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Management of Fever in Children: Realities of Nursing Practice

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*A thesis submitted in fulfilment of the requirements for the degree of
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Abstract

Nurses have a professional responsibility to promote and protect the safety and wellbeing of their patients. A key component of this is ensuring that patients receive effective and evidence-based care. Paediatric nurses play a crucial role in the management of fever in children, being both the first-responder to the detection of patient fever in the inpatient setting, and an educator to families of evidence-based best practice for fever management. It is therefore important to understand how nurses currently manage fever, and what drives their decision-making.

This study aims to describe the fever management practices of nurses within the inpatient setting, and explore influences on these practices.

A mixed-methods research design was employed, utilising a quantitative survey and qualitative focus group interviews. One hundred and nine nurses working within New Zealand's only children's hospital participated in an online-based questionnaire investigating fever management attitudes, knowledge and practices. Eight nurses from within the same population then self-selected to participate in focus group interviews, where ideas related to current practice methods and influencing factors were discussed. The results of both components of this study were then integrated and analysed collectively.

The study findings show that fever management is inconsistent both between nurses and across the hospital setting. These inconsistencies are related to nurses' tendencies to rely on their own, often overcomplicated, decision-making processes that determine their fever management practices. Nurses strive to manage fever in a way that reflects the value they place on patient comfort, and acknowledge the importance of evidence-based guidelines to delivering effective nursing care. However within the current realities of the clinical setting, a range of sociocultural factors such as ward culture and the influence of nurse colleagues, can override the attitudes of the nurse towards fever management, and create decisional conflict.

This study extends previous research and contributes to understanding nurses' fever management practices in the inpatient setting. The findings of this study suggest a need to review nurse fever management practices with regard to nurse decision-making, and with a view to moving practice more towards standardised recommended best practice, in support of the optimisation of paediatric patient outcomes.

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Chapter 1 – Introduction

1.1 Context

The health and wellbeing focus of healthcare systems rests on the adoption of effective and safe practices by healthcare professionals. The healthcare system in New Zealand faces significant challenges as it seeks to improve the health and wellbeing of the New Zealand population. Increased healthcare costs, an ageing population, increased inequality and a shift in healthcare focus from secondary to primary healthcare delivery require healthcare professionals to be committed and adaptable as they seek to maximise positive patient outcomes in the most efficient way possible (Thompson Aitken, Doran & Dowding, 2013). Nurses play a pivotal role in the promotion and support of health and wellbeing for New Zealand people.

Child Health is an essential component of maintaining the health and wellbeing of New Zealanders. Children are an integral part of our society, and make up over 25% of the population of New Zealand (Wills, 2016). They represent a significant proportion of the health demands of the population, accessing healthcare providers frequently for wellbeing checks, disease management and symptom control. Children also represent the future workforce of New Zealand. Investing in the health of children, including addressing inequalities existing between New Zealand European and Maori/Pacific ethnicities, is vital to ensure the long-term health of the population (Wills, 2016). As a paediatric nurse within New Zealand's only tertiary children's hospital, the promotion and preservation of Child Health is of particular importance to me. My experiences within general medical, neurosurgical and cardiology services, coupled with previous study in the field of pharmacology, has shaped my intent to research the current practice of nurses with regards to fever management in children.

1.2 Rationale

Fever is a term used to describe an elevated body temperature set-point (Sullivan & Farrar, 2011). As a component of the body's protective response against invasion, fever is classically accepted as a sign of infection of the body, although this is not always the case (St Geme et al., 2016).

Fever is one of the most frequently managed conditions in children. It is the most common reason worldwide for presentation to an emergency department (Massin, Montesanti & Lepage, 2014), commonly associated with viral or bacterial infection. Childhood fever accounts for approximately 30% of all visits to paediatricians and general practitioners (El-Radhi, Carroll & Klein, 2009). Appropriate and effective management of fever is therefore of huge importance to patients and healthcare providers alike. Nurses play a pivotal role in both managing fever in children, and demonstrating appropriate fever management practices to parents and caregivers. In this way the fever management practices of the

nurse have the potential to have a significant impact on the wellbeing and health promotion of children in the community.

The perception of both healthcare professionals and parents that fever in children is dangerous has long been recognised. (Sullivan & Farrar, 2011). This attitude has existed intermittently throughout history, and has significantly influenced the way in which fever has been managed (El-Radhi et al., 2009).

This fear of fever is reflected in a tendency of both healthcare professionals and parents to liberally administer antipyretic medication to children. Studies have identified that as many as 84% of children had been administered paracetamol, an antipyretic medication, by the time they had reached the age of six months (Hawkins & Golding, 1995). Attention has been drawn to aggressive fever management approaches by medical staff, with the common intent of 'treating', or eliminating fever in children. Anecdotal evidence suggests that the practice of healthcare professionals in New Zealand practice is similar to this.

Paediatric nurses have a significant role in the management of fever in children. They are the first-responder to the detection of fever in patients, and the health professional most often responsible for administration of antipyretic medication. Not only do nurses have a duty of care to provide a high standard of care to all patients; they also have responsibility to educate and role-model evidence-based recommended best practice to parents, caregivers and fellow healthcare professionals. This responsibility is identified within Principles Three, Four and Six of the New Zealand Nursing Code of Conduct (Nursing Council of New Zealand, 2012).

Despite the accumulation of evidence over the past four decades to support a conservative approach to fever management, healthcare professionals and parents have been reported to continue to focus on abolishing fever through liberal use of both environmental methods and antipyretic medication administration (El-Radhi, 2012). In this way, fever management practices have lagged behind evidence-based recommended best practice. Aggressive fever management practices contribute to the inappropriate use of antipyretic medication in the community, thereby increasing the risk to children with regards to overuse of paracetamol and ibuprofen (Hawkins & Golding, 1995).

Within the clinical setting, nurses have been found to use clinical guidelines to differing extents to direct their decision-making (Rycroft-Malone, Fontenla, Seers & Bick, 2009). This, along with nurses' adoption of unique and individual decision-making methods, has been shown to translate to variabilities in everyday practice.

Nurse decision-making is a complex and challenging process. It is often performed in fast-paced and high risk environments, requiring complex knowledge, clinical reasoning skills and experience. Inpatient nurses face a decision or task requiring judgement every 30 seconds on average (Bucknall, 2000). Given the vast numbers of nurses worldwide, the potential risk to health systems associated with sub-standard decision-making and judgements is hugely significant. It has been noted in some recent studies that nurses lack the support and education they need to develop consistently safe and effective

decision-making skills (Thompson et al., 2013). This would suggest that further research and development of actions to better understand nurse decision-making with a view to developing actions that support it is of particular importance to the improvement of healthcare delivery.

1.3 Purpose of research

Given the prevalence of fever in the paediatric inpatient setting and the responsibility of nurses to ensure the safe and effective delivery of care to patients, it is important to gain comprehensive understanding of the current practice of nurses with respect to fever management, and what directs their decision-making.

In light of this, the following research question has been developed to frame this study:

How do nurses manage fever in the paediatric inpatient setting?

The following two aims further define the research question.

This research aims to:

- identify the behaviours and attitudes of New Zealand paediatric nurses with regards to fever management in the inpatient setting, and
- explore influences on their decision-making processes of New Zealand paediatric nurses

Additionally this research provides an opportunity to identify unique findings to the New Zealand setting, and to challenge or confirm and further validate previously completed and published studies.

1.4 Outline of thesis

The thesis will be presented in six chapters. The first chapter (current) provides an introduction and context to the research topic, offering a rationale for the study. This is followed by a literature review in the second chapter, examining the current literature surrounding fever management and identifying specific gaps that provide guidance for the study. The third chapter outlines the methodology selected to fulfil the aims of the study. A research paradigm is presented, with discussion as to its influence on the development of methodology adopted. This is then followed with description of the mixed-methods approach used to conduct the study, comprised of a quantitative survey and qualitative focus group interviews.

The integrated findings of the study are then presented in chapter four. Both quantitative and qualitative aspects are incorporated into the presentation of the key findings areas, reflecting the co-dependent nature of mixed-methods findings. In the following discussion chapter the key findings are discussed in detail and with respect to the wider context and to the literature on fever management.

The thesis concludes in chapter six with the identification of the study limitations, a discussion of the implications of the findings for fever management in nursing practice, and recommendations for future research into this area.

Chapter 2 – Literature review

2.1 Introduction

Review of the relevant literature is an integral part of the research process. A literature review involves critical appraisal of available information related to a specific subject or research question (Hart, 1998). It provides a thorough understanding of current academic information related to an area of interest and allows for the identification of conflicting ideas, gaps in knowledge and opportunities for research (Garrard, 2014). This allows the researcher to identify and position their research within the current academic understanding of that area (Hart, 1998).

This review identifies and examines themes available from the most currently accessible literature that relates to the nursing management of children experiencing fever in the inpatient hospital setting. The resulting summary of key themes and ideas is then used to highlight specific areas of interest within the focus of the research question and direct the development of the study design in alignment with this.

In reviewing the literature resulting from the search methods explained below, three main areas of relevant information emerged and were used to structure the review. The first section discusses fever in broad terms, including its definition, physiological role within the body, and benefits and risks to the human body related to this. This provides background and context required to understand the purpose of this research project within a broader perspective on child health.

The second section focuses on fever management in the inpatient setting. In particular, fever management is defined with respect to its meaning as used within this research project. The key methods used by nurses to manage paediatric fever are discussed. The section concludes with a summary of current evidence-based best practice for paediatric inpatient nurses as described in the literature and in guidelines developed to direct nursing practice.

The final section draws together key themes directly relevant to the research question. It examines and summarises international research investigating nurses' current fever management practices. This is followed by an analysis of significant factors influencing nurses' fever management as reported in the literature.

These three sections conclude with a summary of review findings leading to the identification of gaps and limitations in the literature and opportunities for further investigation through research.

2.2 Search strategy

Prior to the main search, a wider survey of literature was performed to identify keywords which could be used to direct and refine a secondary search focused specifically on the aims and research questions

of this project. The search was undertaken using Google Scholar, PubMed and CINAHL databases, using keywords Fever OR Fever management AND Paediatric* OR Pediatric*.

Following this, a systematic search was conducted with the following parameters applied for article selection:

Electronic databases:

PubMed, Scopus, Google Scholar, CINAHL

Keywords and key phrases, searched for independently and in combination:

nurse; nurses; nursing; nursing staff; nursing practice

child; children; pediatric; paediatric; infant

fever; febrile; fever management; temperature

antipyretic; acetaminophen; paracetamol; ibuprofen; analgesic; NSAID

management; guideline; protocol

Inclusion criteria:

'English language only' text

The reviewed literature was comprised mostly of articles published post-2000, to reflect current understanding and evidence of nursing practice. There were some exceptions to this, where older articles remain significant pieces of literature impacting on the current picture of fever management.

Further relevant authors and published works were found through the review of references cited in sources identified in the database search, and through recommendations from colleagues and supervisors.

2.3 Overview of fever

This section provides background and context to the purpose and research aims of this study. Fever and fever physiology have been prominent in the literature for many years. As a consequence, section 2.3 has primarily been based on systematic reviews and medical textbooks rather than recent clinical studies.

2.3.1 Defining fever

Defining fever is important in determining recommended best practice. Clear numerical definition provides structure to clinical practice guidelines by presenting a threshold value above which action could be indicated (Thompson, 2005).

The term 'fever' encompasses both a pathophysiological (explanatory) definition and a clinical (numerical threshold) definition (El-Radhi, 2012). Both elements are important in directing healthcare professionals' understanding and management of fever in the inpatient paediatric setting. Fever is commonly defined from a pathophysiological perspective as a protective response of the body acting through an elevation of core body temperature set-point (Ogoina, 2011; St. Geme et al., 2016; Sullivan & Farrar, 2011).

Although there appears to be significant variation in the literature on the numerical definition of fever, it is most commonly defined as temperatures above approximately 38 degrees Celsius (°C) (Avner & Baker, 2002; El-Radhi, 2012; Sullivan & Farrar, 2011). 38°C is also the value recommended by the fever management guideline produced by the United Kingdom National Institute for Health and Care Excellence and is utilised in the clinical practice guideline available for paediatric nurses in New Zealand through the Starship Clinical Guidelines library (McDougall & Harrison, 2014; National Institute for Health and Clinical Excellence, 2017; Shepherd & Aickin, 2009).

Many articles written concerning the management of fever in children do not clearly define fever (El-Radhi, 2012). Lack of a numerical definition of fever can make establishing evidence-based guidelines for fever management difficult. The implementation of clinical practice guidelines therefore comes at the discretion of the healthcare provider, and their distinct view of what numerical value constitutes a fever (Watts, Robertson, & Thomas, 2003).

