

As the data shows, both seasons occurred over six months however in 2005/2006 the season commenced very late with the first registered sting on the 4th December, 2005. In

comparison, the following season had the first registration of a patient with IS on 31st October, 2006 which surprised staff within the ED at the time although there had been some rainfall (68.6mls) during the month. The rainfall at the commencement of the 2005/6 season would certainly have contributed to the slow start as the jellyfish need rain to wash them out from the creeks and rivers where they breed. The numbers do show some correlation where the larger rainfalls occurred and consistently the months where swimmers are most at risk are December to March.

I always carried a folder with relevant data collection forms, participant information sheets and consent forms, patient information brochure, and notebook so irrespective of the timing of notification of a jellyfish sting, she was well prepared. It was important for me to remain aloof from the care process even when the patient was distressed. This prevented further anxiety caused by the knowledge that the nurse was "being watched". However, a critical element was to explain my presence to the patient. While approval/consent from the patient was not required due to the nature of the research, it was important to be courteous and explain the project to reassure the patient that the care provided was of high quality and would not be affected by my presence. Nonetheless, from an ethical point of view, I had a clear duty of care to the patient to act on any situations where the patient was considered to be at risk. This was explained to the participating nurses although this situation did not arise during the observational episodes. As pain potentially would affect the memory, I provided each patient with an information brochure for later reference (See Appendix I).

During the observational episodes I made notations regarding points of clinical care, communication processes and departmental processes as well as gathering reflective data from the participating nurses and self. During each observational episode, information was recorded on data collection tools designed prior to the commencement of the study (See Appendix D1 for quantitative field notes and Appendix D2 for qualitative field notes). The quantitative questions asked of the participants to assess how advanced practice nurses in ED managed the patients with IS were:

- What are your thoughts about the condition of this patient?
- How did the patient respond to your care?
- What issues if any were raised for you during the episode of care?
- What do you think you could improve with the care of this patient?

Questions that guided my reflection were:

- How did I feel about the interaction?
- Did the patient receive optimum care based on accepted nursing curricula standards?
- Could anything have been done by the nurse to improve the clinical outcome?
- What was the ED like at the time of the episode?
- How many patients was the nurse allocated during the observation episode?
- Any comments – general or specific?

On completion of each observational episode, quantitative data were loaded into SPSS version 16.0 and qualitative data were entered into an Excel spreadsheet for later analysis.

Following content analysis of the qualitative data collected during the observation episodes, three themes evolved and have guided the presentation of the qualitative findings. The three themes were

1. Clinical (physical) assessment
2. Pain assessment
3. Communication techniques.

Each theme will be discussed in detail within this chapter.

5.5.1 Themes:

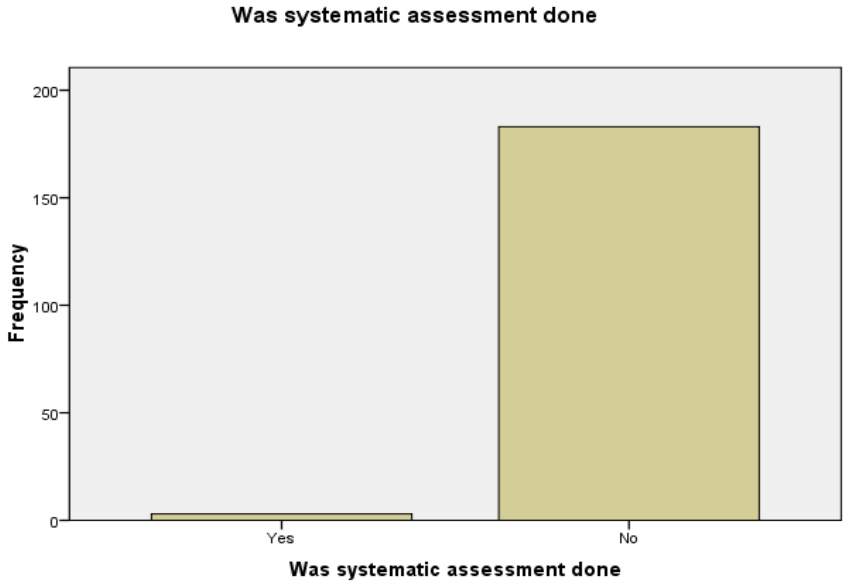
5.5.1.1 Clinical (physical) assessment

It was evident from the first observational episode that a systematic physical assessment was not being overtly undertaken by nursing staff. While the triage nurse used a systems based process when receiving the patient, the nurses assigned to provide clinical care once the patient was in the ED were not documenting information that represented a systematic physical assessment. Table 3 and Figure 2 outline the cases where physical assessment was completed by the nurse caring for a patient with IS. Only three patients observed within the study (1.6%) actually had an assessment completed and documented.

Table 5.3: Systematic assessment activity

	Frequency	Percent
Yes	3	1.6
No	183	98.4
Total	186	100.0

Figure 5.2: Systematic assessment activity



This lack of overt clinical assessment raised a number of issues throughout the observational episodes which had the potential to compromise the patient or prevent timely initiation of alternative nursing actions were they deemed necessary for efficient patient care.

Issue 1:

Lack of formal assessment at admission. This led to delayed identification of asthma status of one patient. The patient was young and fit and within 40 minutes of admission became increasingly compromised at a respiratory level. He became wheezy, had a moist cough and increasing chest tightness. Even with altered respiratory status, it required the patient's mother to ask him if he had his "puffer" with him before the nurse realised he possibly suffered from asthma.

Case 4:
Nurse: *He was really unlucky to be stung as he was only trying to prevent his mates from being stung! He was not the 'classic' victim but I was surprised how chesty he became. I didn't know he was an asthmatic.*
Researcher: *I am surprised at how quickly he has become breathless and wheezy – I have not seen any physical assessment done and then his mother asked him if he had his "puffer". Alarm bells are ringing but it has still taken some time for the nurse to realise there is an issue.*
I was almost ready to speak out when the patient's mother mentioned it to the nurse.

Issue 2:

Differential diagnosis can be compromised if an early assessment is not undertaken. A patient who was medically diagnosed as having Irukandji syndrome caused some anxiety for the nurse who nevertheless did not undertake nor repeat an appropriate assessment to confirm the IS diagnosis.

Case 15:
Nurse: *(He was) very restless and irritable for many hours. I was worried he had DCI but we didn't really do anything about it.*
Researcher: ***This is an issue for the nurse and she is not sure if the agitation and irritability is to do with the sting or DCI (Decompression Illness). No dive profile has been provided nor asked for.***

Issue 3:

Assuming condition based on the "classical picture" of the sting victim. The patient who exhibited the signs and symptoms of IS that are clinically indicative was less likely to be formally assessed. One proviso to this issue was if the patient was stung around the head and neck as it was identified that this could involve the airway and thus the patient needed to be more closely monitored.

Case 19:
Nurse: *(He) looked like the classic sting victim. The signs and symptoms were involuntary and occurring while the patient was talking to staff. He was clinically stable throughout.*
Researcher: ***What is the classic picture? Does this prevent systematic assessment? This patient has been more closely watched than usual but not because of his condition, he was a body double for a Hollywood star here making a movie!***

Case 9:
Nurse: *The sting was not too bad (but) any stings to face and neck are potentially worse due to airway involvement.*

Issue 4:

Interpretation of symptoms based on erratic experience with marine sting patients. Two patients had been stung before according to their conversations with staff. One male patient was a fisherman who was regularly stung while cleaning nets at the water's edge or cast-netting for bait in shallow waters of the beach. The second patient was an Aboriginal woman from Cape York who also had been stung before. She had other clinical issues that were clearly identified in her chart but it seemed to the nurse caring for the patient that the other condition was more important at the time.

Case 21:
Nurse: *This indigenous woman from Cape York has been stung before. I haven't seen many patients with stings so I thought she was pretty sick but colleagues told me not. The medical officers were more interested in her ITP (Idiopathic Thrombocytopenia) than the sting.*

Issue 5:

Inability to assess the patient based on the environmental conditions. One patient who was stung while sleeping on the water's edge at 0820 hours while on holidays was very inebriated at the time of admission and although he was a very happy patient, he was accompanied by several of his friends who were in a similar inebriated state. They promptly went to sleep around the bed and were unable to be roused to move out of the way. The patient was easily roused but could not understand the issue for staff, he just smiled widely and went back to sleep.

Case 5:
Nurse: *It was hard to assess the patient and having to work around all his sleeping mates.*
Researcher: ***This patient is causing considerable humour based on his responses to questions and activities. He is so inebriated he actually is feeling no pain and only came to hospital because he vomited up what he thought was blood, but was actually red wine which he used as a chaser to the spirits he was sculling with his mates from 1130 – 0400 hours.***

Issue 6:

Clinical activity impeded by language difficulties. A Japanese lady was admitted from Green Island, and was still wearing her bathing suit as well as being covered in sand from the beach. The patient spoke no English and was very distressed and agitated. She became increasingly cold and in spite of many warm blankets, it was very difficult to warm the patient. Effort by nursing staff diminished over a few hours which did not assist the improvement in the patient's condition.

Case 8:
Nurse: *I couldn't get the patient warm. I wanted to get her bathers off and that took ages. The ED was so busy and I felt not in control so I think I left her alone too much.*
Researcher: ***This patient is very unwell and has been unable to communicate her difficulty. The nurse can't get her warm and the patient is not able to drink anything. It has been really hard for the nurse who has not been here very long and she seems unable to say no to colleagues who keep calling her away to help with other patients. The ED is chaotic but that is no excuse for leaving the patient alone so much. The interpreter has not arrived in a timely way which hasn't helped either.***

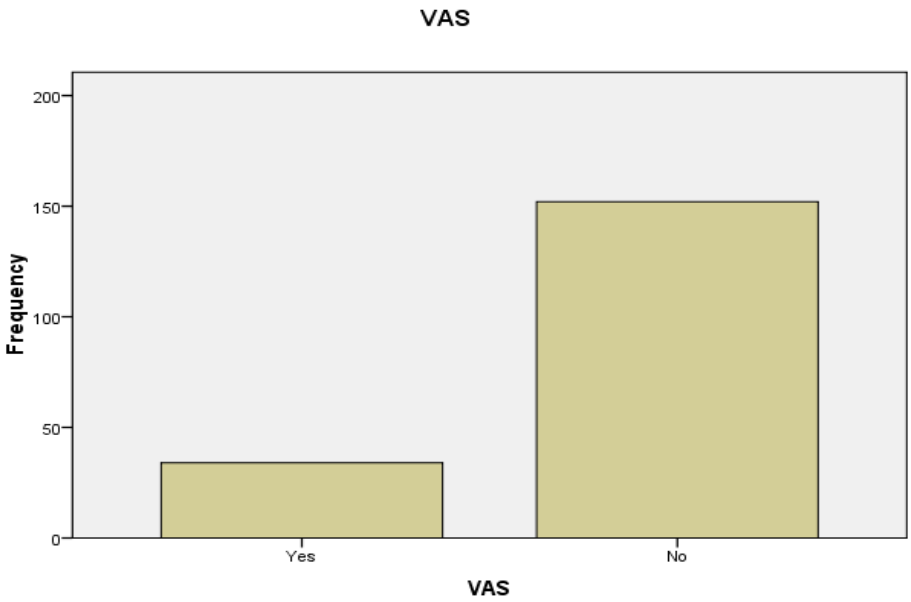
5.5.1.2 Pain assessment

Again this was an area where documented assessment was not evident. This was a particularly difficult issue as pain is the most significant complaint that leads the patient with IS to attend the hospital. Data collected within the study reinforced that this was an area where improvement was necessary to improve the situation for the patient (Table 4 and Figure 2).

Table 5.4: Pain assessment activity

	Frequency	Percent
Yes	34	18.3
No	152	81.7
Total	186	100.0

Figure 5.3: Pain assessment activity



Issue 1:

Timely assessment of the patient by Doctor. A patient was admitted from the reef and was very unwell from admission. She was Japanese and did not speak English although a tour guide did visit to provide some translational services. However, the patient was not see by the Doctor for 30 minutes and by then the pain was difficult to control. This patient eventually required admission to Coronary Care Unit where she remained for a further two days.

During the patient's time in ED, and while I was present, the nurse did not appear anxious about the lack of pursuance of alternate pain options and again no formal pain assessment occurred.

Case 12:
Nurse: *We possibly should have arranged the Anaesthetic Reg(istrar) earlier and moved the patient to CCU earlier.*
Researcher: ***This patient is very unwell and has been unable to communicate her difficulty. I am really concerned about the lack of recognition of the non-verbal cues indicating pain. At what point do we need to think outside the "Narcotics square"? This is a good example of looking at alternative pain techniques that could still be applied within this difficult environment.***

A second patient was slow to be seen by the Doctor but this was not pursued because the patient had been given pain relief by the paramedic staff that transported the patient.

Case 9:
Nurse: *Probably 15 minutes is too long to wait to be seen by the doctor. The unit was busy and the patient did have Morphine on board.*
Researcher: ***There is no reason why this patient could not receive some further pain relief. The patient is young and does not appear to have any respiratory compromise but the assumption that the Morphine would be enough is concerning.***

A second patient suffered some "bounce-back" of pain even though Morphine had been given less that one hour previously. This situation identified the medical staff not willing to consider further pain relief because of the Morphine load and the lack of attendance by the doctor was identified by the nurse caring for the patient.

Case 2:
Nurse: *Sometimes it is hard to get the doctor to see the patient quickly which is a problem. This girl had Morphine on board but the doctor still took too long.*

Issue 2:

Dealing with the poor decision choices of the patient. A number of patients were more challenging to manage because of their lack of insight into chosen activities. Some of

these patients were more demanding, constantly challenging the nurses to improve their condition. Formal regular pain assessment would have assisted the clinical team to treat the patients more actively by providing data that could show either the need for increased pain relief, or that the pain was under control and time (and patience) was needed to allow the toxin to dissipate. One patient was a fisherman who knew the risks of not using protective equipment but still resisted using any. He indicated he had been stung many times without any problem and did have a protective suit in the boat although he only wore it if his wife made him. He was very distressed by the pain and was demanding the nurse cure him quickly so he could go back and get his boat.

Case 1:
Nurse: *He seemed ok to me. He felt he was not in control of the pain and kept asking if this was normal. He said he didn't think the pain would be "this bad".*
Researcher: ***This patient has been very demanding but no assessment has been undertaken to allow him to quantify the pain. This has led to the nursing staff becoming less engaged with the patient due to his demands.***

Issue 3:

Pain levels difficult to assess. There are a number of reasons for this and is a reason why a systematic process needs to be in place to allow everyone to see the pain status of the patient at any point. A Japanese patient was very difficult to assess because she did not speak any English and neither did her husband. However, there were a number of non-verbal cues related to pain that were evident to I but not followed-up by the assigned nurse. If they had been detected they could have assisted greatly in the determination of pain levels. This is probably evidence of the pressure which the nursing staff is under so they cannot find the time to just stand quietly and watch patients.

Case 8:
Researcher: ***The patient has been writhing around in bed for hours, legs very active, eyes screwed up tightly and for periods of time appears to be asleep except for facial grimacing that gives away the pain status of the patient.***

A second patient was so inebriated that he was feeling no pain. The issue was that in that situation, he was eventually discharged against the wishes of staff, without any staff actually being able to make a sound clinical judgement about the clinical status of this patient.

Case 5:
Nurse: *The alcohol is still acting as pain medication. I would be interested in seeing what condition he is in when the alcohol wears off.*

Issue 4:

Pre-hospital pain management. Administration of pain medications is inconsistent as is the type of medication administered. The narcotic of choice (based on QAS policy) is usually Morphine occasionally supplemented by other drugs such as anti-emetics or anti-inflammatory agents. Since 2006, the use of intravenous magnesium has been added to the treatment regime and Magnesium Sulphate bolus doses have also been used within the department to provide pain relief but again it is erratic in its effectiveness. As a pain drug, it generates a very florid response in some patients which can be very stressful if the patient is not made aware of the possibility of the reaction.

Case 16:
Nurse: *The magnesium worked amazingly well for the patient. It would be good to have Mag Sulph as a regular part of care if it works for the patient. This patient responded almost immediately. (We could) probably (give) more information to the patent on the reaction possible – eg feeling like they will explode.*
Researcher: ***This is a really florid response for the patient and the reaction to the Magnesium has given her a really big fright. She has not been at all anxious up until this time and has been marking dive tests (she is a dive instructor). Suddenly she went bright red and hot and feels like she is going to explode.***

Issue 5:

Initiation of Pain Relief:

The ongoing issue of timely ordering of narcotic pain relief was raised periodically by the nurses caring for the IS patients. The study data showed the majority of patients (n=128, 68.8%) were seen by a medical officer within the first 15 minutes, which is very positive. Within this group however (n=58), 35 patients waited between 16-30 minutes and 23 patients waited between 31-90 minutes. Given the intensity of the pain in this clinical condition, even 16 minutes is too long to wait for relief.

According to the Australasian Triage Scale which provides benchmarks for the time taken to assess the patient within the triage environment, there are five codes that categorise the patient as they enter the ED, based on the severity of their condition:

- Code 1 (resuscitation) requires immediate intervention
- Code 2 (emergency) requires intervention within 10 minutes
- Code 3 (urgent) should be seen within 30 minutes
- Code 4 (semi-urgent) should be seen within 1 hour

- Code 5 (non-urgent) should be seen within 2 hours.

Patients admitted to the ED with IS are generally coded as Code 2 or Code 3.

> ***Case 22:***
> **Nurse:** *The usual issues around pain relief and who initiates it comes up. Nurses being able to initiate pain relief would really help with getting early orders for drugs and hopefully make it better for patients.*

Issue 6:

Anxiety impeding pain relief. Some patients are very anxious when admitted to the ED. This could be caused by a number of variables including fear of the unknown and language difficulties, and for the patients with IS, pain is a powerful trigger. Some patients are in such pain, they become aggressive because their pain is not being managed effectively. Other patients become demanding and request more pain relief than is pharmacologically recommended. This does cause issues for the nursing staff which are occasionally difficult to manage.

> ***Case 11:***
> **Nurse:** *(The patient) probably just (needed) instant access to appropriate drugs – especially as she kept locking out the PCA.*
> **Researcher:** ***This has been really frustrating for the nurse. She has been trying really hard to explain to the patient that she could have as much pain relief as she needed but she keeps buzzing to say she is in pain and on investigation, the PCA is locked. This happens almost every 5-10 minutes.***

> ***Case 15:***
> **Nurse:** *For a young, fit man he was very difficult to manage. He was very cranky for over 12 hours so we all 'copped some verbals'.*

Occasionally, the fear does not cause pain but the fear of using narcotics or injections exacerbates the situation for the patient.

> ***Case 14:***
> **Nurse:** *(She) was reticent to have any narcotic relief but I am glad I persisted. She felt much better after the dose of Fentanyl.*

Some patients do not like being in hospital no matter what the issue. This also affects their perceptions and exacerbates their pain.

> ***Case 1:***
> **Nurse:** *It was really hard to discuss his condition with him because he really wanted to go home. I probably could have tried to reduce his anxiety but the area was so busy so I couldn't spend the time. I hope he was ok after discharge.*

> ***Case 3:***
> **Nurse:** *I wish I could fix his anxiety level. Some anti-anxiety medication to relax him would have been useful.*
> **Researcher:** ***This patient has been stung before but says it feels worse this time.***

5.5.1.3 Communication techniques

Issue 1:

Use of interpreter services. Several episodes of care were affected by the need for interpreters to assist with communication between nurse and patient. While these services are accessible, they are not always available when needed which is often after hours and on weekends. When available, the interpreters are invaluable in explaining the patient's needs to the nursing staff as well as clarifying the nurse's requests of the patient.

Case 12:
Nurse: *(The patient had) very closed body language, foetal position, eyes tightly closed. It was very hard to assess the patient and it would have been good to have the interpreter there to assist.*

Issue 2:

Compliance with care plan. A number of patients were very happy to be cared for and were very compliant with instructions and guidance provided by nurses. When variables intervene, the compliance may be significantly compromised as has been previously discussed.