2.3.2 Normal thermoregulation

Given that the human body functions through millions of temperature-dependent chemical reactions, the role of thermoregulation is of paramount importance in homeostatic function and ultimately survival. The human body utilises a sophisticated and efficient thermoregulatory system to maintain high rates of various biochemical reactions in the body and minimise significant fluctuations in temperature that might affect these biochemical reactions.

According to Morrison (2016), the thermoregulatory system is comprised of five communicating elements: thermal sensors, sensory afferent pathways, an integration network within the central nervous system, thermoregulatory efferent pathways, and thermogenic effectors. These five elements function through both positive and negative feedback systems to regulate the core temperature of the body (Boron & Boulpaep, 2016).

Thermal sensors, or thermoreceptors, are commonly found in the skin, and on hypothalamic neurons within the brain. Skin thermoreceptors detect changes in ambient, or environmental, temperature (Boron & Boulpaep, 2016). This feeds back through an activating or inhibitory pathway to the warmth-sensitive neurons within the hypothalamus. These then stimulate both reflex thermoregulation, such as sweating (heat transfer modulator) or shivering (thermogenic effector), and behavioural thermoregulation, such as an intuitive response to move into shade on a hot sunny day (Boron & Boulpaep, 2016; Kurz, 2008). This is shown diagrammatically in Figure 1, section 2.3.4, and discussed later.

In addition to playing a role in processing information from skin thermoreceptors, hypothalamic neurons play a key role in monitoring and regulating core body temperature. Because of their location within the brain, hypothalamic neurons are able to accurately gather information about the temperature of tissue and blood within the body and adjust their firing rate in response to this to promote and maintain thermoregulation (Boron & Boulpaep, 2016).

2.3.3 The inflammatory response

The human body's ability to resist microbial invasion and disease can be classified into two separate responses: innate non-specific mechanisms of defence, and the specific resistance mechanism of immunity (Tortora & Derrickson, 2009).

Non-specific mechanisms of defence involve all mechanisms the body utilises to resist microbial invasion through means non-specific to any single foreign particle (Boron & Boulpaep, 2016; Tortora & Derrickson, 2009). External non-specific defences include protective physical barriers such as the skin, cilia and mucosal membranes which trap foreign particles such as bacteria or dust, and prevent them from entering the respiratory tract. Chemical defences, such as bactericidal substances found in the stomach (hydrochloric acid in gastric juices), tears, and vaginal secretions, also fall into this category (Tortora & Derrickson, 2009). Internal non-specific defences are utilised once pathogens, or foreign items, break through these external defences. Antimicrobial proteins found within the bloodstream act to promote microbe destruction, inhibit growth, and enhance the body's inflammatory response. Phagocytes and natural killer cells also found within the blood recognise 'non-self' particles and destroy them through phagocytosis or chemically-induced cytolysis of cells (Shetty, 2010; Tortora & Derrickson, 2009). The body's inflammatory response and fever initiation processes are key components of the body's internal non-specific defence. In response to cellular and tissue trauma, the inflammatory response of the body is to release substances from surrounding cells which promote vasodilation and increased capillary permeability. This results in the classic inflammation symptoms of heat, redness and swelling. Pain is also generated through stimulation of neurons in the inflamed tissue area. Immune cells are attracted towards the area of inflammation through release of kinins and prostaglandins. Fever occurs as part of this inflammatory process through the effect of released substances such as cytokines, prostaglandins and interleukins (Boron & Boulpaep, 2016; Tortora & Derrickson, 2009).

Specific resistance, namely immunity, involves the actions of immune cells to both specifically target a particular foreign antigen and develop memory to that antigen to allow for a stronger and more effective response to it if encountered again (Tortora & Derrickson, 2009). This is an extremely important mechanism that allows the body to develop immunity to various diseases. This mechanism is exploited in the development of vaccines, which create memory of dangerous pathogens without exposing the person to the disease itself.

2.3.4 Physiology of fever

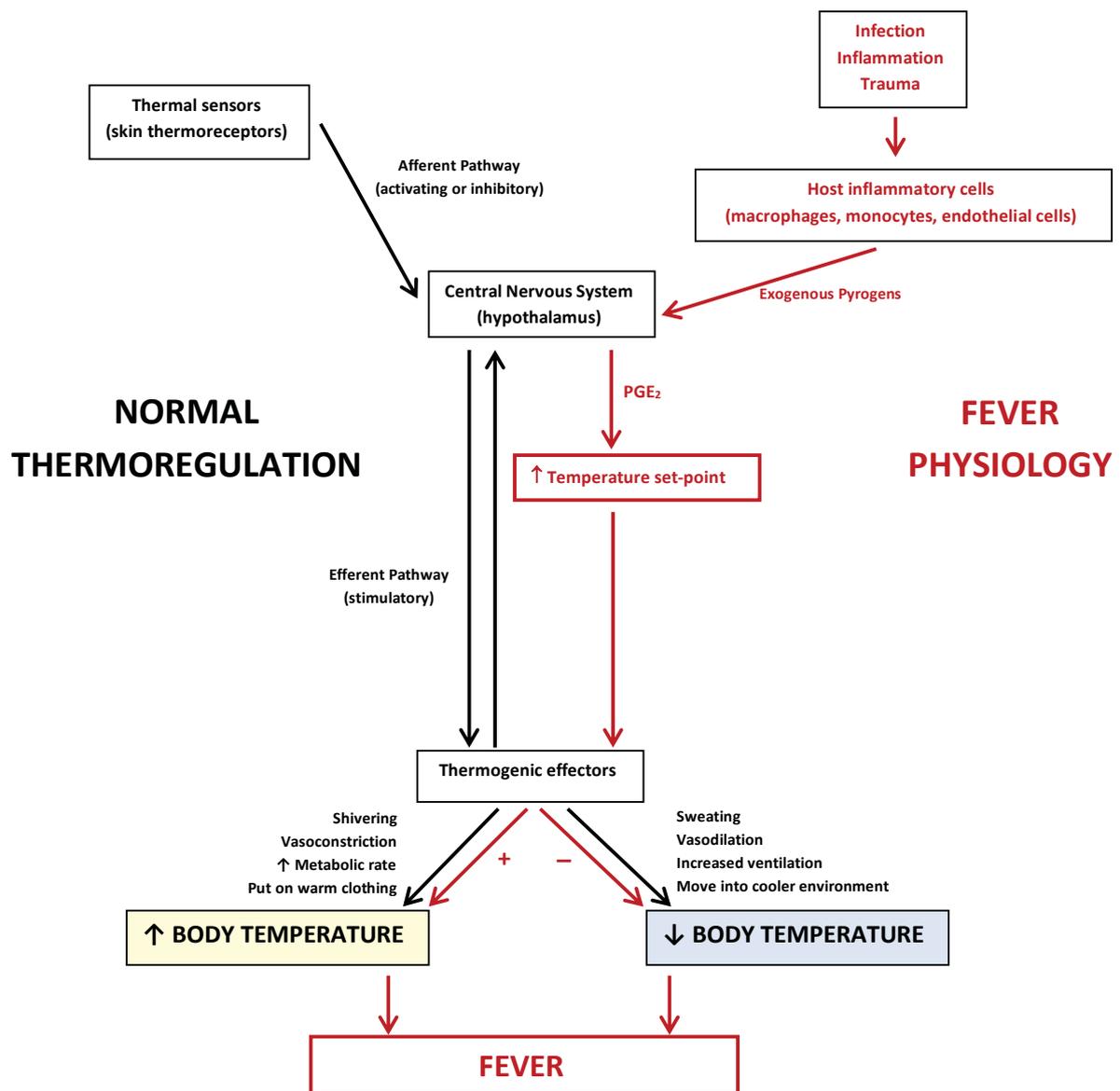


Figure 1. Normal thermoregulation and the effects of fever.

Figure 1 is a diagrammatic representation of the physiology of fever based on clinical knowledge from a number of widely accepted publications (Broom, 2007; Evans, Repasky, & Fisher, 2015; Schafermeyer et al., 2015). In response to the detection of bacterial or viral presence, host inflammatory

cells release exogenous pyrogens (Broom, 2007). These cytokines, namely interferon (IF), tumour necrosis factor (TNF- α), and interleukins (IL), trigger an inflammatory cascade in the body, resulting in Prostaglandin E2 release and subsequent stimulation of an increase in the thermoregulatory set-point of the hypothalamus (Broom, 2007; Turner, Nedjai, Hurst, & Pennington, 2014). This process creates a physical environment unfavourable for replication of pathogens. Prostaglandin E2 has an inhibitory effect on the warmth-sensitive thermoregulatory neurons in the hypothalamus, in effect creating the same response as stimulating the 'cold' skin thermoreceptors. This increase activates thermal effectors such as shivering, metabolic rate increases and vasoconstriction to cause an increase in generation and conservation of heat in an effort to bring the body temperature up to the new set-point, as seen in Figure 1 (Perkin, 2008; Schafermeyer, Tenenbein, Macias, Sharieff, & Yamamoto, 2015).

The excitatory effect of this increase in body temperature does not have the predicted effect on hypothalamic neurons; the inhibitory effect of PGE2 is stronger than the excitatory effect of an increase in body temperature. The net effect of this is an additional increase in the action of thermal effectors, as if responding to a 'cold' message (Boron & Boulpaep, 2016). Behavioural thermoregulation supports this autonomic response (Boron & Boulpaep, 2016) as patients often report feeling cold during a fever and wish to wear more clothing (normally illogical) similarly to if they were outside in cold weather (normally logical) (Boron & Boulpaep, 2016).

2.3.5. Causes of fever

The causes of fever commonly relate to either the body's response to an outside stimulus or an abnormality in the functioning of the body's immune system (Tortora & Derrickson, 2009). The leading cause of fever in childhood is infection, with viral infection being more common than other infectious agent (El-Radhi, 2012). Allergies and sensitivities can also generate an inflammatory response and subsequently a fever. The body reacts excessively to a normally harmless substance through an exaggerated inflammatory response. Other causes of fever include surgical stimulus (i.e. patients commonly develop fevers in the first few days postoperatively following a surgical procedure), post-operative atelectasis, hormonal imbalances, and diseases of the lymphatic system such as lymphoma (Broom, 2007; Kurz, 2008).

2.3.6 Temperature fluctuation

There are a number of factors that normally affect thermoregulation. This has implications clinically, as normal variation in temperature recordings could be interpreted as an abnormal temperature fluctuation. Circadian rhythm has an influence on our basal metabolic rate, causing temperature fluctuations where lower temperatures occur between 3am and 6am and higher temperatures occur between 3pm and 6pm (Dubois, 1927). Reproductive hormones can also affect the temperature of the body, with increased temperatures seen during particular stages within a woman's menstrual cycle. Age and, more specifically, age-related changes to body fat:muscle composition and mass:surface area ratios can result in temperature fluctuations being particularly prevalent for infants and older people (Avner &

Baker, 2002; Kurz, 2008). Finally, exercise has a clear effect on body temperature. Heat production increases as the result of a rise in metabolic rate during exercise; the thermoregulatory system compensates for this heat production through stimulation of thermoregulatory effectors such as sweating and vasodilation (Herman, 2016).

2.3.7 Physiological benefits of fever

Fever is a protective mechanism, and plays an important role in the body's acute phase response to infection. Fever has long been understood to retard growth and replication of foreign/infecting microorganisms in the body and enhance production, proliferation and motility of white blood cells (Carey, 2010). The immune-potentiating function of endogenous pyrogenic cytokines play a significant role in this mechanism (Greisman & Mackowiak, 2002; Schafermeyer et al., 2015).

In animal studies, increasing the body temperature artificially led to enhanced resistance to introduced viral infection (Carey, 2010; Greisman & Mackowiak, 2002). A number of human studies also support the beneficial role of fever in defending the body from infection. Bryant, Hood, Hood & Koenig (1971) performed a retrospective study of 218 patients diagnosed with gram-negative bacteraemia. The study reported a positive relationship between the maximum temperature of patients on the day of diagnosis and survival. Similarly, in reviewing 28 cases of spontaneous bacterial peritonitis over a period of five years, Weinstein, Iannini, Stratton, & Eickhoff (1978) discovered a positive correlation between patients experiencing temperatures above 38°C and survival. In reviewing these studies more recently, Mackowiak suggested that fever has persisted throughout human evolution due to its advantage in protecting against microbial invasion (Greisman & Mackowiak, 2002).

In support of fever's beneficial role in host defence, a substantial number of studies have been published showing a detrimental effect of lowering fever in the immune system's ability to fight infection. Schulman et al. (2005) performed a randomised non-controlled trial to study the effect of antipyretic therapy on patient outcomes in a trauma intensive care unit in the United States of America. The study on 82 adults demonstrated that febrile patients who were treated aggressively with paracetamol every six hours when above a threshold temperature of 38.5°C had a statistically significant increase in mortality when compared to patients treated above a threshold temperature of 40°C ($p=0.06$). The study was stopped prematurely due to this mortality difference (thereby limiting sample size).