A number of patients verbalized their relief at being looked after so well and thanked the nurses for their help and ministrations. Occasionally the patient was anxious but the support people with them were a calming influence and that assisted the nurses to provide appropriate and timely care.

Case 2:
Nurse: *The partner and his mother were calm and that kept the patient calm. She had no problems asking for what she wanted.*

An example of the non compliant patient was the young man who was profoundly inebriated on admission. Communication was very difficult due to his inability to think and speak clearly. His period of hospitalisation appeared to be non-stressful for the patient but the nursing staff did watch him closely due to the unpredictable nature of the added condition.

Case 5:
Nurse: *This is the patient you can't help but like, but want to shake him for being so silly. (This is a) common situation around New Year's Eve but he is a tourist so every night is party time. It was hard to get clear answers to questions but nothing was a problem, he was 'happy' and thanked me for everything.*

5.6 **Reflective processes**:

The anecdotes provided by the nurses and myself were collected as part of the reflective process. The nurses were asked questions at the completion of their involvement in the care of the patient and my perceptions were recorded contemporaneously during the observational episode. Rolfe (1997b) describes reflection-on-action as activity that allows the nurse to convert every experience into a personal knowledge bank that contributes to seamless, intuitive practice. Reflection-in-action is described by Using Rolfe's description of reflection-on-action which is inherent in the expert nurses' role by allowing conversion of experiences into personal knowledge and experience and then seamlessly practice intuitively (Rolfe, 1997a); and reflection-*in*-action as described by Schön (1987), is where reflection occurs while the nurse is practicing and allows the nurse to reflect contemporaneously on the situation at hand, consider the options and consequences of decisions made, and alter priorities of care. Using these reflective processes, a further dimension within the qualitative framework was created.

The third reflective process integrated into the study was that of keeping a journal describing and analysing the activities of the research process as a whole from beginning to conclusion. This journal detailed personal musings and was designed to contribute to a picture of the journey traversed by me beyond just the completion of the thesis.

5.6.1 Reflection-on-action:

Within the present study, the nurses observed in their daily practice of caring for patients with IS exhibited evidence of the use of expertise including tacit knowledge and intuition. Clinical decisions were made without overt problem solving based on observable data, but due to the fact that the majority of patients did make progress and achieve successful discharge from the ED, it is postulated that the outcome for the patient was still safe practice with minimal risk from the care provided. Those patients who were not discharged from the ED were admitted for further treatment of medically diagnosed cardiac sequelae.

All the nurses who consented to participate in the study were experienced ED nurses and most had previously cared for patients with IS. It was anticipated by me that all the nurses would use reflective practice as an integral part of their care régime. The reflection-on-action process was initiated by me at the completion of each observational episode and notes on the discussions were gathered, however the use of reflection-in-action by the participants was less obvious to me. According to Greenwood (1993), reflection-in-action "serves to shape what one is doing while one is doing it" (p. 1185), however decisions were seen to be made by the participants that were more closely linked to "rote" practices, that is those that were completed unconsciously from repetitive activity, rather than reflection on what was/was not working at the time. Thus, during the observational episodes, there was little evidence that changes were being made to care regimes by the participants based on this ongoing evaluative activity. This certainly proved to be an enlightening situation for me and reinforced the usefulness of using the

reflective practice framework for this study. The data challenged the stereotype of the advanced practice nurse whose actions are based on active reflection-in-action throughout the care episodes. It forced me to consider that a possible lack of regular exposure to patients suffering IS could lead to limited ability to undertake reflective activity about 'the unknown clinical picture' while still being able to achieve a high level of reflection when managing other more regularly occurring conditions.

5.6.2 Reflection-in- action:

Over the duration of the study, I used self reflection processes. During the observational episodes it was important to reflect on the activities of the nurses being observed with a view to comparing this reflection to that of the nurses in the study. This is called reflection-in-action as it is a contemporaneous assessment of the nursing activities.

Several triggers guided this reflection during the observational episodes. Firstly, the issue related to pain assessment was a critical element in the improvement cycle for the patient. It was noticeable that a number of patients were not receiving adequate pain relief in a timely manner and this was exacerbated if communication was problematic due to ethnicity. It appeared to me that patients of Asian origin were significantly affected because they were not able to communicate easily. The lack of timeliness in treating the pain was due to the inability of the nurse to successfully engage a medical officer to come to see the patient. Alternative pain relief techniques were offered and/or used in the interim, but not always totally successfully.

There also seemed to be a reticence on the part of the nurses to advocate for alternative pain relief methods or drugs. One patient particularly generated a written notation by me.

> ***Case 12:***
> **Researcher:** ***The patient is really sick and in considerable pain that is hard to stabilize. The staff are unable to meet the patient's needs and even though the nurse can see that alternative options could be considered, she has not initiated anything.***

Secondly, I was surprised by the number of patients who were retrieved by aero-medical retrieval when alternative options exist and are significantly less expensive. As previously described, the conservative cost of using the helicopter for a 1.5 hour retrieval journey is approximately $7,000. This could be reduced if the patient was retrieved using land or boat transport which would not be a difficult option if the patient was suitably pain controlled. This was identified by one nurse following the episode of one patient.

> ***Case 7:***
> **Nurse:** *As he was so mildly affected, I wonder about the use/cost of the chopper to retrieve (him).*

It was also surprising for me to see patients admitted to hospital in a condition that could have been prevented by simply wearing protective clothing. While protective suits have been available for many years and often used by divers and surfers, their use as a protective measure for stings is not consistent. It has been suggested that even the wearing of pantyhose can provide a layer of protection that prevents the tentacles attaching to the skin. However, it appears that even though it is usual practice within the dive industry to offer protective suits to the tourists, not many actually wear them. This is

difficult to rationalize as such a simple option provides protection from this serious problem.

Studies specifically looking at compliance of health workers when using personal protective equipment (PPE) might provide some insight into why the use of protective equipment is problematic in the tourist population. A study into surgical nurses and compliance with PPE by Ganczak and Szych (2007) and supported by studies by Michaelsen, Declos and Felknor (1997); Bennett and Mansell (2004); and Ferguson, Waitzkin, Beekmann and Doebbeling (2004) showed the main reasons for non-compliance were lack of availability of equipment, the staff did not think the patient posed a risk, use of spectacles therefore negating the need to use PPE eyewear and not wanting to frighten the patient.

Case 14:
Nurse: *Why don't all tourists wear stinger suits? It should be mandatory if you want to get into the water.*

Case 18:
Nurse: *Why wasn't she wearing a suit while diving?*

Case 19:
Researcher: ***Why has this "body double" not been protected while filming? What a great opportunity for litigation!***

Throughout the observational episodes, I looked for evidence of pain management processes and acknowledgement of non-verbal pain cues exhibited by a number of non-English speaking patients. Even though these non-verbal cues were evident to me, they were often overlooked by the nurses, which was a source of great frustration.

5.7 Specific areas of strength or weakness identified within the nursing care practices:

One prerequisite for participation in the study by the nurses was the completion of the "Marine Stings" package locally developed and available for all new staff within the ED of the hospital. It is a comprehensive package that provides a sound preparation for nurses who have not worked in a tropical environment where jellyfish stings of this nature occur (See Appendix E). This is an integral part of the ED orientation package; however it is not mandatory, so not all nurses who come to the ED in a permanent capacity undertake it. One nurse who was new to the local ED reflected on her lack of experience with these patients.

Case 21:
Nurse: *(An issue raised was) my lack of familiarity with these patients. I'll get plenty if it's a busy season.*
Researcher: ***This (the package) is offered within the department to all new staff. Not everyone undertakes the package. The consenting nurses have all completed it but this is a good example of how theory is not necessarily helpful until you can put it into practice.***

The most obvious weaknesses were the lack of formal clinical (physical) assessment and pain assessment. These are cornerstones of nursing education and it is hard to see how effective clinical care can be provided without regular review of both processes. It is

important for all patients but it seems more critical if a language barrier exists as the time taken to identify actual or potential problems may be considerably elongated by the need to use indirect methods of communication such as sign language or message cards.

5.8 Clinical guidelines:

A major focus of this study was the development of clinical guidelines that would be proposed for use within the ED to guide expert nurses to more effectively and efficiently manage patients with IS. Specifically, part of this process is improved management of pain which is particularly difficult for this patient group. In order to formulate guidelines that would be useful, it was critical to use the data gathered from both observational episodes and chart audits to inform the initial framework. The first draft of the guidelines was very confused as I attempted to distill the key ideas that would form the core themes for the Delphi technique.

While conceptual activity commenced quite early in the study, a plausible draft was not able to be framed until the completion of the first season of observational activity. At that point, the common themes were emerging and the participants reflections were being embedded within my mind. Once the chart audits commenced at the completion of the first observational season, at least two further iterations of the possible layout of the guidelines evolved before the first round of the Delphi process to the ‘experts’. With consideration given to the comments that were returned from the Delphi and the additional data gathered from the observational and audit components, the key inclusions were clearer and formed the framework of the final document.

Those key inclusions were:

- Physical assessment – on admission and ongoing throughout episode of care,
- Pain management – particularly appropriate and regular assessment of pain levels using verbal and non-verbal cues, and use of narcotic drugs and ensuring clear understanding of implications of their use, and
- Consideration of extended management including the initiation of alternate methods of pain relief.

While using the quantitative and qualitative data to underpin the development of the guidelines, it was still important to ensure a validated framework was used to guide the development process. This was particularly necessary if the guidelines are to be tested and evaluated for future integration into policy frameworks. As identified within the literature review, the AGREE instrument (2001) was designed to provide a framework for assessing the quality of clinical practice guidelines both in terms of the quality of the reporting and the quality of some aspects of the recommendations. It was designed based on theoretical assumptions, not empirical evidence, and provides an assessment of the predicted validity of a guideline and not the impact of the guideline on patient outcomes.

The clinical guidelines for this study were formatted using the six domains of the AGREE guidelines as a template. These domains capture separate dimensions of guideline quality and will form the basis of the subsequent testing of the study guidelines so as to ensure the quality of the implemented tool.

Scope and purpose:

Within this study, the overall aim of the guidelines is to improve the quality of care for patients who have been stung by Irukandji jellyfish. The guidelines have embedded informational files identifying necessary activities and documentary requirements based on current evidence and policy frameworks. The target population is all patients admitted to the emergency department with a diagnosis of Irukandji syndrome.

Stakeholder involvement:

Using the Delphi technique to design and develop the guidelines ensures that many expert practitioners across clinical disciplines were included. Of the 18 final experts who contributed to the development, 12 were from the local environment, either public hospital or external providers of health care. The development of the guidelines commenced only after the first set of observational data collection episodes. This allowed me to gather information regarding the current management of the patients and review the differences between the ideal care regime and the reality. Subsequent information was gathered during the complete chart audit and the second set of observational episodes which reinforced the proposed components of the guidelines draft.

Rigour of development:

All available resources were reviewed prior to the development of the initial draft guidelines document. Electronic databases, databases of systematic reviews, and previously developed guidelines were all used to support the development process. Given the narrow nature of the topic, the formal consensus approach of the Delphi technique was identified as a valid approach to use to develop the pre-trial guidelines.

The quality and usefulness of the guidelines will be the focus of post-doctoral studies. This will include the embedding of linkages to corporate policies and protocols that are related to these patients. This will ensure the information and management aspects are linked to current evidence and practice improvements that occur formally during triennial quality improvement and accreditation assessments.

Clarity and presentation:

The format of the guidelines is designed as a flow chart. This reflects the required process through colour coded arrows with boxed challenge questions or clinical prompts to the sides of the formal pathway. These boxes include hyperlinks to relevant support documents to support the rationale for treatment steps. As part of the post doctoral research, a comprehensive education program will be undertaken with all the relevant staff to ensure understanding and also provide opportunities for clarification and reinforcement.

Applicability: – Items 19 – 21 relate to the likely organizational, behavioural and cost implications of implementing the guidelines.

The implementation of the guidelines should present few problems. The basis of the development of the guidelines is to formalise best practice processes for managing patients with Irukandji syndrome not complicate current practices. Through the implementation of these guidelines,

Editorial independence – The last two items are concerned with the independence of the recommendations and acknowledgement of possible conflict of interest from the group who developed the guidelines.

Importantly, clinical guidelines for nursing practice do not replace the diagnosis and management of the patient by medical officers. Rather the guidelines are used in conjunction with clinical expertise and sound judgement of the entire healthcare team and have the potential to free up the medical officer to attend other unstable or critically ill patients. The introduction of any practice tools must be done in conjunction with education of staff with clearly stated implementation and evaluation strategies.

5.9 Summary:

This chapter has described the qualitative findings collected within the study and introduced the three themes extracted from the data analysis. The themes provide a clear picture of the routine practice of ED nursing clinicians who practice at an expert level and suggest that reflective processes may or may not be used as an integral part of daily practice for these nurses to improve the care provision to the patients with IS. It is also identified that the practice of assessment, both physical and pain level, by nurses may be occurring but it is not an overt practice that can be identified by an observer.

The data were collected from both observational episodes and chart audit processes and was gathered to help support the understanding of the quantitative findings and provide a robust evaluation of the care provision of patients with IS within the ED. The following chapter will discuss the findings from both quantitative and qualitative components of the

study in relation to the current literature about IS, advanced practice opportunities for ED nurses and the development of clinical guidelines to assist nursing practice and provide recommendations for practice and future research.

Chapter Six

Discussion and Recommendations

6.1 Introduction:

The purpose of this concurrent nested case study was to contribute to the evidence about the nursing management of Irukandji syndrome, analyse the parameters of advanced nursing practice, and provide a framework for change through the development of clinical guidelines. The study utilised a mixed methods approach within a case study design. The outcome of the study included clinical guidelines for use by advanced practice nurses managing patients diagnosed with IS within an ED setting in a tropical area. The subject has been studied using a mixed methods approach with the subsequent development of clinical guidelines to support advanced practice nurses deliver effective and timely pain relief to patients diagnosed with IS in the ED of hospitals based in tropical areas.

- The objectives of this study were to:
- Document and analyse information gathered about the condition of patients with Irukandji syndrome;
- Assess the nursing management of patients with Irukandji syndrome; and
- Develop clinical practice guidelines to support the clinical management of patients with IS by advanced practice nurses working in ED settings.

Irukandji syndrome (IS) is a debilitating condition that renders the patient unable to manage the severe and widespread pain that generates an overwhelming feeling of impending doom (Fenner & Carney, 1999; Greenland et al., 2006; Little et al., 2006).

Pain management therefore needs to be swift and aggressive to reduce the effects of the jellyfish toxin on both the physical and psychological status of the patient.

Studies have been undertaken over many years looking at the pain management of patients in acute care environments (Bryant, 2007; Dunwoody, Krenzischek, Pasero, Rathmell & Polomano, 2008; Pasero & McCaffery, 2001; Pasero & McCaffery, 2004; Tanabe & Buschmann, 2000). It is suggested by Dunwoody et al. (2008), that untreated acute pain has the potential to produce serious sequelae including long-lasting psychological and emotional distress which reinforces the need to act quickly and efficiently to reduce pain. To facilitate this with people diagnosed with IS, the opportunity has been created within this study to review the role of the ED nurse with a view to legitimately expand the scope of practice to allow the nurse-initiation of appropriate narcotic pain relief for patients with IS.

Nurses working in the ED currently have a complex environment in which to practise (Fry, 2008; Fry & Burr, 2001a; Hudson & Marshall, 2008; Tanabe & Buschmann, 2000). Increasing political and public demands and subsequent issues such as reduced staffing and greater workload (Christofis, 2001; Gardner, Chang & Duffield, 2007; Griffin & Melby, 2006; Harris & Chaboyer, 2002), have necessitated "growing recognition of increased autonomy in decision-making and patient management" (Hudson & Marshall, 2008, p. 40). Thus, the advanced practice nurse (APN) has been a strategy introduced into a number of ED environments to assist in meeting clinical benchmarks and increase patient satisfaction (Byers & Brunell, 1998; Gardner et al., 2006; Hudson & Marshall, 2008).

To help reduce the time between admission to the ED and initiation of pain relief for the patient with IS, and in recognition of the opportunity for advanced practice nurses to take on an expanded role, advanced practice ED nurses were selected as the participant group within this study. Considering the significance of pain management for the patient with IS, the options that would expedite the ordering and administration of pain relief, specifically narcotics, needed to be considered. To reduce the possibility of sequelae that may exacerbate the patient's condition and extend their stay in hospital, one of the study outcomes was the development of clinical guidelines to support the advanced practice nurses within the ED to administer narcotics to relieve the pain of IS in the acute phase.

Dialogue between the nursing and medical professions in recent years has highlighted the angst which the role expansion of nurses has appeared to generate in doctors (Livingstone, 2005; Lumby, 2005; Usher, 2005). It is hoped the inclusion of medical staff throughout the progress of the study and in the development of the clinical guidelines, will provide a catalyst for a positive expansion in practice for the expert nurses working in the ED of the regional hospital in the study and thus improve the clinical outcome for IS patients.

A concurrent mixed methods approach embedded within a case study was undertaken to investigate the 'case' of the management of patients with IS by advanced practice emergency nurses. This is consistent with Schneider et al. (2003) who explained that case study research enables a detailed examination of a unit within a real life and contemporary context to be undertaken using multiple data sources. Using three data collection processes to gather the relevant data over the seasonal course of the study, I

was able to conduct a chart audit of 186 patient charts, undertake 23 observational episodes within the ED, and subsequently develop clinical guidelines using the Delphi technique with a group of ten 'experts'. Data generated from these data collection processes was both quantitative and qualitative in nature. While the qualitative data were nested in a predominantly quantitative study, both data sets contributed significantly to the study outcomes and each data set was used as supportive reciprocal evidence. Case study approaches can be used to incorporate qualitative data to complement quantitative studies through differentiation, and can offer explanations to help in the interpretation of statistical relationships (Flick et al., 2004), as was the case in this study.

Case studies can also be used to apply multiple theoretical perspectives under the case study using an umbrella approach (Luck et al., 2006). In this study, a pragmatic approach was linked to reflective practice. Further, the use of mixed methods was pivotal to the outcome of the study as the use of multiple methods and approaches meant that both the clinical issue of the management of IS and the practices and decision-making of the participating nurses was explored. As described by Greene, Caracelli and Graham (1989), this study achieved the goal of *complementarity*, which means to measure facets of a phenomenon to reveal an enriched, elaborated understanding. The variety of data collection techniques used within the mixed methods design helped to ensure meaningfulness of the data and illumination of the different facets of the study (Erzberger & Kelle, 2003). As planned, the contrasting methods within the study complemented each other and "offered different strengths that enhance understanding and contribute to overall completeness" (Happ et al., 2006, p. S45).

This chapter discusses the study findings in light of the current literature on Irukandji syndrome, advanced practice roles for nurses, and the management of patients within the Emergency environment. It was particularly important to study the practice issue of the nursing management of patients with Irukandji syndrome (IS), because currently very little information exists in this area that can be used to guide and support nurses' management of these patients. The contribution of the literature to the study findings in terms of education, clinical practice and research are also examined. The findings are discussed using themes described in Chapters Four and Five, and recommendations made to improve the outcomes for patients and health professionals, and potentially, the broader community. Finally, the chapter also discusses the strengths and weaknesses of the study and the potential impact of these issues on the findings.

6.2 Key Findings:

The clinical picture of the patient diagnosed with IS has been validated over many years (Fenner et al., 1986; Fenner & Carney, 1999; Huynh et al., 2003; Little & Mulcahy, 1999; Macrokanis et al., 2004) and although further research is necessary to determine the toxin that causes IS and the subsequent production of antivenom, there is opportunity to review this information from alternate perspectives. Having reviewed the study data from a nursing perspective using a broad group of variables, it is timely to reassess how we manage the person with IS and the clinical parameters we need to objectively and overtly measure and document in order to provide quality nursing care. The findings from the study will contribute to ongoing discussion about the optimum way to clinically manage patients with IS in the future. Discussion of the findings is integrated, as should be the case in a mixed methods approach such as the one used within the study. It is important

to reiterate that there were clear links between the quantitative and qualitative data collected in the study with each informing the other when considering the key study questions.

The questions used to guide the study were:

- What were the characteristics of patients who have suffered an Irukandji sting, including length of stay, demographics of sting – where geographically did the sting occur, where on body did sting occur, what were the vital signs, and pain assessment including extent and severity of pain, duration between admission and being seen by doctor related to level of pain, and the relationship of pain to site of sting and transport modes?
- How did advanced practice nurses in ED reflect on their management of the patients with IS? The following prompts were used:
    - What were your thoughts about the condition of this patient?
    - How did the patient respond to your care?
    - What issues if any were raised for you during the episode of care?
    - What did you think you could improve with the care of this patient?
- How did I feel about the nursing interaction? The following prompts were used:
    - Did the patient receive optimum care?
    - Could anything have been done by the nurse to improve the outcome?
    - What was the ED like at the time of the episode?
    - How many patients was the nurse allocated during the observation episode?
    - Any comments – general or specific?

6.2.1 Demographic overview:

Within this study of 186 patients diagnosed with IS, the demographic data captured included:

- social facts such as age, gender, and place of origin;
- facts related to the alleged sting such as where on the body was the sting, where geographically did the sting occur (beach or ocean), first aid management, mode of transport to hospital; and
- physiological data to establish baseline parameters such as temperature, pulse, respirations, blood pressure, oxygen saturation and pain levels.

Key findings from the section of the study related to social facts suggested that while patient ages ranged from 16 to 77 years of age, most stings occurred in people between 21 and 40 years of age. This is consistent with information from tourist operators about the ages of visitors to far north Queensland (Cairns Regional Council, 2008). The gender of the study cohort was fairly even with 109 males (58.6%) holding a small majority. A study by Fenner and Harrison (2000) which surveyed people visiting an island resort in North Queensland which is similarly prone to the appearance of Irukandji jellyfish in the local waters during the summer season, had a consistent result with 124.5 of 208 people in the cohort (59.8%) registered as male.

The data from this study also showed that the time from sting to worsening of the condition was predominantly between 11 to 30 minutes (64.5% of the cohort) which is consistent with the literature (Fenner et al., 1986; Fenner et al., 1988; Little & Mulcahy, 1999). According to the study data on hospital admission, the largest number of IS

presentations within the cohort (71.5%) occurred between 1200 and 1900 hours. This also aligns with the hottest part of the day, which in the tropics can be very hot and humid, increasing the likelihood that people will swim at the local beaches, and for people stung at the reef it mirrors the times that dive vessels are either visiting or returning from the reef pontoons or island resorts. Most dive vessels currently leave their moorings to travel to the reef between 0730 and 0830 hours each morning. The trip to the reef usually takes approximately one and one half to two hours and leaves at approximately 1530 hours for the return trip. Taking sunrise and sunset times into consideration, it is unlikely tour operators would be willing or able to change departure or arrival times to allow visitors to swim at other times of the day. It is also postulated that the jellyfish are likely to be present in the water at any time of day, so any changes in boat trip times would see the sting time data change also.

It is also noteworthy that there has been a shift in regard to the geographic location of the stings over the years of the study. In the initial years, particularly 2001 to 2003, 82 patients (44%) of the study group were stung at the beach, whereas in the subsequent years, 2004 to 2007, the number was very small (n=27, 14.5%). Conversely, the numbers of people stung at the reef (including off shore islands) increased over the years of the study, and in 2006 and 2007 31 patients (16.7%) were diagnosed with IS after swimming at the reef. In the context of overall inbound tourist numbers, there was a drop in tourist numbers of -1.5% in 2001; -0.3% in 2002 and -2.0% in 2003 which was not predicted by Tourism Australia (2006). Interesting, in 2004 when the number of people stung was the second lowest seen over the years of the study, the tourist numbers increased by 9.9%, and in 2005 with the lowest number of stings, there was a further 5.0% rise in tourist

numbers. With the strengthening Australian dollar continuing to rise in 2006 and 2007, the numbers of tourist had small rises but well below expectations. The projected increase of 2.8% for 2006 was actualized as 0.6% (a reduction of 2.2%); and the projected increase of 5.0% for 2007 was actualized as 2.0% (a reduction of 3.0%) (Tourism Australia, 2008).

This raises the issue of the wearing of protective clothing while swimming at the reef. While mainland beaches do have nets and signs warning of the dangers of stingers, there are no such protective devices at the reef. Identified diving or swimming areas are demarcated by flotation ropes only so the logical protection for the swimmers or divers is protective clothing such as stinger-resistant full body suits. There is also the assumption by many, including local residents, that stingers are not present at the reef (Harrison et al., 2004). This data could potentially be affected by a larger number of tourists visiting the reef during this time; however the tourism research data is not specific enough to clarify if this is the case. Nonetheless, it is interesting to see the clear shift in geographic site of sting, especially as the numbers of people stung at the beaches has dropped where in theory, they should stay the same if the rise on the reef was due to the increase in tourist numbers alone.

Reviewing the data of patients who required extended care for IS, 15 patients (8.1%) were sick enough to require hospitalisation in critical care areas. Of this group, 6 patients (40%) were local residents, 3 of whom (50%) were swimming in the water outside the protective nets. While this is a small number of people, extra protection such as the wearing of protective suits may have prevented their hospitalisation for serious IS. The

impact of IS on the patient is profound and while the precautionary steps taken by Lifesaving Queensland over the last few years have been positive, there are still people being stung where added precautions could have potentially prevented the sting. If a model of change is to be implemented it is important to understand what motivates people to change their behaviour. In this case, two groups of people must be considered because for swimmers to be protected against IS, both the tourism industry and the tourists need to be willing to embrace the change.

There is considerable research regarding behaviour change written about diet, smoking, healthy lifestyle and weight loss to name a few. If I apply this research to the tourism industry and prevention of IS, a number of issues are raised. Research in health and social psychology has drawn upon social cognition models (Azjen, 1985; Rogers, 1975) which highlight a role for behavioural intentions, attitudes and motivation. In terms of behavioural intentions, it is shown that the intention to perform behaviour can be translated into actual behaviour. For example, Yzer and Siero (2001) in a study looking at the use of condoms with new sexual partners showed that the intention to use condoms predicted condom use. Applied to the tourism industry, if people wishing to swim in the ocean during the summer (stinger) season intended to wear protective clothing it could be predicted they would wear it. Attitudes, which are described by Conner and Norman (2005) as a function of a person's salient beliefs which represent perceived consequences of the behaviour, are generally directed at the behaviour rather than at the target of the behaviour. Thus where attitudes to wearing the protective lycra suits are that they do not look good, it would not matter if they were effective, it is unlikely people would wear them. While there are many forms of motivation, both positive and negative, if an

intervention could encourage individuals or groups to be motivated by factors such as ethics, it might be more predictive of positive outcomes. If ethical motivation was applied to the tourism and dive industry, this could be a very powerful catalyst for successful change leading to the mandating of wearing of protective suits when visiting the reef on tour boats.

Of the complete study cohort, 82 (44.1%) of the affected people by IS were from the local area, where annual campaigns remind people to enter the water with care and use appropriate protection, such as swimming within the protective nets at local beaches. Data shows that the number of affected locals was reduced over the years of the study. In spite of this, the study has identified that a greater number of people were stung at beaches where nets were available; however many of those stung were outside the nets at the time of the sting. This was confirmed in the study, as of the 109 patients reported as stung at the mainland beach, 64 (58.7%) were listed as swimming outside the nets at the time of being stung. This has implications for long term education programs for locals and tourists alike. It is clearly not enough to have signage warning of the potential for jellyfish in the water and it is unlikely the lifesavers on patrol would, or should, act as jellyfish police, but alternate forms of public health education should be investigated.

A study investigating behaviour change interventions in adolescents (Crutzen et al., 2008) looked specifically at internet-delivered interventions as a way to educate adolescents about healthy lifestyles and their benefits. This is one area where there is limited information provided to raise awareness of IS and cause people to reconsider risky behaviours such as swimming without protective swimwear.

Several recommendations came out of the study including

- an attractive interface at first sight;
- identification of topics that were of interest to the target group and on which they might look for information;
- the importance of using visual material such as pictures, videos and graphs, and interactive features such as quizzes; and
- the intervention should not take too much time to complete.

Applying these points to a tourism or news website would mean that the web page should be visually appealing with numerous activities and options for gathering relevant information. The message in relation to the appearance of jellyfish should focus on safety rather than on the risks, therefore promoting a positive message which is consistent with the social cognition theories of behaviour change (Ajzen, 1985; Rogers, 1975). The use of web-based activities should be initiated in addition to current notification activities such as news reports on television and in the print media. This provides variation and offers choice to people whose media use varies depending on their ages and experience.

A confounding factor related to IS in particular, is the fact that the stinger-resistant nets are designed to filter only larger jellyfish such as the box jellyfish (*Chironex fleckeri).* This creates a problem for anyone who assumes that swimming within the nets also prevents being stung by Irukandji jellyfish or other very small marine animals. This is not the case as the Irukandji jellyfish (*Carukia barnesi*) and similar sized marine stingers can penetrate the nets. However, according to the makers of the nets, 'Uninet', there is no current plan to develop a micro net as it will also prevent any water movement within the

net area leading to stagnation of water within the net as well as causing an inability of any exit of marine animals that were inadvertently washed inside the net.

To assess the public knowledge and awareness of the stingers, a study completed by Harrison et al. (2004) investigated the knowledge and behaviours of locals and tourists regarding Irukandji jellyfish. The study specifically targeted local residents and tourists who visited an island near Townsville in North Queensland, which is similarly prone to the appearance of Irukandji jellyfish in the local waters during the summer season. This study (n = 208) found that 50% of the international tourists, 20% of domestic tourists and 3.9% of local residents incorrectly assumed it was safe to swim inside the stinger-resistant enclosures or were unsure ($p<.001$), while only 42.3% of respondents realised that there was a risk of being stung by Irukandji jellyfish when at the outer reefs. It concluded that international tourists had little knowledge about Irukandji jellyfish or the related dangers. It was therefore suggested by Harrison et al. (2004) that "accurate educational messages may need to be targeted at this group" (p. 2). In the same study, they also recommended that tour operators should be "encouraged to provide clients with protective clothing to minimize the risk of stings" (p. 2). It is now six years since that study was undertaken, yet it seems that the same issue remains unresolved and people continue to be at risk of IS. While there does appear to be a trend towards less cases of IS in the region, more of the cases that are occurring are tourists who clearly are not heeding whatever educational messages they may be exposed to.

It appears too, that it is not just the tourists to the area who need further education regarding the risks related to conditions like IS resulting from swimming in tropical

waters. Local campaigns remind people that the weather conditions are right for the movement of jellyfish from the rivers and creeks into the ocean, however as occurred this year on the appointed first day of the season, if you missed the message on the evening news report or you did not listen to the radio bulletins throughout the day, you would not necessarily have known that the season had commenced. This appears to have occurred, at least for some people, as the following day three people were stung at the reef and taken to hospital with IS. Daily beach reports do occur on some radio stations, but the communication is erratic.

The study identified the predominant age groups diagnosed with IS in the cohort as 21-25 (26.3%), 31-40 (23.1%) and 26-30 (21.5%) respectively with a median age of patients of 27.0 years (interquartile range = [23, 34.25]). Recent figures from the Australian Bureau of Statistics (2004) identified that in 2003, one million (21.3%) of the total number of visitors from overseas to Australia were aged between 20 to 29 years and were on holidays, while visitors aged between 35 to 44 years (18.4%) were here primarily for business reasons. Social research has shown that age is definitely a factor to be considered when determining the most effective way to send public health messages (Carmel, Shani & Rosenberg, 1994; Leshner, 2001; Maibach, 2002). This 20 to 29 age demographic is very familiar with alternate technology, particularly the internet and programs such as Facebook and MySpace, which they use frequently and which could be better used to promote the area and prevent unnecessary health risks for the tourists. Little apparent effort has been made to exploit the opportunity to use this medium to promote swimming in tropical waters and describing options for making the activity safer. It is evident on tourism websites that the risk associated with swimming in the ocean during

the summer months is described. The opportunity is therefore created to promote the use of alternate forms of water activity; however this is a less than desirable outcome for the local reef operators who make their living taking people to swim and dive at the reef even though it is in their interests to keep the people safe while swimming and diving.

While stinger-resistant clothing is available from the tour boat operators, if, as Harrison et al. (2004) suggests, 57.7% of the tourists surveyed did **not** know that stings could occur at the reef; these same people would not know to request the protective suits before entering the water. Thus, it is suggested that the tourism industry and the reef operators become proactive and mandate the use of such equipment for all passengers who wish to enter the water. Further, it would be prudent to suggest that the wearing of protective suits should become a legal requirement for all tour boat operators. The currently available protective suits range in price from $(A) 60.00 to $(A) 100.00 and as the majority of the operators already have the equipment, this would not be an onerous cost although there would certainly be ongoing care and maintenance requirements. It would seem there is really no reason preventing tour operators from implementing this program of prevention. Considering a risk-benefit analysis, it would seem the benefits of implementing such a process would significantly reduce the risks of people being stung and thus outweigh any costs incurred. While protective body suits are not visually desirable but with some creative lateral thinking, anything can be sold in a positive light particularly when the bigger issue, such as swimming and diving on the Great Barrier Reef, is so enticing. People coming to Far North Queensland usually plan to visit the reef during their trip so it is necessary to develop strategies to ensure the safety of these

swimmers. It is also essential that strategies developed and used for this purpose recognise the need to target age groups in the most appropriate way available.

When reviewing each episode of care, the participants in the study also reflected frustration at the ease with which people could have been prevented from being stung simply by wearing protective clothing. This was particularly evident when caring for local residents who acknowledged that they had protective clothing but chose not to wear it while in the water. This is illustrated by one nurse participant who was surprised and disappointed by a patient who stated he had been stung several times before but refused to wear protective clothing.

6.2.2 Pain:

As pain is such a significant issue for the patients who are admitted to hospital with IS (Barnett et al., 2005; Corkeron, Pereira & Macrokanis, 2004; Fenner & Harrison, 2000; Isbister, 2007), it is important to ensure they are seen as quickly as possible by staff who are authorised to order appropriate pain relief. A number of patients within the study reported to the participating nurses that the pain was worse than they had ever experienced, and therefore pain management was a critical element in improving the situation as quickly as possible for the patient and their families. While the sting inflicts generalised severe muscle pain, patients with IS undergo two seemingly innocuous procedures that could cause worse or extended pain – insertion of cannulae, undertaken by nurses, and skin scraping for jellyfish tentacles to provide data for nematocyst research – undertaken only by medical staff following patient consent. These procedures are examples of situations that support the idea that "the simplest procedures can cause

the greatest pain" (Pasero & McCaffery, 2002, p. 59), although Pasero and McCaffery (2002) state that even turning these patients causes pain.

In the acute environment, narcotic pain relief is ordered only by medical officers which, given the pressure under which both nursing and medical staff within the ED work, means some patients will wait longer than the desirable length of time as specified within the ATS guidelines to be seen by a doctor and have pain relief ordered.

Within this study, pain was assessed in association with:

- the time taken to be seen by the doctor,
- the mode of transport used to deliver the patient to hospital,
- ethnicity of the patient, and
- physiological measures of pulse and blood pressure.

Pain levels were assessed based on either medical notations in the patient's chart or information provided directly from the patient to the staff; however I was unable to determine the basis for the classification by staff due to the lack of consistent information. On approximately five occasions a fluorescent orange *pain* sticker with a numerical score (1 -10 scale) was placed into the patient's chart. However, there was only one sticker in each of five charts with no subsequent follow up documentation of pain status.

Pain assessment documentation within the study was poorly completed by the participants. This made it harder to manage patients due to the lack of clear links between pain and other symptoms such as anxiety, irritability, frustration and physiological

parameters, as found by others previously (Bourbonnais et al., 2003; Bryant, 2007; Odhner Wegman, Freeland, Steinmetz & Ingersoll, 2003). Interestingly, Odhner et al. (2003) warn that if pain is ignored, many of the signs and symptoms that flag a need for action will revert to normal and therefore the opportunity to identify and treat abnormalities will be lost. For the patient with IS, this lack of identification of signs could lead to serious exacerbation of the condition and possibly an extension of hospitalisation time. Copp (2006) suggests that emergency nurses, no matter how busy, must act as advocates for pain management for their patients, especially those who are unable to communicate for whatever reason. If they do not act as advocates, and undertake best practice activities regarding assessment of pain and reassessment of the pain relief effectiveness, there is a flaw in the care regime which could disadvantage the patient.

Interestingly, the participants within the study did reflect on the pain status of their patients and the assessment of this on several occasions. While it was pleasing to hear pain status mentioned, there was no apparent assessment or reassessment made in the cases observed. To further assist in pain management, it is critical that accurate clinical (physical) assessment is conducted as regularly as the patient's condition determines.

The normal parameters of pulse and blood pressure were selected for the study, using those generally accepted within medical and nursing schools when teaching about vital signs (Lord & Ramsden, 2007), that is, adult pulse between 60 and 80 beats per minute; and blood pressure between 110/70 and 130/85 mmHg. There will always be some individual variations from these parameters however, which may be due to fitness levels and the presence of disease or illness, for example. As the toxin implicated in IS is known

to effect the cardiovascular system, it is important to monitor these parameters (pulse and blood pressure) regularly as determined by the condition of the patient to ensure that the cardiovascular system is not compromised. The physiological response to the Irukandji toxin is known to raise the pulse and blood pressure (Monaghan, Parkinson, Armstrong & Cadogan, 2007; Winkel et al., 2005). However, this was not observed consistently in this study. Only 19 (10.2%) of the complete study cohort were both tachycardic and hypertensive together although the data shows further patients were affected by either hypertension or tachycardia.

Irrespective of other variables, it is imperative that all patients have their vital signs monitored regularly to ensure any actual or potential sequelae are identified and appropriately treated. As the quantitative study data showed, overt and documented clinical (physical) assessment was not well done by the participants. In support of this result within the qualitative arm of the study, this risk was manifested in no clearer way that the young man with undiagnosed asthma. The underlying (and unrevealed) presence of asthma eventually concerned the nurse but early assessment and subsequent close monitoring would have reduced the potential risk of pulmonary oedema for this IS patient. The negative cardio-respiratory outcomes associated with IS are debilitating and potentially life-threatening for the patient and prolong the hospital stay. Care of patients within the level 3 intensive care or coronary care unit is currently costed within a Casemix funding model at $3,379 and $1,689 per day respectively. These costs are significant and as a secondary consideration, this reflects an added fiscal burden on the organisation due to the high dependency care and cardiac testing required. Hence, it is important that nurses conduct a thorough assessment and recognise the signs and

symptoms of cardio-respiratory conditions that may be exacerbated by the systemic effects of the jellyfish toxin.

The principal issue for me was the dearth of documented evidence that a thorough physical assessment was actually occurring. The data clearly showed the lack of documented episodes of assessment; however, there was also little evidence during the reflective discussions that the participants were aware of this as an issue. In the aforementioned episode with the asthmatic patient, the participant nurse considered this event retrospectively; however there was a noticeable lack of formal assessment on admission into the unit from the triage section. The triage nurse did however document specific data when the patient entered the ED such as vital signs, pain level, and a general visual assessment that provides the basis for an Australasian Triage Scale category assignment.