Doran, De Angelis, Baumgardner & Melltis (1990) conducted a double-blind randomised controlled trial to investigate the effects of administration of the antipyretic drug paracetamol on the duration and severity of childhood chickenpox. Participants were given either paracetamol four times daily at 10mg/kg, or a placebo. The results of the study showed that children who received paracetamol experienced a longer duration of illness ($p<0.05$), and more significant itching than those administered the placebo.

Another double-blind randomized controlled trial was performed by Graham, Burrell Douglas, Debelle & Davies (1990) on 60 adult volunteers. Participants were randomised to one of four treatment groups:

aspirin, paracetamol, ibuprofen and placebo. 57 of these participants were successfully infected with rhinovirus and monitored with regards to clinical symptoms, serum antibody response and viral shedding. Participants from the aspirin and paracetamol treatment groups were seen to experience an increase in nasal signs and symptoms, suppressed antibody response and longer duration of viral shedding when compared to the placebo group (Graham et al., 1990). A retrospective study of the effect of antipyretics on illness duration in the United States reported similar findings to the Graham study with respect to duration of illness for adults infected with Influenza A and Shigella (Plaisance, Kudaravalli, Wasserman, Levine, & Mackowiak, 2000).

A number of studies have also been published showing no statistically significant difference in patient outcomes when febrile patients are given antipyretics or placebo. A comprehensive literature review by Carey in 2010, however, describes the summation of evidence to support the beneficial role of fever to patients, as opposed to interventions to suppress it (Carey, 2010).

2.3.8 Physiological dangers of fever

In addition to the benefits of fever discussed above, there are also well-documented physiological dangers of fever in the paediatric population.

Dehydration

One of the major risk factors for serious illness (or further clinical deterioration) in a febrile child is dehydration (Canavan & Arant, 2009). Dehydration in conjunction with fever in a child can occur as a result of both increased water loss and decreased fluid intake. Examples of increased water loss include an increase in insensible losses (i.e. sweating and increased respiration), or fluid loss from an infection-associated cause such as diarrhoea (Meyers, 2009). Decreased fluid intake arises from symptoms related to a physiological immune response, such as anorexia, nausea or vomiting, or (particularly in the case of infants) irritability leading to poor feeding (Meyers, 2009; St. Geme et al., 2016).

Dehydration is a serious concern for children, given their poor functional reserve with regards to fluid balance. It can result in a decreased intravascular volume, electrolyte imbalances i.e. sodium and potassium, and put infants at an increased risk of hypoglycaemia through decreased intake of breastmilk or formula (Avner & Baker, 2002; Meyers, 2009).

Febrile seizures

Febrile seizures have long been a primary concern of parents, caregivers and health professionals when considering the dangers of fever. Febrile seizures occur in the presence of fever, and affected children are predominantly genetically predisposed (Schafermeyer et al., 2015; Stafstrom, 2002). Febrile seizures are the most common type of seizure in children, affecting approximately 2-5% of the paediatric population (Stafstrom, 2002). However, children appear to 'grow out' of having febrile seizures. The incidence of febrile seizures decreases with age, and by age seven years febrile seizures are unlikely

(Stafstrom, 2002). In most cases, febrile seizures are benign and do not result in any neurological damage to children. Increase in mortality is only seen in children with complex febrile seizures or an underlying neurological abnormality (Vestergaard et al., 2008). They are also not associated with an increased risk of serious underlying disease, such as sepsis. Contrary to popular belief by health professionals and parents/caregivers, there is no evidence to support a view that administering antipyretics to febrile children will prevent febrile seizures (Greisman & Mackowiak, 2002; Wallenstein et al., 2013; Walsh, Edwards, Courtney, Wilson, & Monaghan, 2005).

Children at risk

In paediatric patients with serious underlying cardiac, respiratory or metabolic conditions, fever presents particular danger. For every degree of temperature rise above a patient's average body temperature, metabolic heat production in the body must increase by 13% to sustain it (Shetty, 2010). This can have serious ramifications for children with pre-existing low metabolic reserves, such as those with significant underlying conditions, and therefore fever in these children is likely to need more aggressive management (Schafermeyer et al., 2015).

2.4 History of fever management

Fever is one of the oldest-identified signs of disease and practices related to the management of fever have existed for millennia (El-Radhi, Carroll & Klein, 2009). For example, ancient Egyptian scholars identified willow tree bark as having antipyretic uses. The salicylate content was identified in the nineteenth century and the synthetic manufacture of aspirin (used as an antipyretic medication) began in 1875 (Lekstrom & Bell, 1991).

The evolution of fever management practices over time reflects changing attitudes towards fever throughout history, oscillating between the view that fever is beneficial to the body and the view that fever related to infection is harmful to the body (El-Radhi et al., 2009).

Ancient writings indicate that civilisations (including Egyptian, Hindu, Chinese and Hebrew) believed that fever was associated with evil spirits and demonic possession. This shaped fever management practices towards removal of fever. Fever was first recorded as beneficial by Hippocrates and the ancient Greeks. Hippocrates, a physician who applied the system of four bodily humours to medicine, identified that fever was beneficial and suggested that it could be used to 'cook' out excess humour in unwell patients. Rufus of Ephesus, another Greek physician, was the first to recommend the use of 'fever therapy' to treat epilepsy through induction of malarial fever. He wrote, "fever is a good remedy for an individual seized with convulsion, and if there were a physician skilful enough to produce a fever it would be useless to seek any other remedy against disease". 18 centuries later, a Dutch surgeon used Rufus' concept to successfully treat neurosyphilis with malarial fever, earning him a Nobel Prize (El-Radhi et al., 2009).

The Medical Renaissance (1800-1960) brought about changes in attitude towards fever. In the early 1800s, fever was considered both a symptom, and a disease in itself. Throughout this century, theories related to the characteristics of fever frequently changed as medical science developed. By the late 1800s, breakthroughs in bacteriology established fever as symptom of underlying illness. Disintegration of the ancient humoral theory culminated in disregard of the concept that fever could be beneficial and, therefore, fever was treated aggressively (El-Radhi et al., 2009).

Fever management in the early 1900s was characterised by controversy surrounding the benefits and dangers of fever. Conflicting attitudes towards fever resulted in a wide variety of fever management practices being used both in the hospital and in the community. Various remedies were used for childhood fever, such as alcohol baths, tepid sponging, overdressing (to 'sweat out the fever') and reducing oral intake ('starve the fever') (Helman, 1978).

Over the last four decades, there has been an accumulation of scientific evidence which demonstrates the physiological benefits of fever to the body. The evidence provides support for not 'treating' fever in most febrile children with the exception of those with established metabolic or cardiac compromise (El-Radhi et al., 2009). Current recommendations to conservatively manage fever reflect this evidence, focusing on improving the comfort and wellbeing of the patient (Sullivan & Farrar, 2011). Conservative management involves the management of fever-associated symptoms such as pain and discomfort, as opposed to 'treating' children with antipyretic medication for the sole purpose of bringing their body temperature to within a 'normal' range. Reflecting a more recent change, non-pharmacological fever management practices such as tepid sponging, undressing patients and environmental cooling are now also not recommended as acceptable interventions, given a lack of clinical evidence to support their efficacy (Avner & Baker, 2002; Sullivan & Farrar, 2011).

2.5 Current approaches to fever management

This section presents a comprehensive overview of fever management and techniques related to fever management. Systematic reviews, recent clinical research and current clinical guidelines formed the basis of the review of this topic. Incorporating older pieces of research with more recent publications, the section provides an understanding of elements of nurse fever management practices over time, as well as a summary of current recommended best-practice.

2.5.1 Defining fever management

Fever management can be defined with respect to the earlier discussed definition of fever.

While reviewing the literature, it was observed that articles written about 'fever management' often discussed a healthcare professional's complete holistic response to discovering a fever (Avner & Baker, 2002; Canavan & Arant, 2009; Shepherd & Aickin, 2009; Teuten, Paul & Heaton, 2015). This

incorporated a thorough history-taking, assessment, and diagnostic tests related to identifying the cause of the fever.

Fever is commonly defined as an elevation of the body's temperature set-point as a *protective response*. Fever is considered to be both a symptom of an underlying cause which is stimulating a response from the body, and a condition in itself (Schafermeyer et al., 2015; Sullivan & Farrar, 2011).

In light of this, for the purpose of this literature review fever management is defined as the therapeutic management of fever specifically. Although an important element of a child's medical and nursing care, the diagnostic process is not included within this definition.

2.5.2 Fever management in the inpatient setting

An important component of the role of the nurse identified in the literature is providing education to patients, families and caregivers. Education is an effective method of optimising both patient and family health in the community and empowering them to take ownership of their own health. It provides nurses with an opportunity to provide new information and to correct inaccurate perceptions or behaviours; for example, fever phobia. The education nurses provide to patients should be consistent with evidence based best practice; therefore, it is recognised as vital that nurses correctly understand best practice and have confidence to educate patients and families of this (Walsh, Edwards, Courtney, & Monaghan, 2006).

2.5.3 Fever management - nursing techniques

Pharmacological management

Paracetamol

Paracetamol is the most commonly used drug in the world (Warwick, 2008), and viewed by many as the first choice drug for pharmacological management of fever (Niehues, 2013; Sullivan & Farrar, 2011; Warwick, 2008). In a quantitative study conducted in 2000, 60% of paediatric nurses participating in the study reported using paracetamol as first-line management of paediatric fever in the emergency department setting (Poirier, Davies, Gonzalez-Del Rey, & Munroe, 2000). This finding is supported by numerous studies completed since 2000 (Greensmith, 2013; Walsh et al., 2005). Given its reputation as a safe, effective and easily accessible drug, it is also first-choice for many parents and caregivers managing fever in the community (Kanabar, 2014; Warwick, 2008).

The mechanism of action for paracetamol continues to be investigated and involves multiple chemical pathways in the central nervous system (Martino & Chiarugi, 2015). It is known to act as a cyclooxygenase (COX) inhibitor, with selectivity to the COX-2 enzyme. Inhibition of COX-2 results in a block to the production of prostaglandin (Graham, Davies, Day, Mohamudally, & Scott, 2013; Martino & Chiarugi, 2015). Paracetamol has a high bioavailability (90%) and takes approximately 30-45 minutes

to achieve peak concentration in the bloodstream (Martino & Chiarugi, 2015). However, due to its action predominantly within the central nervous system (less effective at peripheral prostaglandin inhibition), there is a lag time between achieving therapeutic blood concentration and observing clinical results as the drug has to cross the blood-brain-barrier in order to exert its effects on the hypothalamus (Sinatra, Jahr & Watkins-Pitchford, 2011). Paracetamol is largely metabolised in the liver and eliminated in urine (Warwick, 2008).

The recommended dosage for children is 10-15mg/kg, administered every four to six hours, with a maximum of four doses in a 24 hour period. This dosage is generally agreed upon across most literature (Martino & Chiarugi, 2015; Sullivan & Farrar, 2011; Walsh et al., 2005; Warwick, 2008). Older studies investigating the efficacy of paracetamol were based upon a dosage regime of under 10mg/kg per dose, and often concluded that paracetamol had little efficacy for the management of fever (Warwick, 2008). However this was most likely a result of an inability to reach therapeutic blood concentrations, as opposed to an issue with effectiveness of the drug itself (Martino & Chiarugi, 2015).

Some literature recommends paracetamol administration only for infants over the age of three months (Schmitt, 1984). However the New Zealand Formulary for Children (NZCF) supports the use of paracetamol under the guidance and advice of a doctor for infants of any age (New Zealand Formulary for Children, 2018). Paracetamol is most often administered as a flavoured liquid suspension. It is also available in a rectal formulation, which can be of significant value when administering to children who refuse oral medications or have vomiting related to their current condition (Niehues, 2013).

Paracetamol is largely considered a safe drug to use. It has minimal risk of side effects; this is one of the reasons that it is the drug of choice for many health professionals and parents for the management of fever (Niehues, 2013; Sullivan & Farrar, 2011). Provided that children are administered paracetamol within the dosage recommendations described above, there are no common or significant side effects noted with its use (Niehues, 2013). Unfortunately, due to its accessibility and wide use, it is associated with a high incidence of accidental overdose, with some publications naming it 'one of the most dangerous compounds in medical use' (Brune, Renner & Tiegs, 2015). Medication errors or chronic overdosing of children can lead to hepatotoxicity, and potentially acute liver failure (Brune et al., 2015; Niehues, 2013; Sullivan & Farrar, 2011; Warwick, 2008). A number of studies reported a potential relationship between paracetamol administration and the development of asthma (Kanabar, Dale & Rawat, 2007). However, a causal relationship between the two has not been proven between the two (Kanabar, 2014).

Ibuprofen

Ibuprofen a non-steroidal anti-inflammatory drug (NSAID) increasingly used in both the inpatient and community setting for the pharmacological management of fever (Sinatra et al., 2011). This is in part due to recent evidence emerging which suggests that ibuprofen may be a faster-acting and more effective drug of choice for managing fever than paracetamol. In particular, in a meta-analysis conducted by Pierce and Voss (2010), ibuprofen was shown to be more effective in reducing fever-related

discomfort than paracetamol. It is a similarly safe and easy to access drug, however its choice for selection as a first-line drug for the management of fever is influenced by consideration of its potential side effects related to the condition of the child being treated (Kanabar, 2014; Sullivan & Farrar, 2011).

Ibuprofen is a member of the NSAID drug class (Sinatra et al., 2011). In contrast to paracetamol, ibuprofen non-selectively inhibits both COX-1 and COX-2 enzymes. COX-1 is an enzyme which functions to maintain the protective mucosal lining of the stomach (Rainsford, 2015; Sinatra et al., 2011). While inhibition of COX-2 has antipyretic/anti-inflammatory advantages in that it results in the inhibition of prostaglandin synthesis, inhibition of COX-1 can result in thinning of the mucosal layer in the stomach and increase risk of developing stomach ulceration and bleeding (Sinatra et al., 2011). Ibuprofen has a bioavailability of 80%, and takes approximately 1-2 hours to reach peak blood concentrations after ingestion. It is predominantly cleared through the renal system (Rainsford, 2015; Sinatra et al., 2011).

In 2004 a meta-analysis was conducted on 17 randomised controlled trials related to the efficacy of paracetamol versus ibuprofen in the management of fever or pain (Perrott, Piira, Goodenough, & Champion, 2004). The results of this analysis showed that although there was no difference in efficacy between paracetamol and ibuprofen when treating pain, ibuprofen was a more effective antipyretic, in that it reduced temperature more than paracetamol at two, four and six hours post-administration (Perrott et al., 2004). A large multi-site, blinded randomised controlled trial completed five years later supported this conclusion (Hay et al., 2009), adding that children given a dose of ibuprofen became afebrile 27 minutes faster than those given a dose of paracetamol. Ibuprofen was also seen to have on average a longer duration of effect than paracetamol. However, this was not a statistically significant finding due to the wide confidence intervals for these results (Hay et al., 2009).

The recommended dosage of ibuprofen for children is widely agreed to be 10mg/kg, administered every 6-8 hours, with a maximum of three doses in a 24 hour period (Kanabar, 2014; NZCF, 2018; Niehues, 2013). Some guidelines, including the New Zealand Formulary for Children, recommend that children below the age of three months receive a smaller dose of 5mg/kg every 6-8 hours. However, most evidence reviewed during this project did not make this differentiation for infants. Ibuprofen is predominantly administered to children as an oral liquid suspension (Kanabar, 2014).

Ibuprofen is considered safe to use in normally healthy children of all ages. Risks associated with ibuprofen use do, however, exist and relate mainly to the drug's non-selective binding to both COX-1 and COX-2 enzymes, as described above (Balestracci et al., 2015). This is seen in a randomised controlled trial conducted by researcher Autret and team (Autret et al., 1997). In this study of 351 children, six of the 117 children randomised to the ibuprofen group (5.1% of these participants) developed gastrointestinal disturbances which qualified for withdrawal of the participant from the study (Autret et al., 1997).

Although rare, patients taking ibuprofen could be at risk of developing nephrotoxicity or an acute kidney injury (Misurac et al., 2013). This is related to its mode of clearance through the renal system. There is currently no significant clinical evidence in the form of randomised controlled trials or cohort studies to

support a causal link between ibuprofen administration and the incidence of renal injury. However, a number of case reports have been published describing febrile, acutely unwell children who experienced 'reversible renal insufficiency', acute kidney injury and nephrotoxicity following treatment with ibuprofen (Kanabar, 2014; Misurac et al., 2013). Infants younger than six months are suggested to be at higher risk of developing these adverse effects, given their immature renal system and its effect on drug clearance (Allegaert, Rayyan, & Anderson, 2006).

It has been suggested that kidney-related risks are of specific consideration when patients are concurrently suffering from dehydration. Dehydration is a known risk factor for NSAID-induced renal failure (Kanabar, 2014; Niehues, 2013). This is of particular importance to the paediatric inpatient population as dehydration is one of the most common associated symptoms observed with fever. A case control study of 105 clinically dehydrated children with acute gastroenteritis was recently published, investigating the relationship between ibuprofen administration and acute kidney injury (Balestracci et al., 2015). In the ibuprofen group, 54% of the 63 participants developed acute kidney injury. After adjusting for the children's degree of dehydration, ibuprofen was still demonstrated to be an independent risk factor for the development of acute kidney injury, its administration doubling a child's likelihood of injury (Balestracci et al., 2015).

However, given that the inpatient treatment of febrile children most often involves management of hydration and nutrition, the risk of children developing these injuries is very low. Based on the analysis of both advantages and disadvantages of this drug, reputable evidence-based guidelines such as the National Institute for Health and Clinical Excellence guidelines from the United Kingdom recommend both ibuprofen and paracetamol for the management of discomfort/distress in febrile children (National Institute for Health and Clinical Excellence, 2017).

In a large randomised controlled trial conducted by Hay et al. (2009), there was found to be no significant difference in the number of serious adverse effects between ibuprofen and paracetamol. Side effects seen in children administered ibuprofen have been reported in case studies or case-control study designs, and therefore provide weaker evidence for a causal relationship.

Aspirin

Aspirin is another NSAID drug which has historically been the first-line drug of choice for the management of fever. In the 1980s, concern grew around the potential relationship between aspirin use in children and Reye's disease (Hardie et al., 1996). Reye's disease is a serious, often fatal, disease involving both encephalopathy and hepatic dysfunction (Hardie et al., 1996). A public health service study investigating this relationship was published in 1987 (Hurwitz et al., 1987). Following a pilot study, a case-control study was performed where 27 patients with Reye's disease were compared against 140 controls. The study demonstrated a statistically significant relationship between aspirin administration and the incidence of Reye's disease (Hurwitz et al., 1987). By 1990, aspirin was no longer recommended for use in children and most current clinical guidelines include warnings against the administration of

aspirin for fever management purposes (Hardie et al., 1996; National Institute for Health and Clinical Excellence, 2017; Sullivan & Farrar, 2011).

Non-pharmacological management

External cooling measures have been utilised for many centuries for the management of fever in children. In 1984, Schmitt published a foundational document for the antipyretic management of fever in children, in which external cooling by way of sponging children with tepid water was a recommended antipyretic technique for all children with fevers greater than 40°C (Schmitt, 1984). Since Schmitt's article was published, further clinical trials have been conducted which challenge the validity of the guidelines, particularly those recommendations related to non-pharmacological management and advice related to fever management for children with a history of febrile seizures (Carey, 2010; El-Radhi, 2012; Lenhardt et al., 1999; Niehues, 2013).

Many external cooling techniques are still used by nurses today, despite an absence of research to support their use. These include environmental management, such as cooling rooms and undressing children and infants, and physical cooling techniques such as tepid sponging, bathing and use of cold compresses (Edwards, Courtney, Wilson, Monaghan, & Walsh, 2001; Greensmith, 2013).

The efficacy of such techniques has been widely studied and critiqued. As a result of this, much of the more recent literature regarding external cooling has been in the form of systematic reviews. In 2013, Niehues conducted a literature review of publications related to paediatric fever management in conjunction with the revision of several key textbooks on paediatric fever. Niehues concluded that there was no clinical evidence to support the efficacy (and therefore use) of external cooling techniques to manage fever in children (Niehues, 2013). A number of articles reviewed by Niehues suggested that ice baths and cold compresses could actually have the opposite effect on fever (Niehues, 2013). Peripheral cooling could promote further thermogenesis through the effect of peripheral vasoconstriction on temperature-related signalling pathways to the hypothalamus (Nakamura & Morrison, 2011). This was supported by the Bruderlein study (2006), reviewed by Thompson and Kagan in their investigation into nurse management of fever (Thompson & Kagan, 2011). Niehues did however propose that the physical act of performing cooling cares could have some benefit in reducing child discomfort by providing them with tangible care and attention (Niehues, 2013).

In Carey's systematic review of literature related to antipyretic therapies, several studies were identified that supported the conclusion that clinical evidence does not support the use of physical cooling techniques for management of fever in children (Carey, 2010). A non-blind randomized controlled trial by Gozzoli, Schöttker, Suter and Ricou (2001) compared the effect of external cooling methods (such as ice packs and cooling blankets) on various outcomes related to fever (i.e. temperature, discomfort, length of hospital stay) compared to using no antipyretic management techniques, in critically unwell patients. There was seen to be no difference in hospital length of stay or mortality between the intervention and control groups, and no statistically significant difference in other outcomes such as

discomfort. However, due to the nature of physical cooling methods, participants could not be blinded to each group (Gozzoli et al., 2001).

Carey (2010) also discussed a trial (Lenhardt et al., 1999) which used similar methods to Gozzoli to examine the efficacy of physical cooling measures. In this trial, fever was stimulated in healthy participants and similar indicators were assessed in intervention and control groups as those in the Gozzoli trial (Gozzoli et al., 2001; Lenhardt et al., 1999). In contrast to the Gozzoli trial, Lenhardt demonstrated that participants experienced an increase in discomfort with physical cooling techniques. In addition, participants in the intervention group had a 35% increase in oxygen intake ($p=0.0001$), due to the increased metabolic demand required to maintain fever in participants being actively cooled. This study however was limited by small sample size, with the trial involving nine participants three times over consecutive days (Lenhardt et al., 1999).

Watts performed a systematic review of randomised controlled trials investigating the efficacy of various nursing interventions commonly used for the management of fever in children (Watts et al., 2003). In particular, their review compared the efficacy of antipyretic medication with non-pharmacological management. The review supported Carey's conclusion that discomfort either increased or remained unchanged when physical cooling measures such as sponging were used (Carey, 2010). Watts and team deduced that antipyretic medication was more effective than external cooling measures at reducing child temperature and therefore concluded there was no evidence to support the efficacy of non-pharmacological fever management techniques such as sponging (Watts et al., 2003).

2.5.4 Evidence-based recommended practice

Clinical evidence forms the basis for recommended best practice in the healthcare setting (Kowalak, Hughes & Mills, 2003). Current research provides suggestions and evidence which direct the development of best practice guidelines with the aim of promoting practice uniformity in nursing care. These play a critical role in improving patient outcomes by ensuring most effective practice is maintained (Kowalak et al., 2003).

Current literature on the management of fever in children has recently adopted a more conservative approach, in light of the growing understanding of the risk/benefit balance of antipyretic interventions and the recognition of fever as an important physiological body mechanism in the fight against infection. Instead of focussing on the 'treatment' of a temperature value, reviews on nursing fever management advocate for emphasis to be placed on providing comfort to a child by managing the symptoms related to the fever process, such as discomfort, irritability, dehydration and pain (Carey, 2010; Kanabar, 2014; Niehues, 2013; Watts et al., 2003).

Pharmacological intervention remains an appropriate method of fever management in children with pain or discomfort related to the fever process. Studies generally support the use of either paracetamol or ibuprofen for single-dose therapy, taking into account the specific characteristics of the child such as dehydration status, age, and presence of chronic liver or kidney disease when selecting a drug of choice

(El-Radhi, 2012; Kanabar, 2014; Sullivan & Farrar 2011). Paracetamol is more often used as first drug of choice, due to its wide therapeutic window and perceived lower risk profile, although this has not been clinically proven (El-Radhi, 2012). Studies do not appear to come to a consensus on dosing strategies for antipyretic medications. Some support the use of an alternating dosing strategy where ibuprofen and paracetamol are used concurrently and alternately, while other studies advocate for single-therapy strategies only (El-Radhi, 2012; Kanabar, 2014; Sullivan & Farrar, 2011). Antipyretic medication is no longer recommended for the prevention of febrile seizures, as studies have demonstrated no efficacy of antipyretic medications against the occurrence of febrile seizures (Gunduz, Usak, Koksak & Canbal, 2016; Stafstrom, 2002; Sullivan & Farrar, 2011). Non-pharmacological techniques, such as tepid sponging and ice packs, have long been documented in literature as ineffective techniques for the management of fever, in particular having no effect or negative effect on child discomfort (Griesman & Mackowiak, 2002; Lenhardt et al., 1999; Nakamura & Morrison, 2011; Niehues, 2013).