If limited or no regular assessment is conducted, a differential diagnosis can be compromised. The signs and symptoms of IS are accepted as being distinctive, however every patient admitted into the ED should be constantly assessed for alternative diagnoses. In auditing patient charts, this is clearly seen as an integral step in the medical admission process, although timing of this assessment by the medical officer is dependent on the activity within the unit. Yet the documented information is often not available to the nurses for several hours due to workload pressures placed on ED doctors which is a difficult problem to resolve. Doctors are also working under great pressure of patient throughput and unless an increase in medical staffing allows each doctor to write up their notes in a contemporaneous way, the problem will continue. With advances in bedside

technology, it is possible that both doctors and nurses in the local ED will be able to enter and retrieve patient information and data directly via a bedside computer or hand-held device (Bullard, Meurer, Colan, Holroyd & Rowe, 2004; Carr, Bangalore, Benin & Holmboe, 2006; Gururajan, 2004; Husk & Waxman, 2004) which will significantly improve ED management, reporting and research, enhance data sharing, and ultimately improve the quality of care for the patient (Gillam, Rothenhaus, Smith & Kanhouwa, 2004; Sharman, 2007).

Further, while irritability and frustration are an increasing public response to waiting times and delayed treatment, they are also well known symptoms of an alternative condition associated with water sports, namely decompression illness (DCI) (Bennett, Lehm, Mitchell & Wasiak, 2007; Gaye, Sevinc, Ozgur, Tuna & Fusan, 2007; McDonnell, 1999). Where symptoms such as those of DCI are evident and the patient has been diving, it is imperative at the very least to gather a dive profile for consideration. This is a simple step in the differential diagnosis process for any nurse or doctor caring for patients with water-based injuries, and would alleviate any concern the nurse may have, as one study participant identified on reflection. Even if the medical admission is not completed in the patient's chart, the nurse has a responsibility to act as the patient advocate and raise any question they have that might improve the episode of care. This was particularly noticeable when the patient was not seen by the doctor within what is considered a reasonable time following admission. The Australasian Triage Scale specifies the time within which patients should be seen and assessed based on the severity of their condition (Curtis, Ramsden & Friendship, 2007). This is accepted by Governments as the benchmark for acceptable ED processes.

There are five codes that categorise the patient as they enter the ED, based on the severity of their condition:

- Code 1 (resuscitation) requires immediate intervention
- Code 2 (emergency) requires intervention within 10 minutes
- Code 3 (urgent) should be seen within 30 minutes
- Code 4 (semi-urgent) should be seen within 1 hour
- Code 5 (non-urgent) should be seen within 2 hours.

Patients admitted to the ED with IS are generally coded as Code 2 or Code 3 and according to the study data, 162 (87.1%) were indeed seen within the required time. However, given the actual and potential seriousness of untreated pain such as changes in transmission of nerve impulses within the nervous system, alterations to production of hormones such as adrenaline, and possibly prolonged chronic pain states (Dunwoody et al., 2008), 24 patients (12.9%) were not treated within the acceptable ATS timeframe. Irrespective of which level of pain the patient is experiencing, the earlier the initiation of narcotic pain relief, the better the outcome for the patient (Bryant, 2007; Pasero, Manworren & McCaffery, 2007).

This can be a contentious issue for advanced practice nurses as in many hospitals the policy of medical staff only initiating pain relief is a standard practice (Fry & Holdgate, 2002; Smallwood, 2004; Tanabe & Buschmann, 1999). Historically, nurses could recommend to doctors that certain medicines should be prescribed, although these recommendations were not always enacted (Stenner & Courtenay, 2008). The benefits of nurse prescribing were identified by Stenner and Courtenay (2008) when they reviewed the expansion of the UK nurse's role to include prescribing of drugs to patients with acute

and/ or chronic pain. This is not yet common practice for advanced practice nurses in Australia and it is agreed by many researchers that an issue that is evident is the lack of knowledge of acute nurses about pain and pain management including pharmacology (Dunwoody et al., 2008; McCaffery, Ferrell, O'Neill-Page & Lester, 1990; Tanabe & Buschmann, 2000; Twycross, 2002). Unless medical staff and organisational managers can be assured the nursing knowledge and skills in pain management is up to date, there is little chance of actioning major policy changes in this area in the near future. Clearly, this has implications for the implementation of the clinical guidelines developed within this study. To improve the situation and reassure the medical staff and managers, the education processes put in place prior to the implementation of the guidelines will integrate pain management and pharmacology into the program to be undertaken by all nurses who are selected to use the guidelines.

It was evident to me during the observational episodes that a clear knowledge and understanding of IS was not consistent across all of the participants. The local Marine Stings package is available to all nurses who commence work in the ED although it is not a mandatory requirement. Even though nurses choose to complete the package, this does not mean they are experts when caring for patients diagnosed with IS, particularly if they have minimal exposure to the patients during the stinger season. This was reflected in the study participants who had completed the package as a mandatory criterion for inclusion in this study, but where two of the participants had minimal actual experience with the patients with IS. They clearly understood the theory of the stings and were able to answer knowledge questions regarding the signs and symptoms of the condition, but two issues raised for me were: (a) assumptions made about the patient's condition based on what

was called “the classical picture” of the sting victim, where during the episodes of care, inexperienced participants were less watchful of the patient because colleagues identified the patient as “a classic” case of IS who would progress to discharge in an uncomplicated manner; and (b) interpretation of symptoms based on the inexperience of the nurse. This was particularly evident in the situation where a patient who had been SCUBA diving could have potentially had decompression illness but this was not considered by the participant for some time until a colleague of the participant asked about the dive history.

As the Irukandji jellyfish season runs over the Australian summer, it is possible to predict that some stings will occur during the Christmas and New Year holiday period. The occasional patient admitted with IS may then have been enjoying the party atmosphere and could be inebriated when admitted to the ED. Alcohol reduces the capacity of the patient to understand instructions, thus compliance with instruction and treatment may be an issue for some patients. Inebriated patients may also cause difficult communication between the patient and staff. The presence of alcohol also distorts the perception of pain so it is prudent to ensure the patient remains in hospital until sober enough to make a more accurate judgment about their pain status. The policy of the local ED is to keep the patient in the department for a minimum of six hours before considering discharge. Unless the patient’s condition deteriorates significantly, even those patients who may need inpatient care in ICU or CCU will remain in ED receiving care for IS for this time period.

Standing orders (or ‘range orders’ as described by Pasero et al., 2007) for drugs are regularly embedded into practice environments such as ED, Intensive Care and Coronary

Care units (Caunt, 1992; Chaney, 2004; Flischer, 1995; Heath et al., 2003), but these rarely include opioid drugs. Traditionally the drugs placed on standing order lists include minor analgesics such as Paracetamol and targeted medications such as thrombolytic therapy. However, studies published since 1999 indicate broader application of drugs including oral opioids (Oxycodone) (Campbell, Dennie, Dougherty, Iwaskiw & Rollo, 2004); Schedule 4 analgesic drugs (Panadiene Forte) (Fry et al., 2004); and anaesthetic agents such as Propofol and Midazolam (Huey-Ling, Chun-Che, Jen-Jen, Shau-Ting & Hsing-I, 2008). While there is a well documented clinical picture of the patient with IS as discussed previously within the study, staff were heard to describe the patient as "classic". For the inexperienced nurse this may create an erroneous mental clinical picture of the patient without the clarity generated through practical experience. The importance of links between theory and practice are well documented (Carnwell, Baker, Bellis & Murray, 2007; Carson & Carnwell, 2007) and for two of the participants this linkage had not been made when reflecting on practice with me during the episode of care. One participant did reflect on her lack of familiarity with these patients. She said during reflection "*I'll get plenty* (of experience) *if it's a busy season*" (21), however this may cause issues with care provision until the time this connection occurs. The ED Marine Stings learning package (Hudson, 2004) is evidence-based and provides a sound introduction to the condition of IS, however little review of skills is included as part of the package. Purely completing the package is not an assurance that those nurses had experience with managing patients with IS, nor that they were capable of functioning at an advanced level but it is still a sound starting point and could be supplemented with skills assessment with some content and process adjustment.

Two specific Australian studies have focused on opioid administration by nurses within the ED environment (Coman & Kelly, 1999; Fry & Holdgate, 2002) however the earlier study still required the medical officer to initiate and document the opioid order and the nurses were required to *manage* the titration and administration of the drugs. The study by Fry and Holdgate (2002) was specifically focused on measuring the analgesic efficacy and adverse events following autonomous nurse-initiated intravenous Morphine administration and also determine whether this process would improve the time to analgesia. A particularly critical result in their study was that following comparison of median times from triage to administration of nurse- initiated Morphine, and the time for those same patients being seen by the doctor, the median difference was 26 minutes. "That is, these patients received their narcotic on average 26 minutes earlier than if they had had to see a doctor before analgesia could be ordered" (Fry & Holdgate, 2002, p. 251). Their conclusions were very positive and should serve as a benchmark for implementation of similar practices in any ED in other Australian cities.

Excitement about this progress however must be tempered by the need to ensure appropriate education in pain assessment, pharmacology and pain management is provided to all the advanced practice nurses who would be selected to use the clinical guidelines (Blenkharn, Faughnan & Morgan, 2002; Carr, 1997b; Twycross, 2002; Young, Horton & Davidhizar, 2006). Conversely, Tanabe and Buschmann (2000) researched ED nurses' knowledge of pain management and were very positive about the results. ED nurses in the study scored highest on survey items investigating knowledge and level of pain assessment, although the nurses, while reflecting on barriers to pain control, identified inadequate assessment practices and staff knowledge as two main factors. Thus

it is not as simple as just providing education, as there should be additional processes to measure the knowledge application to ensure the critical skills of assessment and problem-solving are consistent with organisational and legislative policy as well as being current and linked to the evidence (Twycross, 2002).

This study did not include assessment of the nurses' knowledge of analgesics however the quantitative evidence indicated that overt pain assessment was poorly attended by the participants. In the qualitative component of the study, it was identified by participants that they were conscious of the time taken to see the doctor and a reflective comment identified a desire to have nurses initiating the narcotic pain relief to improve the wait for the patient. Prior to the implementation of the clinical guidelines from this study, a comprehensive education program targeting IS and the nursing management of the condition, as well as pain assessment, pharmacology and pain management will be implemented that will include competence assessment.

Competency-based education has supporters (Arcand & Neumann, 2005; Clark, 1999) and critics (Chan & Garbez, 2006; Pincombe, McKellar, Grech, Grinter & Beresford, 2007). There is general agreement that theory alone does not guarantee sound clinical practice (Blenkharn et al., 2002; Christensen & Hewitt-Taylor, 2006; Dalton et al., 1996; Twycross, 2002) and since the early 1970s, writers have described both skills and knowledge as being critical elements of expertise (Liebermann, 1981; Moore, 1970). There are some clear linkages here between these critical elements and the choice of a reflective practice framework for this study. Advanced practice nurses can rapidly assess a situation without consciously checking for alternatives; this ability having been

developed from a combination of knowledge and skills gained from education and 'real world' experience linked in holistic practice. Rolfe (1997a) considers this combination of tacit, experiential, and theoretical knowledge produces best practice, which is supported by Phillips (1994) and Radwin (1995).

One major criticism of competency- based frameworks is the lack of consistency across an environment that is broader than specific individual clinical facilities, and the unknown level of evidence to support the use of competencies (Chan & Garbez, 2006; Chiarella, Thoms, Lau & McInnes, 2008; Pincombe et al., 2007). In Australia, there are currently a number of sets of competency standards that support clinical practice for nurses (ANF, 2005; ANMC, 2005) but these are not always reflected within competency documents developed in response to emergent situations. The importance of integration of these documents into any competency framework cannot be overstated as they are required to meet standards of practice determined by regulatory bodies.

Irrespective of the person's geographic location at the time of the sting, if they have pain and are distressed they need to be transported to hospital for emergency care. In this study, the three most common modes of transport were:

1. using personal transport such as private car or taxi;
2. Queensland Ambulance Service (QAS) land transport; or
3. helicopter used by Emergency Management Queensland (EMQ) (See Figure 1).

However, rarely were fixed wing aircraft used during this study, and only one patient was air-lifted from Lizard Island by fixed wing aircraft owned by the Royal Flying Doctor Service (RFDS) (Lizard Island is 240 kilometres north of Cairns with its own airstrip).

Figure 6.1: Bell 412 Helicopter

With no data available for release by Emergency Management Queensland, an approximate cost per flight/trip was calculated from information retrieved from a number of relevant websites (ExxonMobil Aviation, 2008; International Air Transport Association, 2008). According to information accessed from the Careflight group, who provide aero-medical retrieval similar to those occurring within this study, the average cost of a rescue in Queensland is $7,000 (Careflight Group, 2008). The Bell 412, as pictured in Figure 1, was the helicopter used during the period of this study. It uses 400 litres of aviation fuel per hour and an average domestic mission of approximately one and a half hours will cost up to $600 in fuel alone. Added to the fuel costs are the staff costs, cost of supplies including drugs, and the depreciation costs of the equipment used on board the helicopter. Even without definitive costing, this is an expensive operation.

If discussions between the staff of the helicopter, tour boat operators and the local ED were initiated regarding the usage of this form of transport, it could be suggested that the level of a patient's pain could be a clinical indicator necessitating the use of the helicopter. If appropriate pain relief was provided to the patient, it could be suggested that patients whose pain is determined as "mild" using a standardised scoring scale, would be appropriately transported using a less expensive method of transport with no resulting compromise of their condition. This is especially relevant if the retrievals are from sites such as Green or Fitzroy Islands which are less than 35 kilometres from Cairns by sea.

An added dimension to this discussion is the importance of an explanation to both the patient and their support person/s about the condition and appropriate treatment. It is not enough to provide information to patients about IS unless they understand: (a) the condition, and (b) how the treatment will progress. This includes information about pain management so that the fear regarding their condition is reduced and their pain is effectively managed and thus relieved. When pain-free, even patients from non-English speaking backgrounds who are often more difficult to communicate with, are able to be transported using less expensive transport options while still receiving optimum care.

A pervasive theme within the study was that clinical activity could be significantly impeded by language difficulties where the patients did not speak English as their first language. The inability to gather information regarding clinical status because of lack of common language was frustrating for both patients and nurses and led to some less –than-ideal clinical situations. If interpreters had been freely available to assist with

communication processes, I believes the patient's progress would have been more streamlined and the nurses less frustrated with their inability to deliver care in a timely and effective manner. Byrne (1997) describes anxiety within emergency departments as being caused by a number of factors such as being uncertain about the diagnosis, having to undergo uncomfortable procedures and pain, which are exacerbated by language difficulties. During observational periods, one specific anxiety voiced by patients in this study was the lack of knowledge about what would happen in the department. Bourbonnais et al. (2003) cited poor communication as a specific source of anxiety within ED's and recommends that factors such as those identified by Byrne (1997) should become part of the contextual assessment. Difficulties with communication were also the principal underlying cause for some of the problems with assessing pain effectively within the study.

If anxiety has such a powerful impact on pain levels of patients, it is imperative that nurses proactively drive the provision of information for the patient. Studies over many years (Cochrane, 1989; Dellipani et al. 1976; Ferrell, 1991; Hirsh, George, Bialowsky & Robinson, 2008; Johnson, 1982; Polomano et al. 2001; Starck, Sherwood & Adams-McNeill, 2002; Thompson, 1989; Wallace, 1985;) have concurred regarding sources of anxiety for patients in hospital such as lack of information, poor communication, feeling helpless, being treated by a doctor you didn't know, and being unable to control what is happening to you. Lack of knowledge is a powerful cause of anxiety states (Byrne, 1997). By simply informing the patient step-by-step about what will happen, what treatment options are available, what can be done to alleviate the pain, and how the patient can assist the nursing staff, their anxiety could be reduced to a level that is quite manageable.

Finestone, Alfeeli and Fisher (2008) in their study based around musculoskeletal pain, identified important links between psychological and social factors and recovery from soft tissue insults. While they stated that the psychosocial aspects including the state of distress of the patient must be an integral part of the management of the patient, they acknowledged that this aspect of care is rarely formally recognised n musculoskeletal medicine. Including the patient in the care process and acknowledging that the psychological status of the patient is important should improve the patient outcome and hopefully reduce the length of stay.

6.2.3 Narcotic Pain Relief:

While the study data showed that only 34 (18.3%) of the patients had overt pain assessment documented, few patients were seen to suffer from inadequate pain relief caused by lack of assessment. However, the qualitative data from the reflective discussions showed that the nurses' inability to initiate narcotic pain relief was stressful for them and led to disengagement by the nurse in some situations. This is a less than desirable situation for both patient and nurse and may contribute to poor outcomes and extended length of stay.

Medical evidence from over many years of caring for patients with IS indicates that the use of opiates is an important part of the treatment strategy. However the drugs of choice for particular conditions change over time and currently Fentanyl has become the drug of choice to provide optimum pain relief for IS. Fentanyl is now recommended as the initial treatment strategy with Morphine indicated as a secondary option. For a number of years people diagnosed with IS were ordered intravenous Morphine for pain relief. Morphine

has a number of serious side effects such as respiratory depression, so caution should be exercised when using the drug at any time (Bell, 2000; Coman & Kelly, 1999; Pasero, 1999). Further, given the known effect of the toxin on the cardio-respiratory system, it makes the risk associated with using opiates for these patients even more acute.

In this study the ongoing issue of timely ordering of narcotic pain relief was raised periodically by the nurses caring for the patients with IS. The study data showed the majority of patients (n=128, 68.8%) were seen by a medical officer within the first 15 minutes, therefore it is difficult to persuade the medical officers that there are further improvements necessary. The nurses themselves were troubled by the time taken to have pain relief ordered but were not seen by me as using their advocacy role to expedite the completion of the medication chart by the doctor. Given that it is imperative that efforts are made to improve the timeliness of the ordering of pain relief for all patients, the patients with IS, including those who waited between 15 – 90 minutes, would benefit significantly from future changes in assessment practices within the department.

McCaffery, Pasero and Ferrell (2007) describe at length the incidence of under-treatment of pain by nurses which has not changed greatly since the landmark study by Marks and Sachar (1973). That study showed 73% of the study sample still complained of moderate or severe pain in spite of being treated with opioid analgesics. Much of the work by McCaffery et al. (2007) suggests that the use of protocols, particularly for opioid use, would assist in ensuring better outcomes through improved pain management. Thus, the major outcome from this study - the clinical guidelines, should contribute to the improvement in pain management for patients with IS. The implementation of the

guidelines will also help override many misconceptions that nurses may have that can cause them to under-treat a patient's pain (McCaffery et al., 2007).

Pre-hospital pain management of IS is currently undertaken by either the Queensland Ambulance Service paramedics or the Emergency Management Queensland helicopter staff, and it was evident that, where necessary, patients with IS who were transported by these groups were administered appropriate pain relief within the specific organisational protocols. Unfortunately, in relation to opiate analgesia, these protocols do not synchronise with those of the hospital to which the patients are transported. This creates a dilemma for nursing staff that currently do not have the legitimate authority to make decisions about pain relief options for the patient. One possible outcome from this study would be negotiating with external providers of pre-hospital care of the patients with IS to use the same clinical guidelines to determine care. As these groups were part of the Delphi expert panel who contributed to the development of the clinical guidelines, this is a possible outcome of future research and discussions. A tangible benefit would be congruent care for all adult patients with IS.

In the study by Tanabe and Buschmann (2000), 186 of the 350 ED nurses surveyed from across Illinois in USA (53%) identified that the inability to administer medication until a diagnosis is made was a significant barrier to effective pain relief. Given the current state of ED with increased patient presentations, reduced staffing of both nurses and doctors, and the difficulty moving ill patients into alternate areas, it is logical to consider expansion of the nursing role and increased autonomy through nurse prescribing and reduced dependency on doctors (Bradley & Nolan, 2007; Rodden, 2001). It has been

proposed that this "may…help to improve the scope and efficiency of nurse-led services" (Stenner & Courtenay, 2008, p. 28). While it could be suggested that this is an opportunity to employ nurse practitioners (NP) within the ED, the added recurrent costs of employing NP's is significant which gives merit to the plan to raise the skill levels of advanced practice nurses already within the environment. The current nursing career structure has a complex classification structure and within this structure at least seven levels of nurses with Grade 5 and 6 could be considered to be at an advanced practice level. I have selected out for inclusion in the comparative table the two highest levels within the Grade 5 and Grade 6 classifications. There are also two levels within the Grade 8 (NP) classification. The first pay point is specifically applied to NP candidates who are currently undertaking their study, while the second pay point is for the qualified NP staff. The current wage rates for the NP (Grade 8) and the advanced practice ED nurse (Grade 5.7 or Grade 6.3 or Grade 6.4) are shown below in Table 6.1.