2.5.5 Guidelines to direct nursing practice

Nurses within the inpatient setting are expected to rely on policy and guidelines to direct their provision of nursing care (Kowalak et al., 2003). They are of particular use when a nurse has a personal knowledge deficit in a particular area of nursing care (Walsh et al., 2006). Nurses are strongly encouraged by their hospital organisation to utilise these guidelines in everyday practice, to ensure that current evidence-based best practice is translated into actual practice to ensure the best care is provided to patients.

As noted above, clinical evidence directs the development of hospital and organisational guidelines. Global and national guidelines are often used by smaller countries and regions in conjunction with their own review of clinical evidence, to shape individually developed guidelines for inpatient nurses in their area. The National Institute for Health and Care Excellence based in the United Kingdom develop a substantial number of guidelines for nursing practice based on the most current evidence available (National Institute for Health and Clinical Excellence, 2017). These guidelines are widely used by other organisations including Starship Children's Hospital in New Zealand, in developing their own guidelines. The recommendations made within the NICE guidelines on fever management accurately reflect the evidence-based recommended practice summarised above. As a result the currently advocated conservative approach is also reflected in the Starship Clinical Guideline for fever management (Shepherd & Aickin, 2009).

In 2017, a significant systematic review and appraisal of fever management guidelines was undertaken (Chiappini, Bortone, Galli, & Martino, 2017). This review investigated quality, rigour of development, clarity and scope of guidelines to evaluate their function. Common messages within each guideline appeared to reflect the evidence-based recommended practice discussed above:

- The use of antipyretics is only indicated for children experiencing discomfort associated with fever, as opposed to having an aim of reducing physical temperature.

- Paracetamol and ibuprofen are the two antipyretic medications recommended for use in febrile children, with consideration given to their age, weight and characteristics.
- Febrile seizures cannot be prevented through the use of antipyretics.
- Physical cooling techniques such as tepid sponging and alcohol baths are not recommended for the management of fever in children

Caution is advised when considering the administration of antipyretic medication to children with chronic diseases and conditions involving renal or hepatic impairment, cardiac disease, diabetes or malnutrition. (Chiappini et al., 2017)

Divergent messages were also identified in areas of guidance where guidelines differed in their recommendations. Divergent messages were predominantly related to the dosage and dosing regimen of antipyretic medications and the use of some physical (non-pharmacological) fever management techniques such as overwrapping children or uncovering/unclathing children (Chiappini et al., 2017).

2.6 Nursing fever management practice

This section examines current literature specifically investigating the current fever management practices of paediatric inpatient nurses. It is divided into two main branches, reflective of the two aims of this study. The section will conclude with an overview of literature describing nurses' decision-making processes.

2.6.1 Current nursing practice

Although a wealth of evidence is currently available to guide appropriate fever management practice in the inpatient clinical setting, research into current nursing behaviour and decision-making in the inpatient setting is limited. Of studies published on the topic of nurses' fever management, many focus on the management of fever in adults, or were completed prior to year 2000, thereby decreasing their validity in terms of capturing current practice. However, while research into current practice in the paediatric population is limited, four studies provide valuable insight.

In 2000, a study was published by Poirier et al. which explored the perspectives of paediatric nurses working in emergency departments on the care of children with fever (Poirier et al., 2000). Using convenience sampling, 88 nurses participated across four children's emergency departments in the United States of America. Nurses completed a self-administered questionnaire on both knowledge of fever and attitudes towards fever management. Questions were adapted from a similar previous study on parental attitudes towards fever and its management (Kramer, Naimark & Leduc, 1985). The median temperature considered to be a fever by participating nurses was 38 °C. However, 11% of nurses completing the questionnaire were unsure what temperature would constitute a fever in a child. Approximately 88% of nurses surveyed would choose paracetamol as their first-line 'treatment' for fever, while 7% of nurses also consider non-pharmacological options such as tepid sponging or alcohol baths

acceptable for fever management (Poirier et al., 2000). This study demonstrated significant inconsistencies in fever management approaches between nurses, regardless of level of experience, and that fever phobia (discussed below) remained a consistent issue for participants (Poirier et al., 2000).

A group of Australian researchers from Queensland led by Walsh and Edwards performed a number of studies between 2001 and 2005, investigating behaviours and attitudes of paediatric nurses towards fever management by way of a three-phase study (Edwards et al., 2001; Edwards, Courtney, Wilson, Monaghan, & Walsh, 2003; Walsh et al., 2005). These studies were carried out in a major Queensland tertiary paediatric hospital. Each phase adopted a different methodology. In this way, the study was able to provide comprehensive insight into the subject and generate high quality results for use in subsequent research into fever management. Limitations of each study were minimised through the utilisation of multiple data collection methods, which contributed to a deeper understanding of fever management practices for their selected population of interest in Queensland.

The first phase of the study explored current nurses' management of fever through a retrospective audit of the charts of children admitted to the hospital with a febrile illness over a seven-month period (1098 admissions in total) (Edwards et al., 2003). Information collected from charts included demographics, temperature recordings, and antipyretic prescription and administration. The study indicated that the administration of antipyretic medication to febrile children was routine practice for the majority of nurses; 98.5% of febrile patients were prescribed an antipyretic medication and 77.7% of these patients were given at least one dose of the medication by a nurse (Edwards et al., 2003). Prescribed antipyretic medications included paracetamol, ibuprofen and a 'liquigesic co-analgesic syrup' (suspension of paracetamol and codeine phosphate). Unfortunately, nurses did not record on charts their rationale for administration of these medications (for example, pain, discomfort, temperature) and, therefore, the results do not give a clear picture of the decision-making criteria nurses applied (Edwards et al., 2003). This is a limitation of the study. Although retrospective chart audits give some indication as to the prevalence of a certain behaviour, they cannot provide a more extensive understanding of the decision-making process behind the actions taken.

The second phase of this study explored the nurse decision-making process with regards to the administration of antipyretic medication (Walsh et al., 2005). This was achieved through a quantitative self-report questionnaire. Fifty one nurses from medical wards of the Queensland tertiary paediatric hospital participated in the study. Purposive sampling was utilised to obtain a sample representative of a variety of skill-levels, roles and experience (Walsh et al., 2005). Participating nurses' knowledge of both fever physiology and antipyretic administration behaviours were examined, using a questionnaire adapted from a study investigating the effects of various influences on nurses' intentions to assess pain. A five-point Likert scale was utilised in sections of the questionnaire to quantify answers. Nurses' knowledge scores were lower than expected; only 62% of knowledge items were correctly answered (Walsh et al., 2005). Although many demonstrated positive attitudes toward the beneficial effects of fever, nurses were seen to have strong intentions to administer antipyretic medication to the next febrile

child in their care. The strongest pressure to administer these medications was reported to come from both parents and work colleagues (Walsh et al., 2005). The findings of this phase of the Queensland study suggest that current literature concerning fever physiology and recommended management of fever is neither widely understood nor adopted into the everyday practice of nurses. It also demonstrated that nurses were significantly influenced by the attitudes and beliefs of others when it came to their own fever management practice.

The third and final phase of this study explored nurses' attitudes and decision-making processes with regards to managing fever, using focus group discussions to collect qualitative data (Edwards et al., 2001). Similar to phase two of the study, purposive sampling was utilised to achieve representation of a broad range of nursing experience and roles within medical wards of the Queensland tertiary paediatric hospital. The results of both phase one and two studies were investigated in more depth through the development of open-ended questions to direct group discussion. Again this study demonstrated many inconsistencies in practice among participating nurses (Edwards et al., 2001). Although most nurses in the group indicated that thorough assessment and clinical reasoning were key components in their decision-making processes, their resulting fever management behaviours varied widely. In addition to antipyretic administration, many nurses also reported using non-pharmacological measures, such as tepid sponging and environmental cooling. Some nurses would attempt these prior to antipyretic administration. The majority of nurses reported that they would administer antipyretic medication to children with temperatures over 38.5 degrees regardless of how the child appeared clinically (Edwards et al., 2001). This study again highlighted the influence of clinicians and parents on the decision-making process of nurses when it came to fever management. Within this, fever phobia was a recurring theme evident in both their personal attitude towards fever and in the way other people influenced their behaviour.

In 2013, a quantitative study similar to that of the Walsh et al.'s study was performed in an Irish Children's hospital by Greensmith (2013). The study recruited 119 nurses from within a paediatric hospital in Ireland to complete a self-report questionnaire (response rate of 32%). Greensmith used the questionnaire developed by Walsh et al. (2005) to investigate nurses' attitudes and knowledge surrounding fever management. It was tested for consistency prior to use by performing a test-retest and pilot study. This study produced similar results to the study by Walsh et al., thereby affirming questionnaire content validity and reliability (Greensmith, 2013; Walsh et al., 2005). Inconsistent attitudes and levels of knowledge were revealed across all levels of experience and academic background. Nurses in this study performed more poorly than those in the study by Walsh et al. with regards to knowledge of fever physiology and management, answering only 50.9% of knowledge items correctly (Greensmith, 2013). Fever phobia was again a strong influencing factor for nurses; 84.9% of nurses believed, incorrectly, that febrile seizures were the principal danger of fever and almost half of participating nurses (47.9%) reported that it was important to aggressively treat fever with antipyretic medication in order to prevent the incidence of a febrile seizure. Additionally, 74% of nurses reported in the questionnaire that they believed it was appropriate to wake a sleeping child in order to administer antipyretic treatment. Greensmith suggested that one of the causes of inappropriate attitudes and

behaviours of nurses could be the transfer of incorrect knowledge and management behaviours from nurses precepting both students and new staff nurses (Greensmith, 2013).

Thompson and Kagan (2011) adopted a different approach in their study aimed at understanding the perspectives of nurses on their own fever management practices. 17 nurses caring for both adult and paediatric patients with neurological injury at two separate hospitals in the United States of America participated in the study, which used a collective case study approach to qualitatively describe their nursing practice. Participants took part in both an interview and a direct observation study where their practice was observed by the study's primary investigator. Data collected from both parts of the study suggested that nurses' practice can be organised into the three areas of 'Assessment/analysis', 'Planning/implementation', and 'Evaluation' (Thompson & Kagan, 2011). With regards to assessment and analysis, all but one nurse participant correctly identified fever temperatures in accordance with their own hospital guideline (i.e. 38.5°C). In both interviews and direct observation, nurses appeared to incorporate the clinical picture of patients (i.e. accompanying symptoms) into their assessment and management of fever, often assessing temperature as a result of detecting other symptoms such as altered mental state. A common barrier reported by nurses to good patient assessment was the perceived inaccuracy of thermometers. In the area of 'Planning/implementation' significant variation was seen in nurses' decision-making processes, similar to the studies described above. Nurses either followed an available guideline or used steps unique to each nurse based their own clinical reasoning process, choosing whichever strategy 'worked' for them or their patient. Both the interviews and direct observation demonstrated that nurses would commonly use paracetamol as a first-line response for the management of a fever. Many other non-pharmacological methods were also reported as being used – some nurses admitted to utilising non-pharmacologic interventions such as alcohol baths even though they knew it was not a recommended option (Thompson & Kagan, 2011). In evaluating the success of their management of fever, nurses often defined efficacy of treatments in terms of lowering temperature below the predefined fever temperature threshold. Nurses reported that their temperature threshold was generally set higher for paediatric patients than adults, one nurse explaining that 'they [children] can tolerate higher numbers, so you are not going to necessarily be as aggressive' (Thompson & Kagan, 2011).

Thompson and Kagan's study, although useful in achieving a better understanding of the perspectives and thought-processes of nurses with respect to fever management, is limited in its applicability to this study, due to its apparent focus on nurses working in adult care (although this is not directly specified in the article). As mentioned by some of the nurses participating in the study, their management of fever in children could look quite different from their management of fever in an adult (Thompson & Kagan, 2011). However, the overall findings of Thompson and Kagan's study appear consistent with those found in the above studies on paediatric nurses and therefore their study was deemed relevant for the purposes of this literature review.

All of the studies described above indicate that nursing fever management practice is varied, inconsistent and oriented towards intervention despite the wealth of evidence supporting a conservative

approach to fever management. Although most of the literature on the subject of fever management focuses on the beliefs and behaviours of doctors and parents, these four studies provide some useful insight into the beliefs and behaviours of nurses in their management of fever.

2.6.2 Influences

A range of influences on nursing fever management practices have been identified in the literature. Five influencing factors in particular emerge as being the most significant. Fever phobia, particularly in association with febrile seizures, was by far the most commonly cited influence on fever management practice.

Fever phobia

Fever phobia is described as an 'exaggerated fear' of the occurrence of fever in children (Sullivan & Farrar, 2011). This exaggerated fear is largely based on parental, personal and professional beliefs and misconceptions related to the role of fever in the body and its potential to cause physiological harm (El-Radhi, 2012; Sullivan & Farrar, 2011). First described by Schmitt in 1984, fever phobia remains an ongoing issue for healthcare professionals today (Schmitt, 1984). It has been widely reported in a number of systematic reviews and studies related specifically to nurses' management of fever (Purssell & Collin, 2016). Fever phobia leads health professionals to aggressively 'treat' fever in order to achieve normal temperature ranges, often through liberal prescription and administration of antipyretic medications (El-Radhi, 2012; Niehues, 2013; Sullivan & Farrar, 2011; Wallenstein et al., 2013). Fever phobia has been demonstrated in many studies to strongly influence the fever management practices and behaviour of nurses working within the inpatient setting (Poirier et al., 2000; Walsh et al., 2005). In the quantitative study undertaken by Walsh et al. (2005) over half of the nurse participants believed that nurses were fever phobic, and 86% of nurses reported that it was important to aggressively 'treat' fever in an effort to prevent the occurrence of febrile seizures.

The occurrence of febrile seizures in febrile children is a primary fear that both health professionals and parents/caregivers share (El-Radhi, 2012; Sarrell, Cohen & Kahan, 2002; Wallenstein et al., 2013). In Poirier's study on emergency paediatric nurses' perspectives on the management of fever, 57% of nurse participants reported the primary cause of concern in a febrile patient was febrile seizures (Poirier et al., 2000). This finding is consistent with that of an older study performed on 151 paediatricians, in which 68% of participants believed that fevers equal to or greater than 40 degrees Celsius would cause seizures, brain damage or death (May & Bauchner, 1992). 65% of participants in this study reported that 'fever itself could be dangerous to a child' and 72% reported that they would always or often recommend treatment of fevers (May & Bauchner, 1992).

Temperature

Temperature has an obvious influence on nursing fever management in children. The quantitative phase two study by the Queensland study group reported that many of the nurses participating in the study

believed that antipyretic management decisions could be made solely on the basis of patient temperature (Walsh et al., 2005). This was explored further in the qualitative phase three study. The study identified that nurses often had a temperature value above which they would consider pharmacological management. This was supported by similar studies such as the Poirier (2000) and Thompson and Kagan (2011) studies. Interestingly, however, this value varied significantly between nurses. In Poirier's study, nurses defined this temperature variably as values between 37.2 and 38.9 degrees, and 11% of participants were unsure of what value constituted a fever (Poirier et al., 2000).

Nurse knowledge

Nursing knowledge with respect to both fever physiology and recommended best practice appears to significantly influence current practice. Poor knowledge levels of paediatric nurses have been identified in studies investigating attitudes and influences on practice (Sarrell et al., 2002). A number of these studies have also gone on to link this with inconsistent practice and decision making (Sarrell, et al., 2002; Greensmith, 2013; Walsh et al., 2005). Walsh et al. (2005) in particular noted this in their quantitative study of current fever management practices – nurses scored surprisingly poorly in knowledge questions, and this appeared to then be reflected in inconsistent fever management beliefs and practices. Recognising this as a potential area for improvement in practice, the group of researchers from Queensland including researchers Walsh and Edwards undertook further research to assess the effectiveness of a peer education course on the improvement of nursing knowledge and practice related to fever management in the inpatient setting. They reported a statistically significant improvement in nurses' fever management knowledge ($p=0.01$) (Walsh et al., 2006).

Parent/Caregiver pressure

Parent/caregiver pressure on paediatric inpatient nurses appears to be a consistently reported influence to fever management practice by nurses. In some studies, this pressure was cited as one of the strongest influences on nurses' practice (Edwards et al., 2001; Walsh et al., 2005). In the qualitative third phase of the Queensland study, nurses reported that they would often adjust elements of their own fever management practices based on the beliefs held by the parents of children in their care (Edwards et al., 2001). Nurses gave the example of parents insisting on regular 4-hourly administration of antipyretic medication to children, regardless of the presence or absence of any other symptoms. In contrast, Greensmith's (2013) quantitative study on fever management practices suggested that inconsistent beliefs, behaviours and attitudes of nurses could instead be fuelling fever phobia in parents and caregivers. It could be inferred from this that nurses and parents alike influence the beliefs and attitudes of each other with regards to fever management.

Advice/Pressure from medical staff

Both Walsh et al. (2005) and Edwards et al. (2001) identified medical staff as a key factor influencing nurses' fever management practices. In Walsh et al.'s quantitative study (2005), although nurses reported parents as applying the most significant pressure to administer antipyretic medication to

children, they added that they were more likely to adhere to the recommendations and direction from medical staff in their area. In the same study, interestingly, the majority of nurses also identified medical staff as being fever phobic.

Both Greensmith's (2013) study on nurses' fever management practices and a systematic review on fever management drivers by Kelly et al. (2016) did not appear to identify medical staff as a key influencing factor. However, influence of medical staff is often suggested in older pieces of literature as being of influence to the fever management behaviours of nurses.

2.6.3 Nurse decision-making

Understanding how nurses make decisions in the clinical setting is a significantly important component of understanding how and why nurses manage fever in particular ways. A number of studies investigating nurses' decision-making processes shed more light on the development of fever management practices by paediatric nurses.

Nurses' decision-making processes appear to be shaped by environmental challenges within the clinical setting. Gillespie, Chaboyer, St John, Morley and Niewenhoven (2014) utilised a grounded theory approach to examine health professionals' clinical decision-making within the practice area of wound care. 20 participants representing a number of healthcare disciplines were interviewed. The study showed that challenges such as time pressure, multiple decision goals, overwhelming availability of options and conflicting opinions seen in the clinical setting all contribute to decisional complexity being a commonplace issue for health professionals. Gillespie et al. (2014) used substantive theory to explain the tension experienced by healthcare professionals in making decisions, often balancing their knowledge of current evidence with their intuitive, experience-based knowledge. Health professionals were seen to make decisions focussed towards pragmatism, or solving problems, and appeared to more heavily weight their intuitive knowledge over evidence-based knowledge (Gillespie et al., 2014).

Thompson, Aitken, Doran and Dowding (2013) performed a literature review on the clinical decision-making and judgements of nurses. It highlighted the importance of understanding nurse decision-making with regards to ensuring patient safety in both the hospital and community setting. With particular emphasis on addressing the increased needs and challenges of today's healthcare system, they emphasised that nurses' decision-making must contribute to, and not detract from, the improvement of healthcare. Similarly to Gillespie et al.'s (2014) study, Thompson et al. (2013) identified the decision-making process to be complex, using the idea of analytical (evidence-based) and intuitive thinking to describe the two main reasoning processes of nurses and how these can come into conflict. The clinical setting was described as a 'noisy' environment, full of information that adds little to what is required to make sound clinical decisions and explained that this extra information can detract from clear decision-making and add even more complexity to the task. This was suggested to contribute to wide variation in practices seen by nurses for a particular situation.

Although a substantial amount of literature is available regarding nurses' general decision-making, there appears to be limited information available examining decision-making processes of nurses specifically with regard to fever management.

2.7 Summary

The reviewed literature presents an overview of current understandings of fever and fever management with particular emphasis on nurses' fever management practices. It highlights a number of significant current issues regarding how paediatric inpatient nurses manage fever in children.

There is a wealth of evidence available to support a conservative approach to the management of febrile children in hospital. This evidence is well documented by a number of systematic reviews (Carey, 2010; Niehues, 2013; Sullivan & Farrar, 2011; Watts et al., 2003). However current nursing behaviour in the inpatient setting does not appear to reflect this conservative approach. Research investigating current nursing fever management practices reveal inconsistent nurses' knowledge related to fever physiology and recommended best practice, and inconsistent fever management practices. There is currently no published literature exploring this subject in New Zealand. Although the group of researchers from Queensland have produced several high quality studies investigating both current management and influencing factors to fever management in Australia (Edwards et al., 2001; Edwards et al., 2003; Walsh et al., 2005), these results may not be completely translatable to the New Zealand setting, due to cultural, economic and population differences.

Three studies in particular explored influencing factors to fever management practices of nurses (Greensmith, 2011; Poirier, 2000; Walsh et al., 2005). This provided insight into some of the underlying issues affecting the decision-making behaviours observed in practice. A number of key influences recurred throughout these studies; namely fever phobia, nursing knowledge of fever, nurses' definition of temperature, and pressure placed on nurses by parents/caregivers and doctors (Greensmith, 2011; Poirier, 2000; Walsh et al., 2005). Fever phobia remains a strong influencing factor to fever management practice for nurses, parents/caregivers and doctors, despite many years of evidence supporting fever's physiological benefits. Fever phobia appears to influence nurse decision-making both through personal fear and through fever phobic parents and doctors putting pressure on nurses to manage fever aggressively (Greensmith, 2011; Poirier, 2000; Walsh et al., 2005). Given that the role-modelling of correct health behaviour is a key responsibility of nurses towards parents and caregivers, an understanding of these influences, particularly with respect to the New Zealand paediatric inpatient setting, is essential.

The decision-making processes of nurses have been identified within a number of studies as being highly complex, and affected by many environmental challenges within the clinical setting. There appears to be no studies available specifically focussed on the decision-making processes of nurses with regards to fever management.

Given these gaps in literature for New Zealand application, there is opportunity for further New Zealand-specific investigation into the decision-making behaviours and attitudes of New Zealand inpatient nurses with regards to managing fever in paediatric patients.

Chapter 3 - Methods

3.1 Introduction

This chapter explores both the methodological foundation of this research, and the methods utilised to conduct the study. It describes the research aims and question; constructed within the context of the philosophical worldview of pragmatism. From the stance of this methodological approach it was determined that a sequential explanatory mixed methods design would most effectively fulfil the two aims of this study in order to derive knowledge required to comprehensively understand and answer the research question.

The chapter then describes the mixed methods study, which was conducted in two phases; a descriptive quantitative survey phase, followed by a qualitative study utilising focus group interviews to provide further insight and comprehension of the fever management practices of paediatric nurses. Both quantitative and qualitative phases have been discussed together in each component of the methods section, to reflect the nature of mixed methods approaches through a pragmatist philosophical worldview.

The chapter concludes by exploring the means by which quality of data is ensured and discussing important ethical considerations related to conducting this research.

3.2 Methodology

3.2.1 Philosophical worldview

Establishing and understanding the philosophical worldview behind research intent is an important component of defining a study's research aims, and selecting an appropriate methodology for the purposes of fulfilling these aims (Creswell, 2014).

This study is based upon a pragmatic worldview, in which the focus or intent of research is to understand an issue or phenomenon with the intent of seeking solution. Emphasis is placed on the 'problem' or the requirements of specific situations (often defining the research aim), rather than the methods by which to conduct the research (Creswell, 2014). In this way the pragmatist researcher has freedom to utilise all or any appropriate methods to derive understanding around the issue and fulfil the research purpose (Bredo, 2006). According to Creswell (2014) the focus of the pragmatist is centred on the 'what' and 'how' understanding of a particular issue, with the intention or big-picture purpose of the research in mind. A pragmatic worldview acknowledges the role of different worldviews, methods, contexts and assumptions in shaping research and, therefore, pragmatist researchers are not bound to a specific methodological theory. For these reasons, a pragmatic worldview lends itself towards a mixed-methods design (Andrew & Halcomb, 2009).

3.2.2 Methodology: explanatory sequential mixed methods design

Mixed methods is a research approach by which a researcher collects both quantitative and qualitative data, integrating results and findings derived from both in order to address a particular research question. The advantages of both study designs are utilised to generate more complete and meaningful data. This design is most appropriate when the researcher desires to understand results more comprehensively, or from a number of different perspectives (Andrew & Halcomb, 2009).

When using a mixed methods approach to research, it is common for one element of the design i.e. quantitative or qualitative to become predominant. The more dominant design is chosen based on the specific research question and rationale for the study. For example, predominantly qualitative data may be collected when the purpose of a study is to develop a new instrument, with quantitative data supporting this (known as a sequential exploratory sequential design) (Creswell, 2014). Conversely, many studies utilise quantitative designs to produce concrete statistical data, with qualitative data being used to support these and provide a richer understanding of the reason behind results obtained (known as sequential explanatory design) (Andrew & Halcomb, 2009; Creswell, 2014). However, in order for a mixed methods approach to be most effective, the findings of each research component within the design must be integrated fully with one another to produce balanced findings that reflect the strengths of each component.

Sequential explanatory methodologies involve identification and then exploration of a particular issue or phenomenon. This methodology often employs a two-phase study design weighted towards quantitative methods. The results from a primary quantitative phase are used in the construction/formulation of the secondary qualitative phase of study. The qualitative data is then used to contextualise the quantitative results, providing further insight, explanation and depth of understanding (Andrew & Halcomb, 2009). This methodology reflects both the pragmatic worldview underpinning this research and its resulting research aims.