Table 6.1: Wage Rates for Nurses (2009)

Classification level	Paypoint	Per Annum Wage ($)	Hourly Rate ($)
Grade 5	6	62,110	31.3250
	7	63,396	32.5276
Grade 6	3	68,711	34.6539
	4	70,277	35.4434
Grade 8	1	90,852	45.8211
	2	93,123	46.9658

Retrieved from http://www.health.qld.gov.au/hrpolicies/wage_rates/nursing.asp

Unfortunately while nurse prescribing has been accepted as an integral part of the Nurse Practitioner role (Hooker & Cipher, 2005; Kaasalainen, diCenso, Donald & Staples, 2007; Stark, 2002), this has required many years of negotiation with medical professionals and legislators in Australia. It is therefore particularly logical at this time to actively work toward this step for advanced practice nurses. By collaborating with the

health care team in ED as well as organisational management representatives, it is reasonable to propose the implementation of clinical guidelines for advanced practice nurses which have inbuilt checks and balances approved by medical staff within ED. The quantitative study data showed that some patients did in fact wait longer than the accepted time frame to see the doctor therefore their pain relief was not timely. The comments by participant nurses within the qualitative arm of the study reinforced that the nurses were not necessarily happy with having to wait for doctors to see the patient and they were understandably frustrated by delays in pain management.

While opiate analgesia is the gold standard for effective pain relief in IS, it is also important for advanced practice nurses to consider advocating for alternative pain relief either as a supplement for the opiate or a replacement if maximal therapeutic dosages have been reached. To do this would require improved dosage documentation by nurses in order to be able to periodically total the drugs administered. Current approved forms do not capture all necessary information on the one form, which has the potential to lead to errors of omission due to duplication of information. While this study did not specifically assess the quality of the drug documentation, it was recorded within the qualitative arm of the study that some stress occurred regarding the timeliness of calling for alternative opinions from staff anaesthetists who were members of the hospital's acute pain team.

In recent years, alternate analgesics have been integrated into the pain management regime for patients with IS (See Appendix K3). The current policy within the ED at Cairns Base Hospital states that the two most prescribed narcotic drugs are to be titrated

to effect (a) Morphine (0.05mg/kg) or (b) Fentanyl (0.5mcg/kg) repeated every 5 min(utes) until adequate analgesia or 4 doses achieved (Queensland Irukandji Taskforce, 2007). This policy limitation requires regular review by the doctors to allow continuation of the pain relief regime. A number of patients in the study cohort required significant amounts of pain relief that regularly exceeded this parameter. While the statistical tests used showed no significance in regard to the narcotic requirements and gender, any patient with IS, regardless of gender, must be rendered pain-free if possible to improve their physical and psychological status (Copp, 2006; Pasero & McCaffery, 2005; Pasero et al., 2007). The optimum way to achieve pain-free status for the patient is to ensure that both pre- and post-assessment of pain status in undertaken which is why this assessment is an integral part of the clinical guidelines for use by the advanced practice nurses.

6.2.4 Country of origin:

Ethnicity was considered by me as a phenomenon that warranted further investigation within the study. This was based on the reactions of patients from Asian countries in the observational arm of the cohort, where it appeared they responded very differently when compared to the rest of the cohort to the pain associated with the jellyfish sting. Within the study cohort, 24 patients (12.9%) were of Asian origin and 47 (25.3%) were European, all of whom had English as a second language. The patients who struggled most to communicate with the nursing staff were predominantly of Asian origin. This meant that two-way communication had the potential to be problematic especially in regard to the management of symptomatology such as pain.

These patients did not appear to be relieved of the pain related to IS using the dosages that were reported and observed as effective for non-Asian patients. I also queried whether patients of Asian origin admitted with IS would be hospitalised for longer periods. Analysing the descriptive data demonstrated that the mean time spent in ED by patients of Asian origin was approximately eight hours longer than the time spent by Australian patients. This is quite a striking difference and would appear to support recent research into ethnicity and drug metabolism. As previously discussed in Chapter Four, there is an increasing amount of research into the relationship between ethnicity and the ability to metabolise certain drugs, one of which is Morphine (Gaikovitch, 2003; Heins et al., 2006; Liu, Chung & Wong, 2003; Wilcox & Owen, 2000). This provides additional empirical support for potential international changes to proposed pain management for different ethnic groups. It also raises support for the need for thorough pain assessment by nurses and other health professionals and the need to consider other forms of pain relief when pain relief is not achieved within what is usually considered as 'normal' parameters. While the mean time spent in hospital was elongated for the patients of Asian origin, there was little other quantitative evidence in this study of any other significant relationships related to country of origin.

Conversely, there was interesting data related to ethnicity of the patient reflected from the participants within the study and myself. The principal concern that was expressed related to patients of Asian origin more than the other three classified groups within the study, regarding their inability to communicate with the staff effectively. This was a problem for the patients and the nurses and created what I identified as less than desirable clinical situations that, while not actually putting the patient at immediate risk, could certainly

have extended their stay in ED. The difficulty with communication was a significant issue for the participants and the lack of easily available support from translational resources, both human and material, meant that patients from non-English speaking backgrounds were unable to easily communicate their feelings and needs.

Interpreter services are an integral part of health services in larger facilities within Queensland Health, however many of the interpreters who have been trained to provide this service are not on staff and must come to the hospital from elsewhere when requested. Unfortunately, the majority of patients with IS attended the ED outside standard working hours when the interpreters were not easily accessible to staff. This created difficulty and exacerbated the communication problems as previously identified in Chapter Five. In order to assist the patient, reduce anxiety, and provide optimum information, interpreters are most helpful very early in the episode of care. (Davis, 2000; DeRosa & Kockurka, 2006; Nailon, 2006).

The participants in the study were certainly aware of the language barriers and the impact on their ability to meet the patient's needs; however the advocacy role seemed to be of lesser importance in the majority of situations observed. While Bourbonnais et al. (2003) believe that available pain measurement tools are accurate, it is important to be aware that they are reliable only to the extent that practitioners document exactly what patients say, and only where the nurse or health professional can effectively communicate with the patient. This reinforces McCaffery and Pasero's (1999) position regarding the subjectivity of pain, as while English speaking patients can usually elucidate the status of their pain, patients of Asian origin are often less likely to do so. It is understood that their

communication attempts are often impeded by a lack of language-specific tools to assist in understanding both the questions and the range of responses available to them. Any patient admitted with IS deserves to be assisted as much as possible to participate with staff to determine the severity of their pain and the effectiveness of the analgesia. Bird (2003) researched patients in the United Kingdom who were from non-English speaking backgrounds and suggests that there should be translations of pain tools available for use. The findings of this study support this strategy and I believe it would significantly assist both patients and staff in these situations in future.

An alternative suggestion would be the development of multi-lingual laminated communication cards with specific questions and guidelines regarding responses that could be used by the patient. These could use words or symbols to enhance the message – either would be more useful than having access to nothing. Incorporated within this system would be a pain assessment process. Of the many validated options available to assess pain, the organisation would need to select one and use it consistently throughout their facilities (Blankharn et al., 2002; Bourbonnais et al., 2004; Tanabe & Buschmann, 1999; Young et al., 2006).

Communication between patients and staff was also involved in the difficulties identified with lack of compliance with the plan of care by some patients. Patients of Asian origin were difficult to care for because they did not understand what was being asked of them or what signs and symptoms were to be expected with IS. To expect these patients to accurately use a patient-controlled analgesia (PCA) machine without the assistance of

interpreters or translational material may be an unreasonable expectation and requires further investigation with this group of patients.

Another consideration when managing patients of Asian origin would be the education of staff regarding the way these patients metabolise drugs. Recent studies (Bjornsson et al., 2003; Chung, 2004; Fishbain et al., 2004; Gaikovitch, 2003; Kim et al., 2004; Price, Lobos, Risk & Todd, 2004; Wilcox & Owen, 2000) report differences of metabolism across a broad range of drug groups including narcotics, one of the drugs of choice for managing patients with IS. It has also been suggested (Kim et al., 2004) that international processes regarding the classification of drugs that are metabolised differently should be considered. Kim et al. (2004) identified that the International Conference on Harmonization (ICH) published the "Guidance on ethnic factors in the acceptability of foreign clinical data" in 1998. Their purpose is to facilitate the registration of drugs among ICH regions by recommending a framework for evaluating the impact of ethnic factors on a drug's efficacy and safety. Kim et al. (2004) suggest that part of this process should be the development of a process that divides all drugs into 2 groups – ethnically sensitive or insensitive (p. 1084). These issues need to be known by nurses and others responsible for prescribing and administering pain relief across a variety of conditions and situations.

The gender breakdown within cultural groups was also analysed in the study. The predominant group within the male cohort, by a considerable margin, was Australian. While Australian women were also more prevalent, European women made up a significant group within the cohort. Overall, 106 patients (57.0%) were Australian which

is interesting considering annual presence of the jellyfish and the promotion of safety messages during the summer months. Of course this group did not discriminate between locals and tourists, which could suggest that the message for Australian people is less than successful beyond the local area. Certainly for this group, language was not an issue that could compromise understanding of the messages delivered by radio, television and other forms of media. This is an important finding of the study because it would support any move to update and re-orientate informational and emergency messages.

6.3 Educational preparation of nurses for advanced roles:

Nurses develop expertise when they spend consistent time in a clinical practice area. This clinical experience underpins the expectation that over time the nurse progresses along the continuum from novice to expert. With expert status comes an added expectation that the nurse has expanded clinical skills in decision-making, critical-thinking, problem solving and autonomous practice, as well as professional skills such as leadership, mentoring and research (Gardner et al., 2006; Mantzoukas & Watkinson, 2006).

Hamric and Hanson (2003) identified core competencies of the advanced practice nurse as "direct clinical practice, expert coaching and guidance, consultation, research, clinical and professional leadership, collaboration and ethical decision making" (p. 263). These skills have also been identified as integral to the Nurse Practitioner (NP) role; however specific educational requirements exist that are linked to legislative frameworks, as part of the achievement of this role. It is important to reiterate though, that the advanced practice nurses within this study were not necessarily desirous of NP status and did not have a designated position as an 'advanced practice nurse'; they were nurses with a high

level of expertise and experience within a specialised environment whose principal role remains clinically focused.

This finding is consistent with Rolfe's (1997a) description of the advanced practice role being more of a developmental process in the career of the nurse. It is about developing both professionally and personally within the discipline of nursing (Elson, Happell & Manias, 2005). While nurses can and do clinically specialise, advanced practice skills should prepare the nurse for advanced practice in generalist areas as well, allowing a sustained focus on holistic principles (Carseldine, 1998). These skills do not develop in an unsupported environment and the anecdotal expectation that 'the longer one works in an environment, the more expert one is' is grossly inaccurate and ignores the need to provide consistent opportunities for all nurses to achieve this necessary development.

Education to develop nurses' expertise can be provided in various ways including clinically-based inservice programs, formal workshops or education programs, evidence-based learning packages, and conference attendance. Consistent with the principles of learning, both knowledge and skills need to be targeted to bridge the knowledge-practice gap (Franklin, 2007; Russell, 2006; Suter & Suter, 2008). It is therefore important to consider formal education opportunities that provide robust support for the advanced practice nurse.

Recent examination of credentialing of advanced practice nurses has been suggested by the Royal College of Nursing, Australia (RCNA, 2008a, 2008b). Discussions were held in November 2008 at the International Council of Nurses (ICN) Credentialing Forum,

which were guided by the following definition: Credentialing is "a means of assuring quality and protecting the public by confirming that individuals, programs, institutions or products meet agreed standards" (RCNA, 2008a, p. 9). Their focus is on global credentialing, although national programs are already in place in some countries such as Canada. Australia does not have such a program currently for generalist nurses, although specialist programs do exist. For example The Australian College of Mental Health Nurses and the Australian College of Critical Care Nurses (RCNA, 2008a) already conduct credentialing of nurses with specialty skills.

This formal professional process acts to verify and evaluate qualifications, experience and other relevant professional attributes of the advanced practice nurse to ensure they continually provide high quality health care to patients in their care (RCNA, 2008b). It is suggested by the RCNA (2008b) that credentialing is "a key component of professional governance" (p. 3) which ensures that consistent standards of practice are maintained. Importantly, where credentialing processes are in place, there is additional recognition for the nurse for their level of expertise which may benefit the nurse through financial incentives and job satisfaction. The formal, supported professional development would be an additional catalyst for role change and the endorsement of advanced practice nurses being able to initiate narcotic analgesia as an integral part of their role.

Unfortunately, there is currently little formal recognition for advanced practice for nurses within the acute generalist setting. Formal credentialing processes would provide an option for acute care nurses that were similar to the Rural and Isolated Practice,

Registered Nurse (RIPRN) qualification available to advanced practice nurses working in rural and remote settings as previously discussed.

6.4 Clinical guidelines:

A significant outcome from this study was the development of clinical guidelines to support the administration of narcotic pain relief medications by advanced practice nurses within the emergency department environment. According to Field and Lohr (1992), clinical guidelines are systematically developed statements to assist practitioners with decision-making about appropriate healthcare in specific circumstances. The key word to consider when reflecting on the advanced practice role and the need for clinical guidelines is 'guide'. Importantly, clinical guidelines for nursing practice do not replace the diagnosis and management of the patient by medical officers. Rather, the guidelines are used in conjunction with clinical expertise and sound judgment of the entire healthcare team and have the potential to free up the medical officer to attend to other unstable or critically ill patients. I considered the roles of all clinicians within the ED prior to the development of the clinical guidelines to ensure that the tool was supportive of all staff and not so prescriptive that the critical thinking of the advanced practice nurses was undermined.

Carryer, Gardner, Dunn and Gardner (2007), in specifically researching the Nurse Practitioner role, were critical of protocols for being "restrictive" and "inhibiting the development and utilization of capability" (p. 108). Carryer et al. (2007) did indeed make the distinction between multidisciplinary guidelines that aim to *support* practice, and discipline-specific protocols designed to *control* practice. In this study, I used a modified

version of the Delphi technique to develop the clinical guidelines. The 'expert' group reflected the multidisciplinary nature of the clinical team so as to engage all relevant disciplines and reinforce the supportive, rather than prescriptive, nature of the guidelines.

The content of the guidelines were selected by distilling the critical issues elicited from the study data to ensure that areas of importance and relevance to the goal of having advanced practice nurses initiate narcotic analgesia for patients diagnosed with IS were included. Consequently, the two critical issues developed within the guidelines were physical assessment and pain management. Within the design, the key elements of the decision-making process were contained within the central set of boxes connected by orange arrows. These boxes specifically targeted assessment, both initial and ongoing, and included pain assessment. At each point in the process, challenge boxes were included, connected by blue arrows to provide prompts for the advanced practice nurse to either gather relevant information to assist in the nursing management, or to stimulate the opportunity for reflection-on-action.

Included within the challenge boxes were links to further documents that could assist in the decision-making process, for example, when considering pain control, a linked document was included that provided necessary practical information about the commonly prescribed narcotics of choice for IS. Also a second document was linked that provided information about alternative methods of pharmaceutical pain relief to supplement narcotics for the pain related to IS. The linked documents are attached as appendices, both in hard copy (See Appendices K1-K4) and as documents on the attached

CD ROM. The CD ROM version is the preferred format as it opens the links to the attached documents.

While the guidelines are specifically designed for the patient's episode of care within the ED, they could easily be adapted to include either pre-hospital care and/or acute inpatient care within the intensive or coronary care environments particularly those specialising in respiratory or cardiac care. Adaptation of clinical guidelines across contexts is supported by Tu et al. (1989) and Shahar, Miksch and Johnson (1998), who claim that "clinical guidelines can be viewed as reusable skeletal plans that need to be refined by a reactive planner over significant time periods when applied to a particular patient" (pp. 2-3).

Any introduction of new or improved practice tools such as the clinical guidelines must, however, be undertaken in conjunction with education of staff with clearly stated implementation and evaluation strategies. An education program would allow for an assessment of previous knowledge and skills to take place followed by educational input regarding the tool with subsequent follow-up and necessary remedial education put in place expeditiously. Ultimately, the practice of advanced practice nurses within the ED will be expanded and the care of patients diagnosed with IS will be improved. This is the goal of further research flowing from this study.

6.5 Study strengths and limitations:

The purpose of this study was to look at the 'real world' within the environment of a busy regional ED, and potentially improve the clinical situation for patients admitted with IS, as well as the staff caring for them. This was achieved through the combination of case

study using a concurrent nested mixed methods design underpinned by the use of a pragmatic theoretical approach and a reflective practice framework. The strengths of case study research make it particularly useful in areas such as nursing because of the practical nature of the profession coupled with the clinical challenge of caring effectively for patients with IS.

This study was situated as a collective case study using a concurrent nested mixed methods design. This provided a number of strengths consistent with using two robust methods together. Considering the case study approach, and as the patients with IS exhibit a clearly defined and validated set of signs and symptoms, it is reasonable to suggest that data could be extrapolated to a far wider group of cases of marine sting patients being cared for by people providing pre- hospital care; such as QAS paramedics, tourism operators with suitably qualified staff, nurses working in general practice environments where patients may go for initial treatment, and nurses working in smaller health centres where access to medical officers is limited.

Mixed methods use multiple sources of data which has practical benefits and reflects the 'real' situation where people use multiple ways to solve problems and make decisions. This concurrent nested design has reflected the concurrent collection of both quantitative and qualitative data, with quantitative data guiding the study and qualitative data nested within. This meant that I was able to use the seasonal aspects of a jellyfish 'season' to collect the observational data while continuing to collect data from the chart audit concurrently through the season as well as between seasons. This design also allowed description and exploration of aspects of a quantitative study that were otherwise unable

to be measured. Simultaneous data collection from observational episodes and chart audits allowed me to gain perspectives from both types of data.

Case study is flexible and allows the inclusion of multiple data collection methods. As there is no agreed set of methods for case study; methods are selected in relation to the nature of the case and the research question. The question posed was a real-life question based in a constantly changing environment that had specifically explicit boundaries such as locale, culture and group processes where advanced practice nurses provide clinical care to IS patients. While this care is evidence-based, there is so little written about the nursing management of these patients that this can be considered an excellent reason for using case study and thus add to the nursing evidence.

Initiation of the observational episodes followed by the chart audits provided clarity of the research question and initial identification of possible qualitative themes. The data collection tools were able to be refined to capture both quantitative and qualitative components from each episode of care, and allow connection between the empirical data and the reflective observations of both participants and researcher. The use of field work as part of the research design also provided an opportunity for me to compare the observed behaviours and practices of the participants with their reflections on practice, and this increases the robust nature of the study.

An added unanticipated strength of the study was evident early in the observational episodes when my lack of ED clinical background served to allow greater objectivity with the data collection. Certain assumptions about the care provision were anticipated by

me but were quickly tempered by the lack of knowledge of what constituted "normal practice" for the patients with IS. This allowed me to see the episode of care through eyes unaffected by what might normally be expected by a more experienced ED clinician. Hence, the position of "outsider status" was helpful to the study outcomes. It was imperative that during each observational episode little contact occurred between me and nurse so that my presence did not create difficulties for the nurse. It was also important that the patient did not consider me as a second carer to whom they could direct questions or requests and thus potentially disrupt the nurse-patient relationship. In order to reduce the likelihood of this happening, I positioned myself on the furthest side of a walkway that was present between the bed space and the central monitoring area. This was a distance of approximately two to two and one half metres from the end of the patient's bed. This was far enough removed that the patient did not appear to register my presence but close enough for me to clearly see the activity occurring with the patient. It also meant that I was not 'in the way' of nursing or medical activity that might cause my presence to become problematic.

Researcher comments became an integral part of the qualitative data report where relevant, although some information and perceptions were less tangible and harder to explain. A critical element in my observation was the status of the ED during the episodes of care. At times, this impacted on the staffing numbers and consequently the number of patients allocated to each nurse. The ED of the local hospital allocates nurses to bed clusters so it is common for the nurse caring for the patient with IS to also be caring for at least three other patients who require continuous monitoring. It is not uncommon for this nurse to also be required to assist with major cases in the resuscitation

area of the ED while continuing to manage patient movement in the monitored area. During any one shift, each of the four beds within the cardiac area may have occupancy of up to five patients over the course of the shift, so the workload can be heavy. In all 23 patient care episodes observed by me, there was not one situation when any of the beds was empty for greater than 10-15 minutes before being filled by another patient. This throughput creates a heavy workload for an individual nurse and on only five occasions was an additional nurse allocated to assist in the cardiac area where the IS patients were placed.

Yet despite the workload of the participants, there was no occasion where I felt the patient was at risk due to inadequate or inappropriate care provision. Situations where further information was required to optimize care were resolved without any action by me. The analysis of the study data shows that overt assessment and documentation of clinical status and pain levels were not conducted routinely across the cohort. While this deficit is unacceptable in any clinical environment, this is the area which I believe will have the greatest positive benefit when remediated. With systematic regular assessments in place, a number of the issues raised within the data would be alleviated or minimised. The current status of assessment is not acceptable and the study data will form the basis of education processes within the ED for all nurses.

No study is devoid of limitations but it is a goal of legitimate research to minimise these and maximize the strengths of the study. The principal potential limitation within this study related to the sample size of the cohort, given the predominant data were quantitative in nature. However, this was a spurious issue because this was a case study

and descriptive in nature, and as a descriptive study, conclusions were only drawn from specific cases which were confined in space and context; the hallmark of a mixed methods case study. IS is also a very specific condition with a small number of people affected. From six years of data collection, the cohort included the complete population of adult patients with IS, presenting during this time period, therefore the sample was comprehensive.

It was difficult for me to be present for the total periods of time where patients with IS were in the ED. Principally, the observational episodes were restricted to the presence of the nurse participants. If patients were admitted where no participant was available or allocated to the relevant section of the ED, data could only be collected retrospectively via chart audit and added to the empirical data. At these times, no reflective processes were possible. I was also concerned that there may be some impact on the nurse-patient interaction through researcher presence, particularly as this was not the regular environment for me. It was possible that the participants may alter the way they delivered their care due to sensitivity regarding the process of observation. There was no apparent evidence that my presence caused any alteration to the care practices of any of the participants and no patients identified anxiety about having me present either.

A third potential limitation was whether the findings would be transferable to alternate contexts. Given the narrow geographic area where these jellyfish occur, there is certainly a question about the ability to transfer the outcomes of this study to hospitals and health care centres where IS is unlikely to occur. However with evidence of IS occurring at a number of sites across northern Australia and more broadly across tropical areas globally,

there is evidence to support the transferability of the clinical guidelines to a number of care environments. Australian health centres, particularly those in rural and remote areas, suffer from staffing crises on a regular basis (Hegney et al., 2002; Struber, 2004; Allan et al., 2007). Nurses new to the environment would benefit from access to the clinical guidelines to assist in care provision to patients diagnosed with a seasonal condition. On these grounds, changing the health care context does not alter the usefulness or credibility of the clinical guidelines, in fact the guidelines potentially increase the capacity and capability of the staff to deliver timely, evidence-based care for this very specific condition.

6.6 Recommendations:

The findings as described within Chapters Four and Five have identified a well documented clinical picture of a patient with IS, tempered with evidence of a need to tighten some of the benchmark principles of nursing care. Consequently, there are areas for improvement from which the following recommendations emanate. The areas where improvements are implicated are described under the headings of Nursing Education, Patient Care and Nursing Research.

6.6.1 Implications for Nursing Education:

While assessment techniques are included in nursing education programs, the findings from this study indicate that added emphasis, both in course curricula and other educational opportunities, needs to be placed on documentation of assessment data. Within any clinical environment specific focus should be placed on pain assessment to allow appropriate and effective pain management to occur.

Again within undergraduate and postgraduate nursing curricula, communication skills are discussed, including the relevance of cross cultural communication. It is recommended that the importance of using multiple methods of communication techniques is reinforced at every opportunity.

It is also recommended that education of ED nurses is introduced prior to formal implementation of the clinical guidelines, with ongoing education and support of all nurses planned within the department to further embed the guidelines into practice. This would occur through regular refresher in-service programs and question/answer sessions available to any staff.

6.6.2 Implications for Patient Care:

While the ED Marine Stings learning package is available to all new nursing staff who commence in the department, completion of the package is not mandatory. It is recommended that all ED nursing staff be required to complete the package with the added inclusion of information about the clinical guidelines in the Marine Stings learning package.

Congruent with the discussion regarding the role of advanced practice nurses; it is recommended that all advanced practice nurses within the ED undergo education to support their role as mentor to new or less experienced nursing staff. As mentioned within the findings chapters, even experienced nurses who are new to the local ED may be asked to care for patients with IS without the necessary experience with this condition. It was acknowledged by participants that completing the Marine Stings learning package

did not prepare them for the practicality of the experience. Mentoring is therefore an educationally sound way of supporting new staff that may have basic knowledge but need guidance regarding the practical application of appropriate skills. Further, participation within the mentoring program should be considered by the organisation as a positive contribution by the nurse towards acknowledgement of advanced practice status.

Use of standardised communication tools is also highly recommended to enable accurate, consistent assessment of patient status from the point of admission. This is especially important in the area of knowledge provision about IS and pain assessment, and would include pain stickers that use a validated pain scoring system for inclusion in the patient's chart. It is critical however that as many forms of communication are available to nurses and patients to expedite effective interactions. Use of accredited interpreter services cannot always be guaranteed so the use of language cards with questions and possible answers would be a critical adjunct for use if an interpreter is unavailable in a timely manner. The findings from this study would also support development and provision of innovative multi-lingual education programs for the general public in regard to the local marine environment and prevention of stings causing IS.

6.6.3 Implications for Nursing Research:

As this is the first known research study into the nursing care of patients with IS within an emergency environment, the potential opportunities for further research are immense. The collected study data highlighted several areas which could be further developed, such as the effects of IS on paediatric patients, more specific identifiable links between country of origin and use of narcotic analgesia in patients with IS, use of non-verbal

communication techniques by patients whose first language is not English, and the integration of alternative pain relief techniques into the management plan for patients with IS.

Formal implementation and critical evaluation of the clinical guidelines would also be considered a natural progression of this study. This could take the form of a broader study including not only the site of the current study but also alternate sites where IS is a known seasonal occurrence. This would allow analysis of the generalisability of the application of clinical guidelines across similar environments.

The study findings identify the lack of overt documentation of both physical and pain assessment, therefore it would be opportune to research the concepts of reflection, intuition, and problem- solving and the roles they play in the decisions to adjust or amend clinical practice. While the study was narrow in its focus, this research opportunity would be relevant and applicable across contexts and potentially across disciplines. This could conceivably contribute to broader questions about the critical thinking differences between experience levels of nurses and the impact of support processes for advanced practice nurses in general versus specialty environments.

6.7 Summary:

This study has provided significant information regarding the nursing management of a tropically focused clinical issue where little has previously existed. In order to maximize the data collection and provide a complete picture of IS and the impact on the patients and the nurses, a flexible research framework – a concurrent nested mixed methods case

study – was selected to underpin the study. This framework allowed a connection to be made between the context - a regional ED - and the issue of IS which has a narrow global geographic incidence but has the potential to be an international phenomenon of interest.

The data contributed to a greater understanding of the clinical issue of IS through the collection of substantial empirical data. The nesting of qualitative data within this predominantly quantitative study provided critical mutually supportive information reflecting nursing management of IS and the basis for practice. The use of mixed methods data collection techniques of observation, chart auditing and use of the Delphi technique provided robust support for the pragmatic approach and reflective practice framework used to inform this study.

The study findings revealed that patients with IS suffer considerably with pain and require active management of the condition by the health team. There are clear associations between a number of variables that has implication for the care provided both within the ED and in the pre-hospital environment. It was also identified that aspects of nursing practice, particularly regarding assessment techniques, were less evident than recommended, although given the positive outcomes for the patients it could be argued that decisions about nursing care are being made intuitively by these advanced practice nurses.

The study findings therefore support the underpinning premise for the development of clinical guidelines - that is to provide a supportive process for advanced practice nurses to

use to ensure their practice is sound under scrutiny. Two factors create the perfect environment for implementation of clinical guidelines for patients with IS:

1. Dedicated, repeated practice is what leads to optimum performance, and
2. Experience alone is insufficient for predicting or endowing expert practice, and in some cases it can actually hinder performance.

The clinical guidelines can also ensure that a robust practice framework is embedded into a busy environment where the seasonal nature of IS can lead to a need for prompting about the standard management process of the condition. Research on expertise and performance suggests that we all need ongoing training, practice and periodic assessment to help identify where we can improve cognitive and clinical performance. While these guidelines have been developed for implementation at a local level, it is hoped the study is a first step in a broader application to support nurses who care for patients with IS around the world.

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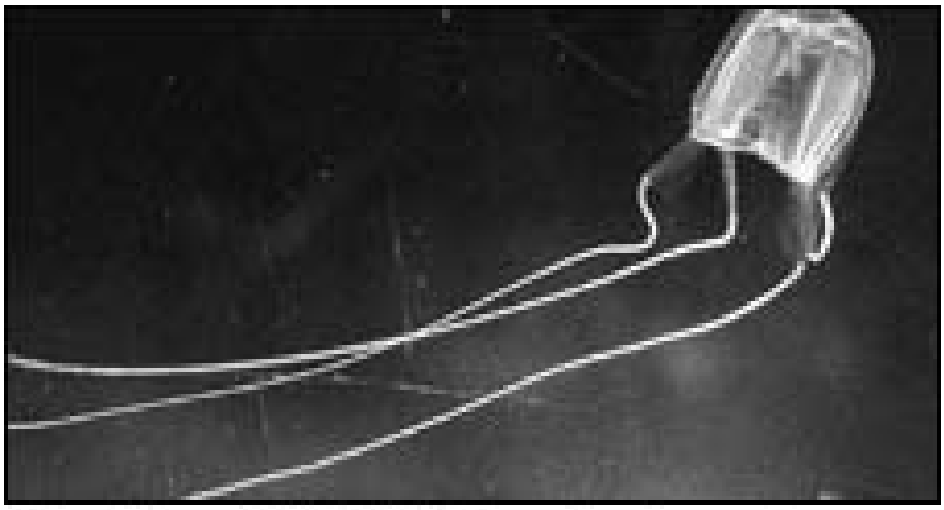
Appendices

Appendix A1
Irukandji Jellyfish (Carukia barnesi)



The Irukandji jellyfish (*Carukia barnesi*). Illustrations reproduced, with permission, from Venomous & Poisonous Marine Animals, published by the University of New South Wales Press.

Appendix A2

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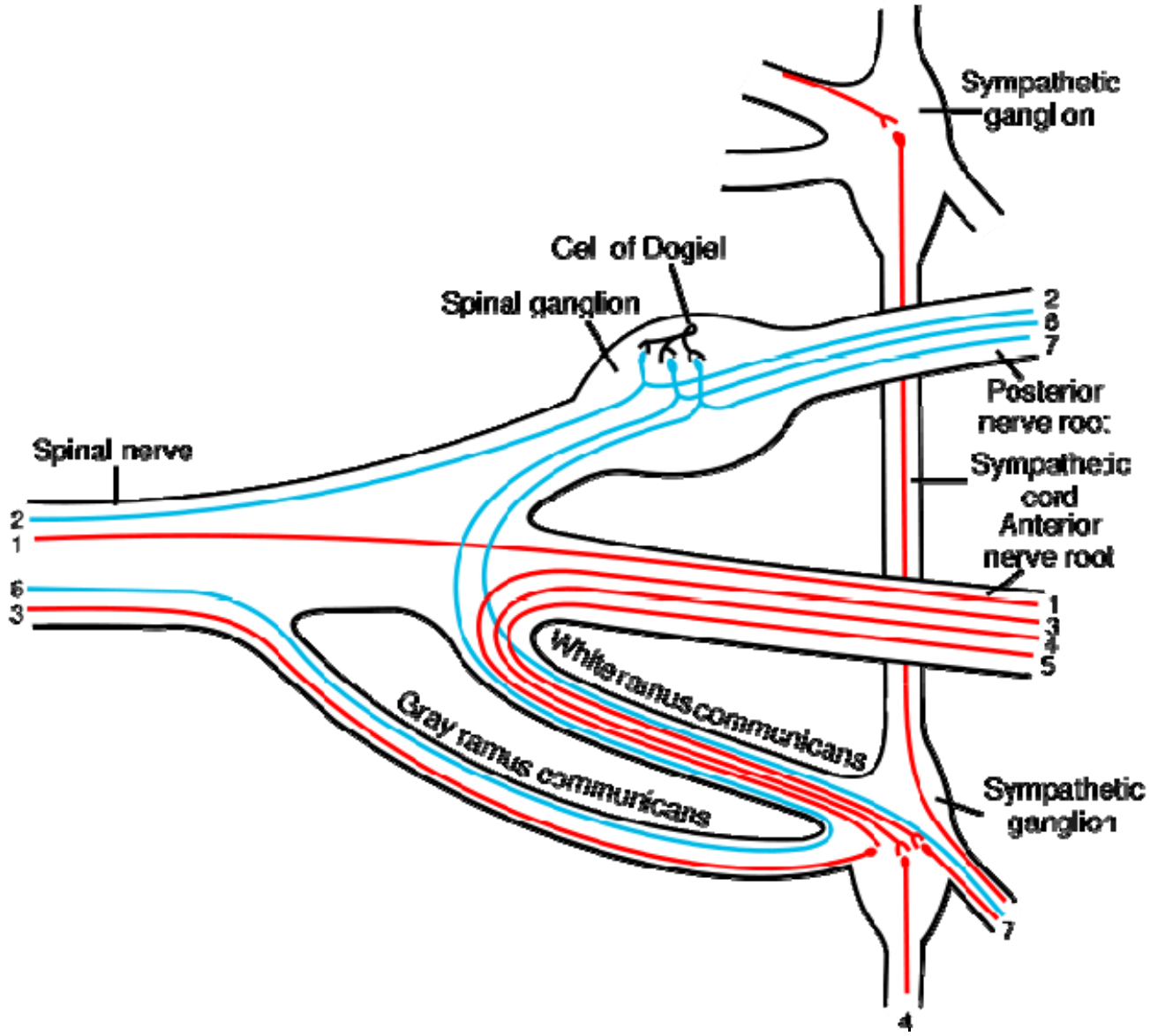
Articles from The Cairns Post, 3/1/2007; 26/2/2008



Appendix A3 – Spinal nerve anatomy

Scheme showing structure of a typical spinal nerve.
1. Somatic efferent.
2. Somatic afferent.
3,4,5. Sympathetic efferent.
6,7. Sympathetic afferent.

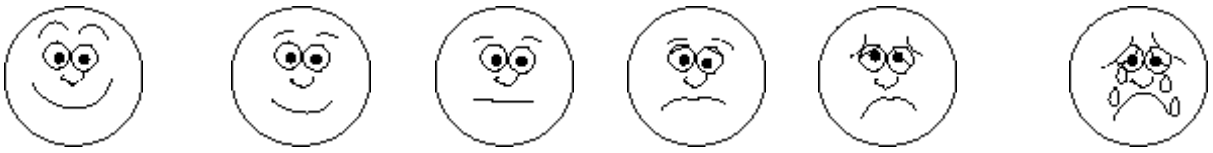
Taken from: Standring, S. (Ed). (2008) *Gray's anatomy: the anatomical basis of clinical practice.* Edinburgh: Churchill Livingstone/Elsevier.

Appendix B

Pain Management:

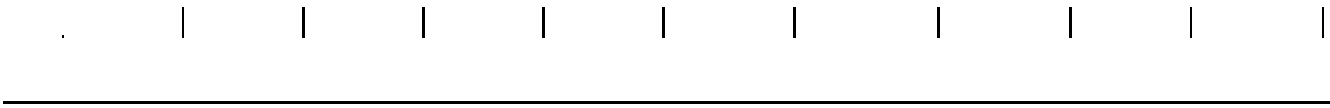
- **Pain Scores** via validated method: Pain assessment should be undertaken whenever the patient requires further pain relief. This provides a sound set of ongoing data from which to make informed decisions about pain management.
- **Examples of validated pain scales are below.**

Pain Faces Scale



0	2	4	6	8	10
Very happy, no hurt	Hurts just a little bit	Hurts a little more	Hurts even more	Hurts a whole lot	Hurts as much as you can imagine (don't have to be crying to feel this much pain)

Numerical Scale



0 1 2 3 4 5 6 7 8 9 10

No pain — Worst pain imaginable

Visual Analog Scale

No pain _____ Worst pain

Directions: Ask the patient to indicate on the line where the pain is in relation to the two extremes. Qualification is only approximate; for example, a midpoint mark would indicate that the pain is approximately half of the worst possible pain.

Categorical Scale

None (0) Mild (1-3) Moderate (4-6) Severe (7-10)

Adapted with permission from Whaley L, Wong, D. *Nursing Care of Infants and Children*, ed 3, p. 1070. ©1987 by C.V. Mosby Company. Research reported in Wong D, Baker C. Pain in children: Comparison of assessment scales. Pediatric Nursing 14(1):9-17, 1988.