With respect to this study's research question, a sequential explanatory mixed methods approach has been chosen as it addresses the need for both objective understanding of nursing practice, as well as the need for exploration of nurse experience and attitudes relating to their practice.

3.2.3 Quantitative design

Quantitative research generates numeric information to describe or demonstrate trends and relationships between variables (Creswell, 2014). Results can be tested for statistical significance with regards to variability of data and sample sizes. Characteristically, quantitative research relies on large data sets (sample sizes) to increase the reliability of results and therefore strengthen a study's generalisability to a wider population.

A deductive approach is often utilised to shape quantitative research, the intention being to test or substantiate a predetermined hypothesis through the gathering and analysis of quantitative data. Quantitative research can be used to generate concrete information in relation to the confirmation or negation of a particular theory. This is advantageous in situations where it is necessary to provide clear, objective and generalisable evidence to support a particular conclusion (Creswell, 2014).

3.2.4 Qualitative design

Qualitative research is an inquiry method by which the researcher seeks to build a rich description to understand why, or how, a phenomenon occurs (Creswell, 2014). The researcher acts as the data collection tool, engaging with participants to collect data through mechanisms such as interview or observation, after which an inductive approach is often utilised to generate a new theory from the collected data. Miles and Huberman (1994) describe qualitative data as possessing “*richness and holism*”, with strong potential for revealing complexity. Such data allow for ‘thick descriptions’ that are vivid, nestled in a real context, and have a ring of truth that has strong impact on the reader” (p. 10).

Qualitative research can provide an in-depth understanding of a particular phenomenon, and often involves collection of large amounts of data from a small number of subjects (Beck, 2013). In this way, qualitative data provides useful and comprehensive insight into a particular area, although the results are often difficult to generalise to a wider population. This is addressed in the foundational methodology of this research – a sequential explanatory design allows for triangulation of results across quantitative and qualitative data, contributing towards demonstrating (or negating) the generalisability of results from the qualitative phase of study (Creswell, 2014).

3.3 Context

Given that the study aims to describe and understand current practice of New Zealand paediatric inpatient nurses, Starship Children’s Hospital was selected as the setting for the study. Starship Children’s Hospital is the only children’s hospital in New Zealand and services the needs of New Zealand children across all specialities. Other regional hospitals only have smaller children’s inpatient wards within adult-focussed hospitals, so the setting of Starship Children’s Hospital provides the best representation of New Zealand paediatric inpatient nurse practice, given that it employs the majority of inpatient paediatric nurses in New Zealand and allows for sampling from all inpatient paediatric specialities.

3.4 Participants

As described above, participants for this research came from the population of nurses working in inpatient units within Starship Children’s Hospital in Auckland, New Zealand. This population was identical for both quantitative and qualitative phases of this research, providing consistency to both elements.

Inclusion and exclusion criteria were applied to this population in order to capture participants most relevant to the study's aim and research question:

3.4.1 Inclusion criteria

To be considered for this study participants had to be nurses registered with the Nursing Council of New Zealand, of any experience level, working clinically within any inpatient unit within Starship Children's Hospital. In order to consent to the questionnaire, participants had to be over the age of 16. However, this naturally included all nurses.

3.4.2 Exclusion criteria

The exclusion criteria for this study merely reflected all individuals who did not fit the inclusion criteria listed above. This included *enrolled nurses*, nurses employed in a *non-clinical position*, and nurses *exclusively working outside of Starship Children's Hospital*.

These criteria were communicated to potential participants within the email invitation, Participant Information Sheet, and electronic questionnaire.

3.5 Sampling, Recruitment and Consent

3.5.1 Sampling

Quantitative Sampling

In order to produce meaningful, statistically significant results, quantitative studies rely on large sample sizes. Both Walsh et al. (2005) and Greensmith (2013) completed quantitative investigations similar to this study on the subject of nursing fever management in the inpatient paediatric setting; the study by Walsh et al. recruited 51 participants, and the study by Greensmith recruited 119 participants. Both of these studies are considered high quality pieces of research and are frequently cited within other peer-reviewed works. Based both on these studies and on the population size of inpatient paediatric nurses at Starship Children's Hospital (approximately 540), the questionnaire was sent out to all inpatient paediatric nurses with the intention of recruiting at least 80-100 nurses to participate. This is an example of convenience sampling, by which all participants within the target population who meet the criteria are invited to participate (Wood & Kerr, 2011).

Qualitative Sampling

The qualitative section of the study sampled from the same population as the quantitative study, to allow for continuity and comparability of results over each section.

A purposive sampling method was used to generate the final sample of nurses to participate in the focus group interviews. Purposive sampling is a method of sampling by which participants are sampled based on their personal experience of the issue or phenomenon being studied (Creswell, 2014). Participants are more actively involved in the development of the researcher's depth of understanding of a specific topic than those participating in quantitative research. Given that this study had specific interest in the behaviours, beliefs, and attitudes of paediatric inpatient nurses, sampling from the specific population of paediatric inpatient nurses enabled the study to collect the most meaningful data with respect to answering the research question. Purposive sampling is a common sampling tool used in qualitative studies, the intent being to select participants specifically who have had experience with the particular phenomenon being studied (Beck, 2013; Creswell, 2014).

Qualitative study designs differ significantly from quantitative designs in their approach to sampling. Quantitative designs generally require large samples, the aim being to achieve statistical significance and minimise the effect of individual variation on overall results (Creswell, 2014). Target sample sizes are established in the design phase of research. In contrast, qualitative studies often require fewer participants than quantitative. The aim of qualitative sampling with regards to data collection is to collect data from participants until data saturation is achieved, meaning that data is collected until no new ideas are presented by participants. For this reason qualitative studies commonly do not define a specific sample size as a target, as the size of sample is dictated by the quality and quantity of data obtained by participants (Beck, 2013; Fusch & Ness, 2015).

This study utilised focus group interviews to collect data. Creswell (2014) suggests that focus groups must be large enough to stimulate discussion, yet small enough that all participants are able to contribute fully and richly to the body of data collected. The optimal size for focus group interviews appears to be between four and ten participants. In light of this, sample size of four to six was proposed, with the potential for further focus groups of four to six participants to be conducted if needed in order to obtain data saturation regarding participant experiences and attitudes towards fever management (Beck, 2013).

3.5.2 Recruitment

Quantitative Recruitment

Access to participants was gained through application to the Auckland District Health Board (ADHB) research office for project approval, and approval from the Starship Children's Hospital Director of Nursing.

After being granted approval, all registered nurses within Starship Children's Hospital were invited to participate in the quantitative study by email sent by their ward clerk or charge nurse. Ward clerks from each inpatient unit were approached by the researcher and provided a pre-written email invitation, which was forwarded to all registered nurses working within the unit. This email contained an electronic link to

the questionnaire through the anonymous online survey platform, Qualtrics. The email also included an attached Participant Information Sheet, which was downloadable and able to be printed.

Where ward clerks were unable to complete this task, charge nurses were approached to distribute the email invitations to all nursing staff. The pre-written content of the emails did not change, and both ward clerks and charge nurses had no other role or influence in the study or data analysis. A reminder notice was also given to ward/unit staff in staff safety briefings at the commencement of shift by the nurse conducting the safety briefing. A total of 108 nurse participants completed the online questionnaire.

Qualitative recruitment

All registered nurses who worked in inpatient units within Starship Children's Hospital were sent an invitation to participate in the focus group interview via email, with the intention of recruiting nurses to participate. This email was separate to the initial email inviting nurses to participate in the questionnaire, ensuring complete actual (and perceived) anonymity of questionnaire data. Nurses registered interest in participation by return email. These potential participants were asked to provide their contact email addresses to the researcher, as well as some demographic details i.e. age, gender, level of paediatric experience, in order to capture a broad range of paediatric nurses. Participants were notified by email of their selection to participate in the group interview. Participants' email addresses were not linked to their questionnaire results, thereby maintaining their anonymity.

As potential participants responded to the email invitation, they were placed into a focus group based on their availability to attend established timeslots. The contact details of all respondents were kept to be used in the event other focus group interviews would be required. A total of eight nurses responded to the email invitation and participated in one of two focus group interviews.

3.5.3 Consent

Gaining informed consent prior to involvement in a study is a key component of ethical treatment of participants. By participants consenting to being involved in the study, they acknowledged that they had understood all aspects of the study and any risks to them from their involvement (Kvale, 2007).

Given that the questionnaire was electronic and anonymous, submission of the questionnaire was taken as consent of the participant. This was explicitly stated within the online questionnaire prior to participants accessing the question sections.

Focus group interview participants acknowledged that they agreed to participate in the study and had read the Participant Information Sheet by signing a consent form at the commencement of the focus group interview.

The Participant Information Sheets and focus group consent form can be found in Appendices A to C.

3.6 Data collection

3.6.1 Quantitative phase - survey

Questionnaires

Questionnaires are commonly-used tools with which to conduct quantitative surveys. They are designed to be straightforward for participants to complete. This, combined with their anonymity, promotes good response rates. Questionnaires provide an easy and efficient tool to collect meaningful data with and data can be easily analysed to examine relationships and trends (Moule & Goodman, 2013). Questionnaires are useful for studies with a non-experimental design in which there is no intervention or treatment of participants required (Moule & Goodman, 2013). Although less controlled than randomized controlled design with regards to sampling and verification of responses, surveys are an appropriate approach for the purpose of answering research questions of a descriptive or inductive nature (Creswell, 2014). The reliability of collected data from questionnaires must be considered, however, when used to investigate behaviours such as nurses' practice. Participants can potentially respond to questions with answers they feel are most correct, as opposed to answers reflecting real attitudes and behaviours (Moule & Goodman, 2013). This issue is often minimised through the utilisation of pre-validated questionnaires from previous studies, to ensure reliability and practicability of results.

Given this study's mixed methods design, validity of questionnaire data with regards to real nursing practice was demonstrated through triangulation of data with that of the qualitative results collected through the use of a focus group interview (Creswell, 2014).

Survey tool/content

The survey tool used in this study was developed using a pre-existing, validated questionnaire which was developed by Walsh et al. (2005) and then used in a similar study on paediatric nurses' fever management by Greensmith (2013). The use of pre-existing tools provides opportunity for comparisons to be made between similar studies (Creswell, 2014; Sacsynski, McManus & Goldberg, 2013). Given the similarities in research aims between this study and studies completed by Greensmith (2013) and Walsh et al. (2005), utilising the same survey tool allowed for observations and comparisons to be made between all three studies; for example, identifying similarities and differences in results across the three study settings (specific medical wards within an Australian paediatric hospital, Irish children's hospital and New Zealand children's hospital).

However, the research aims of this study differed slightly from those in previous studies. For example, the pre-existing questionnaire placed significant emphasis on the assessment of nursing knowledge of fever and fever physiology, but assessment of this was not a primary focus of this study. Therefore in an effort to improve the questionnaire design and target the specific research aims of this study, some sections of the questionnaire were modified, with permission from its original creators (Walsh et al.,

2005). Additional questions regarding patient demographics were inserted into the first section. The second section assessing nurse knowledge of fever and fever management, originally containing 20 multiple choice questions, was shortened and refined to seven multiple choice questions. The third section assessing the beliefs and attitudes of nurses towards statements related to fever was shortened to contain 13 of the original 33 statements; four addressing attitudes towards fever, seven addressing the use of antipyretics and two addressing fever phobia. The final section explored intentions in practice specifically related to antipyretic administration. Answers to both sections three and four were collected using a five-point Likert scale.

The content of remaining questions was kept as similar as possible to that of the original questionnaire. This allowed for as much comparison as possible to be made between this study and the previously conducted studies on paediatric fever management (Edwards et al., 2001; Edwards et al., 2003; Greensmith, 2013; Walsh et al., 2005). The full survey has been included in Appendix H.

Use of electronic survey tool

The survey was disseminated to all potential participants in an electronic format using the online survey tool, Qualtrics. Qualtrics is a commonly used tool which provides researchers with a straightforward program to create online questionnaires. It also ensures anonymity of participants by preventing any identifying information of participants, such as IP addresses, to be collected by the researcher in the process of completing the survey. All collected data from the online tool was transferred into the program Microsoft Excel for analysis. This minimised the time required to process responses when compared to paper-based survey tools (Bastos, Duquia, Gonzalez-Chica, Mesa, & Bonamigo, 2014).

In the design of this study, consideration was given to the possibility that nurses working within inpatient units could prefer a paper-based survey tool. Paper-based questionnaires are often used within Starship Children's Hospital and using an electronic tool could potentially have resulted in a poor response rate if nurses were reluctant to participate in a different style of. Provision was made within the ethics proposal of this study for the secondary use of a paper-based survey tool with the same questionnaire content, if initial response rates with the electronic tool were low. However, response rates were sufficient using the electronic tool that paper-based methods were unnecessary.