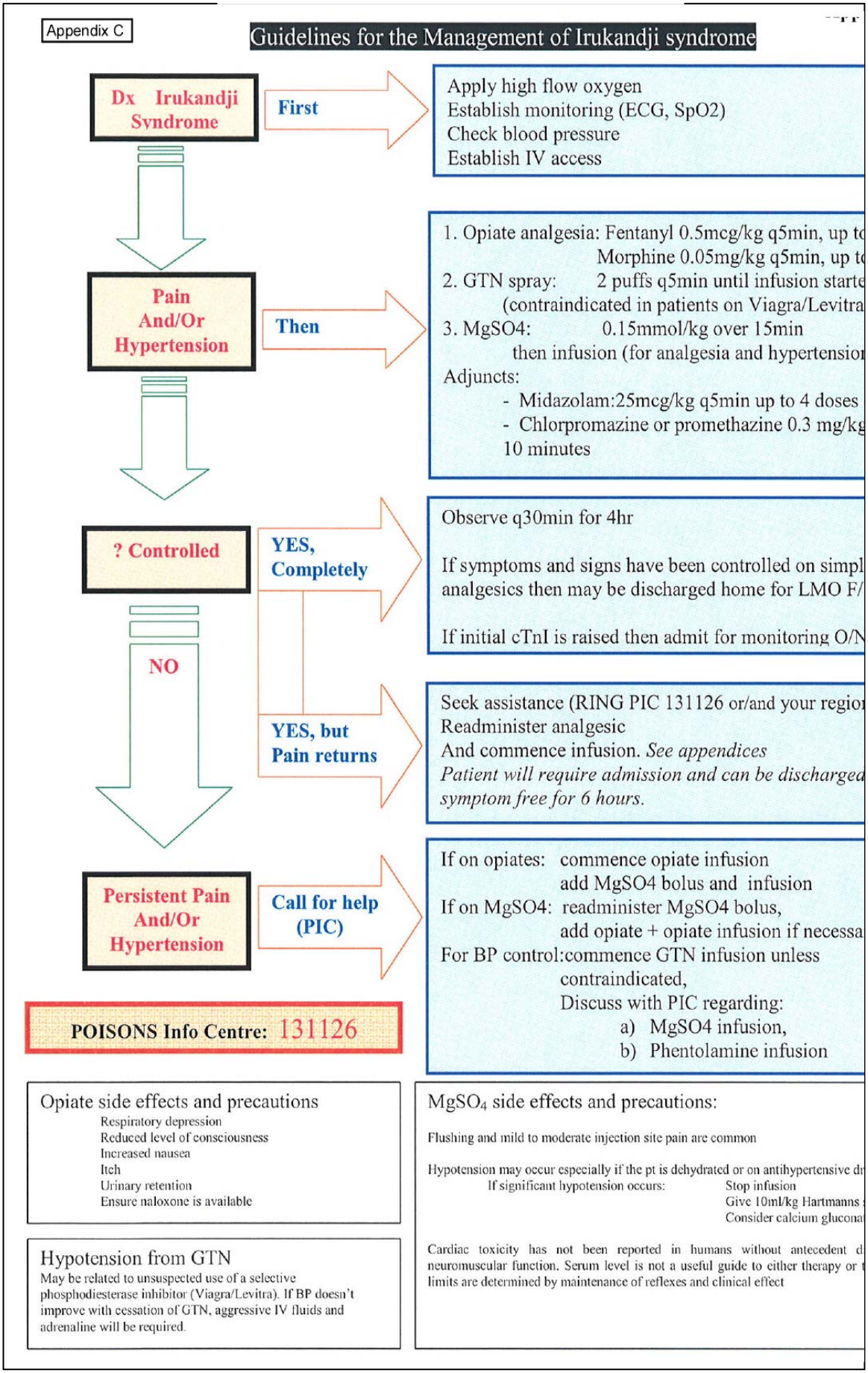
- **Dosage Controls** – These will depend on the drug used, mode of delivery (eg Intravenous bolus or PCA), local drug policy.

See Narcotic Information.doc for information about intravenous narcotics

- **Alternative Methods of pain relief** is a decision of the Medical Officer. Drugs that are commonly considered include:
    - Ibuprofen
    - Panadiene Forte
    - Promethazine
    - Ondansatron
    - Largactil
    - Temazepan
    - Tramadol

See Alternative Drug Therapy.doc for information on alternative methods of pain relief.

Appendix C


Appendix C
Guidelines for the Management of Irukandji syndrome
Dx Irukandji Syndrome
First
Apply high flow oxygen
Establish monitoring (ECG, SpO2)
Check blood pressure
Establish IV access
Pain And/Or Hypertension
Then
1. Opiate analgesia: Fentanyl 0.5mcg/kg q5min, up to
Morphine 0.05mg/kg q5min, up to
2. GTN spray: 2 puffs q5min until infusion starte
(contraindicated in patients on Viagra/Levitra
3. MgSO4: 0.15mmol/kg over 15min
then infusion (for analgesia and hypertensio
Adjuncts:
- Midazolam:25mcg/kg q5min up to 4 doses
- Chlorpromazine or promethazine 0.3 mg/kg
10 minutes
? Controlled
YES, Completely
Observe q30min for 4hr
If symptoms and signs have been controlled on simpl
analgesics then may be discharged home for LMO F/
If initial cTnI is raised then admit for monitoring O/N
NO
YES, but Pain returns
Seek assistance (RING PIC 131126 or/and your regio
Readminister analgesic
And commence infusion. See appendices
Patient will require admission and can be discharged
symptom free for 6 hours.
Persistent Pain And/Or Hypertension
Call for help (PIC)
If on opiates: commence opiate infusion
add MgSO4 bolus and infusion
If on MgSO4: readminister MgSO4 bolus,
add opiate + opiate infusion if necessa
For BP control:commence GTN infusion unless
contraindicated,
Discuss with PIC regarding:
a) MgSO4 infusion,
b) Phentolamine infusion
POISONS Info Centre: 131126
Opiate side effects and precautions
Respiratory depression
Reduced level of consciousness
Increased nausea
Itch
Urinary retention
Ensure naloxone is available
MgSO4 side effects and precautions:
Flushing and mild to moderate injection site pain are common
Hypotension may occur especially if the pt is dehydrated or on antihypertensive dr
If significant hypotension occurs: Stop infusion
Give 10ml/kg Hartmanns
Consider calcium gluconat
Cardiac toxicity has not been reported in humans without antecedent d
neuromuscular function. Serum level is not a useful guide to either therapy or t
limits are determined by maintenance of reflexes and clinical effect
Hypotension from GTN
May be related to unsuspected use of a selective phosphodiesterase inhibitor (Viagra/Levitra). If BP doesn't improve with cessation of GTN, aggressive IV fluids and adrenaline will be required.

Appendix D1 – Quantitative Data Collection

Data Point	Data Information	Comments
Time of admission to ED. How arrived – QAS; EMQ; RFDS; Self?	QAS EMQ RFDS Self	
Time of Discharge from ED (did patient leave from ED or transferred to ward)?		
Time between admission and seen by MO		
How long was the patient in ED?		
Was the patient a Tourist or Local?	Tourist Local	
Where on the body was the patient stung?		
Was Vinegar applied?	YES NO	
What was the patient's condition at time of admission? (Signs & Symptoms)		
Nursing Interventions: Vital signs	T: P: R: BP: SaO2:	
Did the RN use a systematic assessment of patient's condition?	YES NO	
Pain Levels - were they measured? How were they measured? (VAS; Numerical Scale or Verbal Scale?)	YES NO	
Pain Management: What drugs were used? Maximum dosage of what drug administered?		

Any referral to other health personnel?	YES NO	To whom?
Improvement/deterioration in condition?		
What is the plan of action for the patient?		
Was the patient able to speak English? **What strategies did the nurse use to communicate with the patient?**	YES NO	
Was the patient provided information regarding post-discharge problems/care?	YES NO	

UR Number: _____ Patient Name: _____

Date of Admission: _____ DOB: _____ Age: _____

Appendix D2 – Qualitative Data Collection

Researcher Perceptions of episode	
How did the researcher feel about the interaction?	
Did the patient receive optimum care?	
Could anything have been done by the nurse to improve the outcome?	
What was the ED like at the time of the episode?	
How many patients was the nurse allocated during the observation episode?	
Any comments – general?	
Any comments – specific?	

UR Number: _____ Patient Name: _____

Date of Admission: _____ DOB: _____ Age: _____

Nurse Perceptions of Care Episode:

Nurse:_____ Number: _____

What are your thoughts about the condition of this patient?

How did the patient respond to your case?

What issues if any were raised for you during the episode of care?

What do you think you could improve with the care of this patient?

Appendix E

Queensland Government - Queensland Health

Emergency Nursing of Patients Stung by Life-threatening Jellyfish Found in Tropical Waters of Queensland

EMERGENCY DEPARTMENT

LEARNING MODULE

© Denis Hudson

Nurse Educator

Cairns Base Hospital

PO Box 902 CAIRNS Queensland 4870

October 2003

Revised April 2007

Name:

Date of issue:

Complete module found on CD ROM

Appendix F

Analysis of how nursing staff in Far North Queensland manage people who are victims of Irukandji syndrome.

Researcher

Mrs Jennifer Sando, Nursing Director, Education/Research, Cairns Base Hospital.

Supervisor

Professor Kim Usher, Head of School, School of Nursing Sciences, James Cook University

This research is being undertaken as part of a PhD in Nursing degree and will be conducted under the guidance of experienced researchers from the School of Nursing Sciences at James Cook University.

Dear Nursing Colleague,

Please find enclosed a Participant Information Sheet, consent form and addressed reply envelope. You may have already heard a little about the project through ward meetings but if not, my project is briefly explained below.

Anecdotal information suggests that the most distressing part of the sting from the Irukandji jellyfish is the pain over the site as well as that affecting other body systems. Current high staff workloads and patient throughputs in the ED suggest that waiting times for clients may be extended. This then has the potential to impact significantly on clients who have suffered a marine sting and who are in pain.

The time taken to see a medical officer and receive pain relief for these clients can be prolonged, but one possible way to ensure the time between attendance at ED and receipt of pain relief is expedient, is to introduce a specific targeted education program linked to clinical care guidelines designed for nurses who care for clients with Irukandji syndrome. This will be used by appropriately selected registered nurses who will then be able to practice at a level equivalent to advanced practice when caring for these envenomated clients.

By raising the practice level of nurses, all participants in the episode of care will benefit. The client will receive optimum care in a timely manner, the nurses will feel greater job satisfaction and the medical staff will be supported to spend appropriate amounts of time with all patients because of reduced pressure.

Please thoroughly read the attached Participant Information Sheet and if you have any questions, please do not hesitate to contact Mrs Jenny Sando (tel: 40506288).

If you are interested in participating in the observational episodes and trialing of the Clinical Guidelines tool, please complete the consent form and return in the pre-addressed envelope to **Jenny Sando, Nursing Director, Education/ Research, Cairns Base Hospital.**

I appreciate the opportunity to work with you and appreciate your time and input into this project.

Appendix G

INFORMATION TO THE PARTICIPANT

Analysis of how nursing staff in Far North Queensland manage people who are victims of Irukandji syndrome.

Researcher:
Ms Jennifer Sando, Nursing Director, Education/Research, Cairns Base Hospital
Supervisor
Professor Kim Usher, Head of School, School of Nursing Sciences, James Cook University

This research is being undertaken as part of a PhD in Nursing degree and will be conducted under the guidance of experienced researchers from the School of Nursing Sciences at James Cook University.

You are invited to take part in research to develop clinical guidelines that support an expansion of the nurse's role when caring for client's who suffer a marine envenomation, specifically Irukandji Syndrome.

1. PURPOSE AND BACKGROUND OF THE RESEARCH/PROJECT

The purpose of this research is to address the anecdotal information that suggests that the pain suffered by clients who are stung by *Carukia Barnesi* (Irukandji jellyfish) is significant enough that it has the potential to exacerbate symptoms and lengthen the hospital stay for these clients. If pain relief can be administered more quickly, there is the possibility that the patient may be physically better able to cope with the sting and will respond more quickly to treatment.

In collaboration with a number of specialist nurses and an panel of experts in the area of marine stings, I plan to develop a set of clinical guidelines that can be used by nursing staff to assess, diagnose and manage the initial phases of the care of the client who has been envenomated by the Irukandji jellyfish at an advanced level.

2. PROCEDURE/RESEARCH

If you agree to participate in this research, you will be given the option to participate in observational episodes within the study. This component of the research will involve emergency nurses who meet the criteria of:

- Having worked in the ED for greater that 12 months
- Having experience in the triage and resuscitation areas of the department
- Having completed the Marine Stings learning package within the CBH ED
- Willingness to be involved in this project

During the "summer season", the researcher will be regularly in touch with nurses from the ED. At the time of knowledge of admission to the ED of a patient with possible Irukandji syndrome, the nurse will be asked to contact the researcher to attend. The researcher will be in the department 5-10 minutes following the call.

During the observational episodes, field notes will be collected on the behaviour and activities of each individual nurse at the research site. The researcher will record the nursing care provided, the assessment, planning, implementation and evaluation of the condition of the client and the management of pain in an unstructured or semi-structured way. Notes will also be collected about the researcher's and nurses' perceptions and interpretations of the events occurring during these episodes. The researcher, as a qualitative observer, will be a complete observer in each episode.

A consent form has been included in your package. If you are interested in participating in the research and meet the criteria, please complete the consent for and return to the researcher in the pre-addressed envelope.

3. **BENEFITS**

By gathering this information about clients with Irukandji Syndrome, the researcher hopes to develop appropriate strategies to advance nursing clinical practice within the Emergency Department. By raising the practice level of nurses, all participants in the episode of care will benefit. The client will receive optimum care in a timely manner, the nurses will feel greater job satisfaction and the medical staff will be supported to spend appropriate amounts of time with all patients because of reduced pressure.

An important consideration that needs to be identified is that clinical guidelines for nursing practice do not replace the diagnosis and management of the patient by medical officers. Rather the guidelines are used in conjunction with clinical expertise and sound judgement of the team members and have the potential to provide initial treatment until the patient is assessed by a medical officer and to free up the medical officer's time to attend to other unstable or critically ill patients.

4. **RISKS/DISCOMFORTS**

It is not envisaged you will experience any discomfort while completing the survey. During the observational episodes, the researcher will be taking field notes regarding your activities and will not be involved in your management of the client. If you feel anxious during the observational episode, the researcher will quietly leave the environment. Every effort will be made by the researcher to fit in with all nursing staff so that there is no compromise to either patient care or personal time.

All access and activities by the researcher will be negotiated initially with the appropriate managers (Nursing and Medical) so that agreement to visit the department and the staff is pre-approved. At all times during the study your identity will be protected and remain confidential. Only the researcher will have access to these details.

Your participation in the study is entirely voluntary and you have the right to withdraw from the research project at any time. If you decide not to participate or if you withdraw, you may do this freely without any influence on your position at the hospital. If you withdraw from the research project all information obtained relating to you will not be used in the study. All information will be treated with absolute confidentiality.

Results from this study will be presented in the form of Master's thesis, at conferences and published in journals.

5. **QUERIES OR COUNSELLING** (Contact numbers in the event that the consenting party has any queries, concerns or requires assistance):

If you have any questions regarding this project, please contact the principal investigator, Jenny Sando on 07- 40506288.

Thank you for considering participation in this project.

NOTE: This study has been approved by the James Cook University Human Ethics Sub-Committee. If you have any complaints or reservations about the ethical conduct of this research, you may contact the Ethics Committee through the Ethics Administrator, Tina Langford at the Research Office, James Cook University, Townsville Qld 4811. Phone: 07 – 4781 4342; Fax: 07 4781 5521. Email: Tina.Langford@jcu.edu.au. Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

Appendix H

INFORMED CONSENT FORM

PRINCIPAL INVESTIGATOR Mrs Jennifer Sando

PROJECT TITLE: Analysis of how nursing staff in Far North Queensland manage people who are victims of Irukandji syndrome.

SCHOOL School of Nursing Sciences

CONTACT DETAILS Jenny Sando
Jenny_Sando@health.qld.gov.au

DETAILS OF CONSENT:
You are invited to take part in research to develop clinical guidelines that support an expansion of the nurse's role when caring for client's who suffer a marine envenomation, specifically Irukandji Syndrome.

PURPOSE AND BACKGROUND OF THE RESEARCH PROJECT
The purpose of this research is to address the anecdotal information that suggests that the pain suffered by clients who are stung by *Carukia Barnesi* (Irukandji jellyfish) is significant enough that it has the potential to exacerbate symptoms and lengthen the hospital stay for these clients. If pain relief can be administered more quickly, there is the possibility that the patient may be physically better able to cope with the sting and will respond more quickly to treatment.

In collaboration with a number of specialist nurses and an panel of experts in the area of marine stings, the researcher plans to develop a set of clinical guidelines that can be used by nursing staff to assess, diagnose and manage, at an advanced level, the initial phases of the care of the client who has been envenomated by the Irukandji jellyfish.

The research will involve emergency nurses who meet the criteria of:

- Having worked in the Emergency Department (ED) at CBH for greater that 12 months
- Having experience in the triage and resuscitation areas of the department
- Having completed the Marine Stings learning package within the CBH ED
- Willingness to be involved in this project.

All access and activities by the researcher have been negotiated with the appropriate managers (Nursing and Medical) so that agreement to visit the department and the staff is pre-approved. At all times during the study your identity will be protected and remain confidential. Only the researcher will have access to these details. During the observational episodes, the researcher will be observing your management of the client so no additional time will be required. The amount of your time required during the education and trialling of the clinical guidelines should be no more than 15 minutes of your time.

Your participation in the study is entirely voluntary and you have the right to withdraw from the research project at any time. If you decide not to participate or if you withdraw, you may do this freely without any influence on your position at the hospital. If you withdraw from the research project all information obtained relating to you will not be used in the study. All information will be treated with absolute confidentiality.

Results from this study will be presented in the form of PhD thesis, at conferences and published in journals.

The aims of this study have been clearly explained to me and I understand what is wanted of me. I know that taking part in this study is voluntary and I am aware that I can stop taking part in it at any time and may refuse to answer any questions.

I understand that any information I give will be kept strictly confidential and that no names will be used to identify me with this study without my approval.

Name: *(printed)*	
Signature:	**Date:**

Appendix I

Analysis of how nursing staff in Far North Queensland manage people who are victims of Irukandji syndrome.

Researcher

Mrs Jennifer Sando,

Nursing Director - Education/Research

Cairns Base Hospital.

Research Objectives

To document and analyse information gathered about Irukandji syndrome

To assess the nursing management of patients with Irukandji syndrome

To develop clinical practice guidelines that enhance clinical management skills of nurses

You have unfortunately been stung by a jellyfish in the waters of Far North Queensland.

You will notice me sitting in the corner of the cubicle where you are being treated. I am observing the nurse who is caring for you in the Emergency Department of Cairns Base Hospital to gather information that will allow me to develop some guidelines that will further improve the expert care you are receiving.

By expanding the practice level of ED nurses, all participants in the episode of care will benefit. You, the client, will continue to receive optimum care in a timely manner, the nurses will feel greater job satisfaction and the medical staff will be supported to spend appropriate amounts of time with all patients.

An important consideration that needs to be identified is that clinical guidelines for nursing practice do not replace the diagnosis and management of the patient by medical officers. You will still be seen by both doctors and nurses who are working to give you the best care possible.

The project has been approved by the Ethics committees of both James Cook University and Cairns Base Hospital and I have given a commitment that no

identifying information about you will be used in this research project and all the data I collect will be treated confidentially.

Thankyou for taking the time to read about my research and I hope you recover quickly from your sting.

Jenny Sando

If you have any complaints or reservations about the ethical conduct of this research, you may contact the Ethics Committee through the Ethics Administrator, Tina Langford at the Research Office, James Cook University, Townsville Qld 4811. Phone: 07 – 4781 4342; Fax: 07 4781 5521. Email: Tina.Langford@jcu.edu.au. Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

JAMES COOK UNIVERSITY

Analysis of how nursing staff in Far North Queensland manage people who are victims of Irukandji syndrome.

Researcher

Mrs Jennifer Sando, Nursing Director - Education/Research, Cairns Base Hospital.

Supervisor

Associate Professor Kim Usher, Head of School, School of Nursing Sciences, James Cook University

This research is being undertaken as part of a PhD in Nursing and will be conducted under the guidance of experienced researchers from the School of Nursing Sciences at James Cook University.

This administrative form
has been removed

Appendix J2

JAMES COOK UNIVERSITY
Townsville Qld 4811 Australia

Tina Langford, Ethics Administrator, Research Office. Ph: 07 4781 4342; Fax: 07 4781 5521

This administrative form has been removed

Appendix K

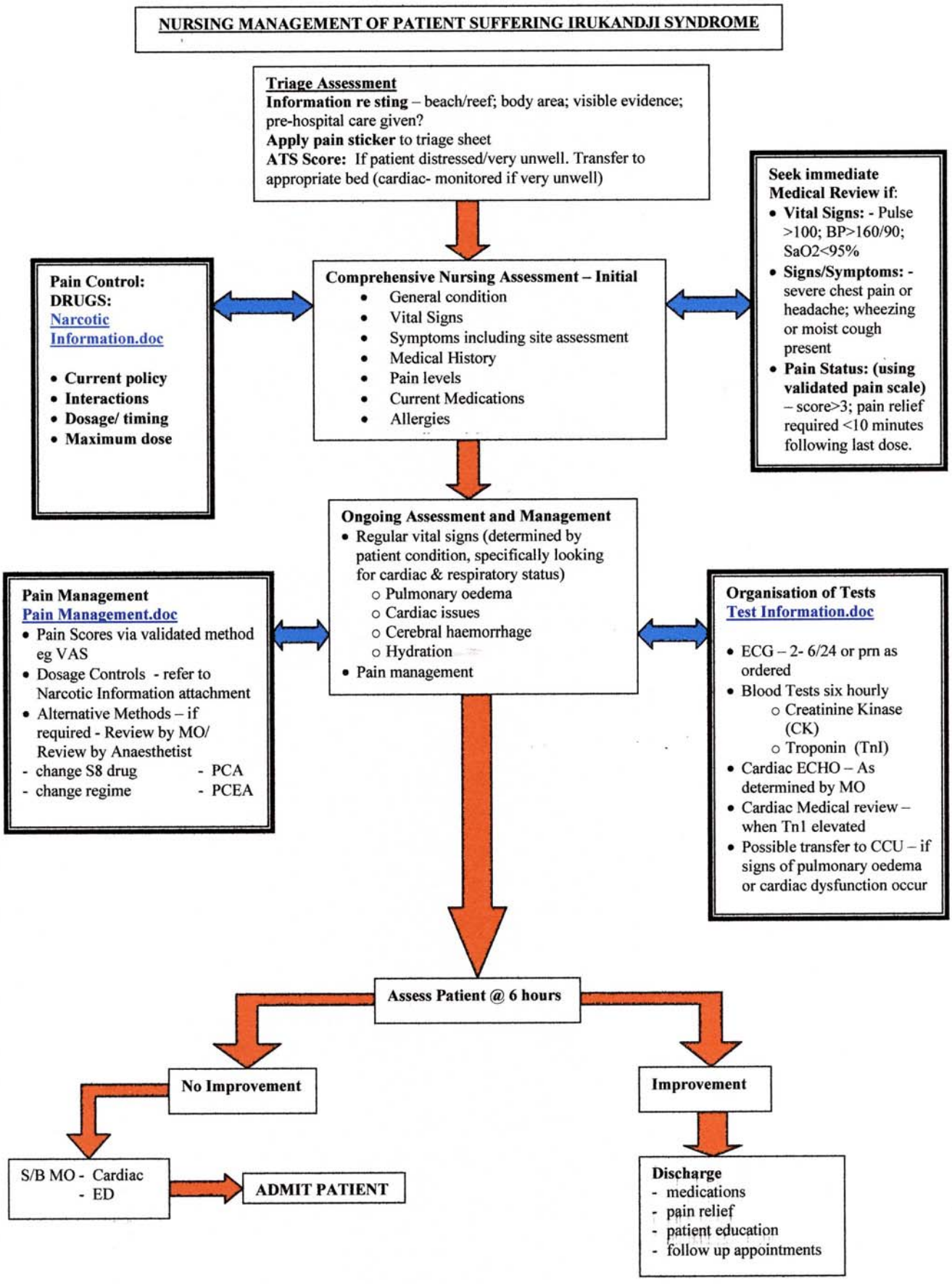
The following appendices (K1 – K4) are documents that also can be found on the attached CD ROM (inside back cover of thesis).

Please start viewing these document at the file titled:
1_Start here_Guidelines

[This file is labelled as Appendix K1 in this thesis.]

Within this CD ROM file, there are hyperlinks to the documents labelled in the thesis as K2 – K4.

Appendix K1


NURSING MANAGEMENT OF PATIENT SUFFERING IRUKANDJI SYNDROME
Triage Assessment
Information re sting – beach/reef; body area; visible evidence; pre-hospital care given?
Apply pain sticker to triage sheet
ATS Score: If patient distressed/very unwell. Transfer to appropriate bed (cardiac- monitored if very unwell)
Seek immediate Medical Review if:
Vital Signs: - Pulse >100; BP>160/90; SaO2<95%
Signs/Symptoms: - severe chest pain or headache; wheezing or moist cough present
Pain Status: (using validated pain scale) – score>3; pain relief required <10 minutes following last dose.
Pain Control:
DRUGS:
Narcotic Information.doc
Current policy
Interactions
Dosage/ timing
Maximum dose
Comprehensive Nursing Assessment – Initial
General condition
Vital Signs
Symptoms including site assessment
Medical History
Pain levels
Current Medications
Allergies
Ongoing Assessment and Management
Regular vital signs (determined by patient condition, specifically looking for cardiac & respiratory status)
Pulmonary oedema
Cardiac issues
Cerebral haemorrhage
Hydration
Pain management
Pain Management
Pain Management.doc
Pain Scores via validated method eg VAS
Dosage Controls - refer to Narcotic Information attachment
Alternative Methods – if required - Review by MO/ Review by Anaesthetist
- change S8 drug - PCA
- change regime - PCEA
Organisation of Tests
Test Information.doc
ECG – 2- 6/24 or prn as ordered
Blood Tests six hourly
Creatinine Kinase (CK)
Troponin (TnI)
Cardiac ECHO – As determined by MO
Cardiac Medical review – when Tn1 elevated
Possible transfer to CCU – if signs of pulmonary oedema or cardiac dysfunction occur
Assess Patient @ 6 hours
No Improvement
Improvement
S/B MO - Cardiac
- ED
ADMIT PATIENT
Discharge
- medications
- pain relief
- patient education
- follow up appointments

Appendix K2

NARCOTIC DRUGS FOR USE WITH PATIENTS SUFFERING IRUKANDJI SYNDROME

FENTANYL: Narcotic analgesic similar in action to Morphine. Minimal cardiac depressant action. Metabolised in liver with metabolites excreted by kidneys. ***Rapid onset of action. Duration 30 – 60 minutes.***

- **Current CBH policy**
  - **fentanyl injection 0308.pdf (within organisation will be an active link to updated information)**
- **Interactions**
  - Other Central Nervous Systems (CNS) depressants
  - MAO inhibitors
- **Dosage/ timing**
  - Presentation – Ampoules – 100mcg/2 ml and 500mcg/10 ml
  - **Guidelines: Fentanyl 0.5mcg/kg q5min, up to 4 doses**
  - **Infusion**: **Dilution** – Add 1,000mcg in 80 ml 0.9% Sodium Chloride: total volume in 100 ml (5% Dextrose may be use in cases of hypernatraemia)
    Dosage – Infuse at a rate of 30 – 100mcg per hour (3 -10 ml per hour)
  - **Bolus: Dilution** – nil
    Dosage – 50 – 100 mcg undiluted
- **Maximum dose**
  - 100 mcg undiluted in a single dose
- **Contraindications**
  - Respiratory depression in unventilated patients
  - Myasthenia Gravis
  - Coma (head injury, brain tumour) and raised intracranial pressure *unless* the patient is mechanically ventilated (due to risk of hypoventilation and hypercapnia)
- **Side effects**
  - Respiratory / circulatory depression
  - Bradycardia
  - Bronchospasm
  - Nausea and vomiting
  - Increased muscle tome and rigidity
- **Precautions**
  - Bronchial Asthma
  - Decrease dose in chronic hepatic disease

NURSING CONSIDERATIONS:

- Monitor the patient's respiratory rate and depth

MORPHINE: Narcotic used to relieve pain and anxiety. Opioid adjunct during general anaesthesia. Used in Acute Pulmonary Oedema associated with congestive cardiac Failure (venodilation effect).
Rapid onset of action. Half-life – 2 to 3 hours.

- **Current CBH policy**
  - **morphine infusion 0308.pdf (within organisation will be an active link to updated information)**
- **Interactions**
  - Alcohol
  - Other CNS depressants
  - Antihypertensive agents
- **Dosage/ timing**
  - Presentation: Ampoules – 10mg/1 ml and 30mg/ 1.5 ml
  - **Guidelines: Morphine 0.05mg/kg q5min. up to 4 doses**
  - **Infusion:** **Dilution –** Dilute 10mg in 9 ml 0.9% Sodium Chloride (1mg/ml)
    Dosage – 2.5mg – 5mg
  - **Bolus:** **Dilution** – 100mg in 0.9% Sodium Chloride to total 100ml (1mg/ml)
    Dosage - Commence at a low rate and titrate to desired effect.
    Ventilated patients: Usual commencement dose is 5mg per hour.
- **Maximum dose** - 100mg undiluted in a single dose
- **Contraindications**
  - Respiratory depression
  - Asthma
  - MAO inhibitors in the last 10 days
- **Side Effects**
  - Hypotension
  - Respiratory depression
  - Nausea and vomiting
- **Precautions**
  - Shock states
  - Impaired liver function
  - Renal failure
  - Raised intracranial pressure unless the patient is mechanically ventilated (due to risk of hypoventilation and hypercapnia)
  - Biliary tract surgery

NURSING CONSIDERATIONS:
- Measure patient's blood pressure, heart rate and respiratory rate every 4 hours and prn.
- An anti-emetic drug may need to be administered concurrently with Morphine.

Appendix K3

Alternative Drug Therapy for Patients with Irukandji Syndrome

IBUPROFEN: Non steroidal anti-inflammatory agent. Used in acute and chronic pain states with inflammation.

- **Interactions**
  - Anticoagulants
  - Other NSAID's
  - ACE inhibitors
- **Dosage/ timing**
  - Presentation: Tablets – 400mg per tablet
  - **Take with fluid or food**
  - **Dosage** – initially 1200 – 1600 mg/day in 3-4 divided doses, then max 1600mg/day when stable
- **Maximum dose** - 2400mg/day in acute pain situations; max 1600mg/day when stable
- **Contraindications**
  - Pregnancy and/or lactation
  - NSAID- sensitive Asthma
  - GI conditions – bleeding, ulcerative colitis, peptic ulcer
- **Side Effects**
  - GI upset including ulceration
  - Tinnitus
  - Increased risk of cardiovascular event eg: myocardial Infarction, stroke
  - Raised liver function tests, hepatic dysfunction
- **Precautions**
  - With prolonged use – GI bleeding
  - Bronchial Asthma history
  - CV disease or risk factors
  - Smoking
  - Hypertension

NURSING CONSIDERATIONS:

- Measure patient's blood pressure, heart rate and respiratory rate every 4 hours and prn
- Regular pain scores.

PANADIENE FORTE: Narcotic analgesia for moderate-severs pain and fever.

- **Interactions**
  - CNS depressants
  - Hepatic enzyme inducers eg: alcohol, salicylates, NSAID's
  - Antihypertensives
- **Dosage/ timing**
  - Presentation: Tablets – 500mg Paracetamol and Codiene Phosphate 30mg per tablet
  - **Take with or without food**
  - **Dosage** – ADULTS: Mild-mod pain: 1 tablet every 4-6 hours; severe pain: 2 tablets every 4-6 hourly.
    Maximum dose - Maximum 8 tabs/day.

- **Contraindications**
  - Respiratory depression eg: acute COPD, Asthma
  - Paracetamol intolerance
  - Morphine allergy
  - NSAID's within 10 days
- **Side Effects**
  - GI upset including constipation
  - Drowsiness, dizziness
  - Bronchospasm
- **Precautions**
  - Hepatic, renal impairment
  - CNS depression
  - Analgesic intolerance, asthma

NURSING CONSIDERATIONS:

- Measure patient's blood pressure, heart rate and respiratory rate every 4 hours and prn.
- Regular pain scores

PROMETHAZINE (Phenergan): Long acting antihistamine. Used for allergies, as an antiemetic and for upper respiratory tract infection.

- **Interactions**
  - MAOI's
  - CNS depressants eg: Alcohol, barbirurates, opioids
- **Dosage/ timing**
  - Presentation: Injection– prescription required (S4). Ampoule 25mg/1 ml.
  - **Dosage** – Allergy in adults: 25 – 50mg IMI
    Maximum dose - 50 mg IMI in single dose
- **Contraindications**
  - Concomitant MAOI's
  - High doses of other CNS depressants
  - Jaundice induced by phenothiazines
  - Subcutaneous administration
- **Side Effects**
  - Dry mouth
  - GI upset
  - Epigestric discomfort
  - CNS depressive or stimulatory effects
  - Blurred vision
  - QT prolongation
- **Precautions**
  - Hypertensive crisis
  - Cardiovascular disease
  - Renal, hepatic and/or respiratory impairment

NURSING CONSIDERATIONS:

- Measure patient's blood pressure, heart rate and respiratory rate every 4 hours and prn.

ONDANSETRON: Noncytotoxic and supportive therapy. Used in prevention and treatment of chemo/radiotherapy induced, postoperative nausea and vomiting.

- **Interactions**
  - Tramadol
  - Potent CYP3A4 inducers
- **Dosage/ timing**
  - Presentation: Solution for injection – prescription required (S4)
  - **Dosage** – IM injection – 4mg/2ml only. Slow IVinjection/infusion over ≥ 15 min (>8mg/dose).
- **Contraindications**
  - Lactation
- **Side Effects**
  - Headache
  - Constipation
  - Warm sensation
  - Flushing
  - Extrapyramidal effects
  - Arrhythmias
- **Precautions**
  - Hepatic impairment
  - $5HT_3$- antagonist hypersensitivity

NURSING CONSIDERATIONS:

- Measure patient's blood pressure, heart rate and respiratory rate every 4 hours and prn
- 4-6 hourly ECG's.

CHLORPROMAZINE (Largactil): Antipsychotic agent used for acute functional psychoses, agitation, to enhance analgesia, control nausea and vomiting in terminal illness.

- **Interactions**
  - Adrenaline
  - CNS depressants eg: Alcohol
  - Hypotensive agents eg: MAOI inhibitors
  - Drugs that prolong QT interval
- **Dosage/ timing**
  - Presentation: Injection , syrup and tablets. Prescription required (S4). **Take with with or without food**
  - **Dosage** – Oral regime – Adults: initially 25mg tds, may increase by 25mg 2-3 times daily to maximum dose. Maintenance: 25 -100mg tds.
    Maximum dose - oral regime: maximum 800 mg/day.
- **Contraindications**
  - Circulatory collapse
  - CNS depression
  - Phenothiazine hypersensitivity
  - Hepatic failure
- **Side Effects**
  - Impaired thermoregulation
  - CNS disturbances including impaired alertness
  - Cardiac arrhythmia, QT interval prolongation
  - Urinary retention

- **Precautions**
  - Abrupt withdrawal with prolonged use
  - Hypotensive effects
  - Bradycardia, hypokalaemia, QT prolongation
  - Chronic respiratory disorders
  - Renal, hepatic impairment

NURSING CONSIDERATIONS:

- Measure patient's blood pressure, heart rate and respiratory rate every 4 hours and prn
- 4-6 hourly ECG's
- 6 hourly urine output check

TEMAZEPAM (Normison): Benzodiazepine (Sedative, hypnotic). Adjunctive therapy in short-term management of insomnia in adults.

- **Interactions**
  - Alcohol
  - Other CNS depressants eg: antihistamines, sedatives, non-selective MAOI's, narcotics
- **Dosage/ timing**
  - Presentation: Tablets – 10mg per tablet. Prescription required (S4)
  - **Dosage** – individualise, re-evaluate periodically. Adults: 10 – 30mg 1/2hour before bedtime. Older patients – initially 10mg dose.
    Maximum dose - 30mg but may be tailored to suit individual patient in consultation with Doctor.
- **Contraindications**
  - COAD with insipient respiratory failure
  - Sleep apnoea
  - pregnancy
- **Side Effects**
  - CNS disturbances including impaired alertness, drowsiness, sedation, headache, vertigo, confusion
  - Respiratory depression
  - Rash, pruritis
  - Raised LFT's, blood dyscrasias
- **Precautions**
  - Prolonged use, high dose
  - Hypotensive sensitive conditions
  - Cardiorespiratory, renal, hepatic impairment
  - History of drug or alcohol abuse

NURSING CONSIDERATIONS:

- Measure patient's blood pressure, heart rate and respiratory rate every 4 hours and prn
- Check regular blood tests for disturbances/imbalances.

TRAMADOL: Centrally acting synthetic aminocyclohexanol analgesic with opioid-like effects. Moderate-severe pain in adults.

- **Interactions**
  - CNS drugs eg: opioids, alcohol)
  - Ondansetron
  - Incompatibility

- **Dosage/ timing**
  - Presentation: Solution for injection. Prescription required (S4).
  - **Dosage** – Administration IM OR slow IVI (over 2-3 mins): Initially 100mg, then 50 – 100mg every 4-6 hours.
    Maximum dose - 600mg/day
- **Contraindications**
  - Acute intoxication with alcohol, analgesics, opioids
  - MAOI's (concurrent, in previous 14 days)
  - Opioid sensitivity
- **Side Effects**
  - Seizures
  - GI upset
  - CNS disturbances including dizziness, headache, sedation, fatigue
  - Autonomic nervous system effects including dry mouth, sweating
  - Tachycardia, flushing
- **Precautions**
  - Acute abdominal conditions
  - Respiratory depression, seizure risk
  - Raised intracranial pressure, shock, decreased consciousness

NURSING CONSIDERATIONS:

- Measure patient's blood pressure, heart rate and respiratory rate every 4 hours and prn
- Regular pain scores.

Appendix K4

Irukandji Syndrome - Test Information:

- Electrocardiograph (ECG) – 12 lead ECG completed on admission and then 2-6 hourly depending on patient condition and/or abnormalities detected. Lead 11 is helpful in identifying decreased cardiac output due to alteration in contractility

- Chest Xray (CXR) – completed on admission and then prn depending on condition of patient and existence of ongoing cardiac or respiratory sequelae.

- Pathology investigations on admission:
    - Full Blood Count, Electrolytes, Magnesium levels, Troponin I

- Repeated blood tests
    - Creatinine Kinase (CK) – this enzyme is found in cardiac muscle, skeletal muscle and brain tissue and helps control the amount of energy available to the body. CK is released into the bloodstream from damaged cells. Ck activity begins to rise 2 – 6 hours after the cardiac event, reaches peak levels within 18 – 36 hours and returns to normal within 3 – 6 days.

    - Troponin (cTnI) – is a complex of proteins that regulates the calcium-mediated actin-myosin interaction in muscle. Cardiac-specific Troponin (cTnI) can be used as a marker of myocardial damage. Because this enzyme is not usually found in the blood, even small amounts of cardiac damage will produce a positive result. In Myocardial Infarction elevation occurs from 4 -12 hours after onset of pain and lasts for about 7 days. The test MUST be taken at the correct times for the results to be valid. **The tests are usually conducted at 6 hours post-onset and repeated at 12 hours**.

- Echocardiogram (ECHO) – This test may be required if there is clinical or radiographic evidence of cardiovascular instability. May be repeated 24 – 48 hours after initial ECHO.

- Cardiac Medical review – If the patient is still unstable 6 hours following admission or if the patient has ongoing severe pain or cardiac abnormalities on ECG, CXR or raised Troponin there should be a Cardiac review and admission to Coronary Care Unit (or Intensive Care if there is evidence of neurological dysfunction or overt cardiac failure).

Appendix L
Outcomes from this Thesis

Journal Articles

Sando, J., & Usher, K. (2009). Case review: A 28-year-old Korean man with Irukandji syndrome. *International Emergency Nursing*, *17*, 72 – 76.

Sando, J., Usher, K., & Buettner, P. (*accepted for publication)*. To Swim or Not To Swim: The impact of jellyfish stings causing Irukandji syndrome in Tropical Queensland. *Journal of Clinical Nursing*

Sando, J., Usher, K., & Buettner, P. (*under review)*. An application of the Delphi Technique in the development of clinical guidelines: Overcoming web-based delivery issues. *Nursing Research*

Conference Papers

July 2006:	7th International Interdisciplinary Qualitative Methodology Conference – Advances in Qualitative Methods
September, 2009	Abstract accepted for presentation at Royal College of Nursing Australia annual conference Abstract title: 1. Assessing the cost and improving the outcomes; Best practice management of patients with Irukandji syndrome.
October 2009:	Two abstracts submitted to 7th International Conference for Emergency Nursing Abstract titles: 1. Where is the intersection of art and science for the Advanced Practice ED Nurse? The nursing management of Irukandji syndrome (IS). 2. Nurse-initiated narcotics: Their role in optimum management of patient with Irukandji syndrome (IS).