3.6.2 Qualitative focus group interviews

Focus groups

Focus group interviews involve groups of approximately four to ten participants brought together for the purpose of discussing a particular topic of interest. They are focussed on collecting group data, as opposed to individual responses. Focus group interviews can provide significant and meaningful data related to socially influenced phenomena. This makes them particularly useful in the nursing setting and for this study (Beck, 2013; Creswell, 2014).

Within a nurse's daily practice, social interaction is a major component to the establishment of individual nursing practice. The individual nurse is influenced by interactions with others (Rycroft- Malone, Fontenla, Seers, & Bick, 2009). Through talking to colleagues, comparing viewpoints and beliefs, and observing other's clinical practice, the individual nurse is able to adjust or consolidate personal attitudes and behaviours based on this social interaction (Moule & Goodman, 2013).

The social dynamic of nurse practice shares similarities with the purposes and aims of a focus group interview. Given that conducting a focus group interview involves collection of group data as opposed to individual responses, it is acknowledged that the data obtained is the product of social interaction, where the views of individuals have the potential to shape and influence those of others (Beck, 2013).

As with the choice of any qualitative method, focus group interviews have both advantages and disadvantages to be considered. Focus group interviews allow the researcher to obtain large amounts of rich data in a short space of time. This data can be more meaningful with respect to nursing research, than that of individual interviews, given the social component of nursing practice development (Breen, 2006). The social dynamic of a focus group interview promotes synergy between participants, where each individual can elaborate, contribute to and build on the ideas and responses of others (Beck, 2013). On the other hand, focus group interviews can be difficult to arrange (i.e. co-ordinate several participants to meet together at a mutually agreeable time) and difficult to transcribe, as the facilitator/moderator must record the verbal and physical responses of multiple participants at once. The results of focus group interviews are often less generalisable to a larger population, as they involve the exploration of personal experiences of a small sample of people (Beck, 2013). In addition, the results gained through conducting the focus group could be biased towards the views of a particularly talkative or opinionated participant.

Given the aims of this study and the social components of nursing practice development, collecting qualitative data through use of focus group interviews was the most suitable and appropriate method, and so two focus groups were used in this study.

Content

By following quantitative data collection and analysis with a secondary qualitative study, key results and interesting findings from the quantitative study were further explored. This allowed both for a more in-depth understanding of the quantitative results and a more comprehensive insight into the experiences, attitudes and beliefs of participants.

The results of preliminary analysis of the questionnaire data were used to direct semi-structured interviews of two focus groups. These interviews contained questions related to participants' current nursing fever management practice and influences associated with these.

In order to stimulate discussion between participants, two exercises were developed by the researcher in which participants were asked to rank items in order of their importance. These two exercises focused

on and reflected the two aims of the study, by firstly identifying current fever management practices, or 'Methods', and secondly identifying 'Influences' to participants' current nursing practice. The items for each exercise were methods and influences that were identified frequently by participants within the quantitative questionnaire. Participants were presented with a ranking tool and separate items to rank, and asked to discuss their reasoning for ranking actions throughout the exercise. Please see Appendix I for the outcomes of the ranking exercise for each focus group interview.

Table 1: Methods and influences identified by questionnaire participants.

	METHODS	INFLUENCES
Item:	Undress patient	Temperature
	Encouraging fluids	Febrile Seizures
	Paracetamol	Patient Discomfort
	Ibuprofen	Pressure From Parent
	Paracetamol + Ibuprofen	Pressure From Doctor
	Tepid sponging	Personal Experience
	Cold water bath	Clinical Guidelines

Pilot study

A pilot study is a small, preliminary study conducted prior to a larger study to evaluate the effectiveness of a chosen data collection tool. It provides opportunity to improve aspects of the study design with respect to content, structure, cost and time (Maxwell, 2013).

A preliminary pilot study of the focus group interviews was conducted with registered nurses working within the paediatric setting, to identify any potential issues and improve the tool to facilitate better focus group discussion. The two nurses who participated in the pilot did not participate in the actual focus group interviews. Following the pilot study, the two nurses reported some confusion as to the researcher's meaning of 'ranking in order of importance'. For example, one nurse reported being unsure whether the 'Influences' exercise related to her practice to reduce fever in patients or her practice to administer antipyretics. As a result the researcher made changes to the way in which the exercise was explained to participants, to clarify this point.

Amendments prior to second focus group interview

After conducting the first focus group interview, the researcher reflected on the discussion with the intent of identifying issues and altering content in response, in order to improve the quality of data gained in the second focus group interview. Two main issues were identified:

- Two more experienced nurses in the group appeared to dominate discussion, with the younger/less experienced nurses tending to agree with their opinions, or direct questions related to practice towards those more experienced participants.
- At times during the focus group discussion, it appeared to the researcher that opinions given by participants potentially did not reflect real practice; instead, participants appeared to be offering 'textbook' answers to questions regarding fever management practice. This was seen particularly when nurses discussed the use of clinical guidelines in their practice.

These issues did not require revision of the exercise content itself. However, the researcher altered the introduction and interview style prior to the second focus group interview in order to discuss the potential for 'textbook' answers with participants, and encourage honest feedback and opinions. In providing feedback during the discussion, the researcher directed follow-up questions to all participants as equally as possible to avoid dominance of a few talkative participants.

As a result, participants of the second focus group interview appeared more relaxed and candid with responses and appeared to provide more personal experience and opinions without prompting than the first focus group.

3.7 Data analysis

3.7.1 Quantitative analysis

Collected data was entered into an Excel spreadsheet for analysis. This data was then used to produce data calculations such as percentages, mean values, and standard deviations in order to interpret and understand the raw data and relationships between various data sets.

Data sets were then re-organised based on the relation of each question to three key sections: Current Nursing Practice, External Influences to Practice and Internal/Personal Influences to Practice. The collated data was presented graphically for clearer presentation and interpretation using descriptive statistics.

3.7.2 Qualitative analysis

Qualitative analysis, within a mixed-methods study design, often utilises an inductive methodological approach to make sense of the collected data (Creswell, 2014). This approach complements that used in the analysis of quantitative data to produce a convergent result that provides more complete insight into the research topic than either approach alone. Thomas (2006) presented a systematic multiple-step process for the inductive analysis of qualitative data. This has been adapted to construct the framework for the analysis of this study's focus group interview data.

Transcription, preparation and cleaning

Preparation of raw data involved the researcher transcribing both focus group interviews. During the transcription process, thoughts and instincts of the researcher were noted (see example in Figure 2). Thoughts and instincts of the researcher noted during and immediately after the focus group interviews were also recorded in order to obtain further insight into the discussion between participants.

- Emphasis on patient comfort
- Questionable influence of clinical guidelines (said important but referred to nonexistent guidelines/careplans & were not sure exactly what they said)
- Biggest barrier to effective practice → inconsistent or strong opinions from other nurses
- Unclear understanding of febrile seizures?
- ? are answers reflecting real practice?
- Two overpowering voices – needed to encourage dialogue with others

Figure 2. Researcher notes post-focus group interview.

Following each focus group interview, photographs were also taken of the exercises participants jointly completed to provide context to the discussion occurring parallel to the exercise (Appendix I).

Close reading of transcribed data

The transcribed focus group interviews were read closely by the researcher in order to obtain a clear understanding of their content. The text was read four times as a whole to gain a more comprehensive overview of themes and ideas. The transcriptions were then studied more closely in further readings with the researcher annotating text with ideas and comments.

Identification of themes

Through the process of close reading, the researcher identified key themes discussed by participants within the focus group interview. These were derived from both the researcher's own notes and impressions of the focus group interview content, as well as identification of repeated words and phrases (sub-categories) within the transcription. Eleven key themes were identified, with a further two being added during the process of coding the text.

Data was coded manually based on these thirteen themes. Each key theme was assigned a colour and relevant text for each theme was identified through colouring these sections. Key words and sub-categories were used to direct the researcher to identify text related to a specific theme, although text was not specifically labelled with key words or sub-categories.

Table 2: Coding system for organisation of qualitative data.

Theme	Key Words/Sub-categories	Colour
Gap in Knowledge	Physiology Guidelines Seizures	Brown
Patient Comfort	Distress Pain Miserable Irritability	Red
Parental Pressure	TV/media Culture Decision-making	Yellow
Fear of Febrile Seizures	Antipyretics Parents Nurses	Yellow
Influence of Specialty Area	Oncology Orthopaedics General Medical Cardiology	Light Green
Antipyretic Medication	Safety Danger Culture Guidelines	Green
Threshold Temperature	Environmental Antipyretic Decision-making	Blue
Clinical Guidelines	Inconsistencies What is a guideline? Reality vs Perceived Influence	Purple
Ward Culture	Observed Practice Nurse Colleagues Pressure Doctors	Magenta
Influence of Nursing Colleagues	Senior Nurses Assertive Overpowering	Pink
Personal Experience	At home Own Children Workplace experience	Dark Grey
Clinical Reasoning	Whole picture Specialty knowledge	Light Green
Defensive Practice	Nurse Perception Responsibility Decision-making	Light Blue

During this process it became clear that a large amount of text was being coded to more than one category. The inductive coding process described by Thomas (2006) identifies the next step of analysis being the revision of categories to minimise both overlapping and un-coded text. However, in this adaptation of Thomas' coding tool the fourth step has been omitted intentionally by the researcher as it was considered that compounding of overlapping categories would result in loss of subtle yet important differences between them.

Revision and refinement

Coded data related to each theme was collated and reviewed with the intention of understanding their core ideas and insights. During this process, it was identified that themes could be grouped and linked under the same three overarching section categories used to organise the quantitative data for this study: Knowledge and Attitudes, Current Nursing Practices, and Influences to Practice. This provided a useful structure for the integration of findings across both quantitative and qualitative methodologies used within the study.

Table 3: Organisation of ideas into overarching section categories.

Section	Theme
SECTION ONE: CURRENT NURSING PRACTICE	Fever Management Methods
	Criteria for Practice
	Use of Clinical Guidelines
	Defensive Practice
SECTION TWO: EXTERNAL INFLUENCES TO PRACTICE	Ward Culture
	Influence of Nurse Colleagues
	Specialty Areas
	Parental Pressure
SECTION THREE: INTERNAL/PERSONAL INFLUENCES TO PRACTICE	Valuing Patient Comfort
	Febrile Seizures
	Knowledge of Fever
	Personal Experience
	Clinical Reasoning

3.8 Ensuring quality of data

3.8.1 Sample sizes

In both qualitative and quantitative study designs, careful consideration of sample size can contribute to the collection of quality, meaningful data. With regards to quantitative studies, larger sample sizes can provide a study with more statistically significant trends or relationships between two variables (Creswell, 2014). The effects of variation between data collected from individual participants are minimised and mean results can therefore better represent the wider population. A target sample size of 80-100 participants for the quantitative phase of this study ensured that results were reflective of the wider population of inpatient paediatric nurses and were therefore more generalisable. A total of 108 nurse participants were recruited for the quantitative online questionnaire, confirming the quality of collected data.

Because the aim of qualitative data collection is to reach data saturation, the sample size (although smaller) is more heavily influenced by the richness and quantity of data received from each participant (Fusch & Ness, 2015; Seale & Silverman, 1997). Conducting two focus group interviews, with five and three members respectively, allowed participants to each contribute a significant amount of data. This ensured that a wide range of ideas or themes related to fever management in the paediatric inpatient setting emerged through the data collection process.

3.8.2 Thematic analysis (independent code test)

As discussed previously, results of the qualitative phase were analysed by the researcher using thematic analysis as a tool. In order to ensure that data was coded and analysed in an objective fashion, a researcher with no other association to the research project performed an independent code test. This involved coding results using the same method of thematic analysis used by the researcher. Independent code testing ensures quality of results by identifying any possible subjectivity in the researcher's own analysis process and therefore creating opportunity to eliminate/minimise this (Creswell, 2014).

3.8.3 Pre-validated survey tool

Utilising a validated data collection tool can be highly beneficial to quality as it ensures, through previous testing, that data collected from participants properly reflects the aims and purpose of the study and that results can be generalised to broader settings or populations (Moule & Goodman, 2014). The pre-existing questionnaire developed by Walsh et al. (2005) and used again by Greensmith (2013) demonstrated its reliability as a survey tool by generating similar results in this study to those of the two previous.

3.8.4 Use of pilot study

Utilising pilot studies prior to conducting research can be a valuable in ensuring data quality. Qualitative pilot studies provide information to the researcher as to both the effectiveness of the interview content in terms of obtaining meaningful results appropriate to the aims of the study and the effectiveness of the researcher/moderator in terms of their processes for data collection and involvement in the focus group discussion (Breen, 2006). Issues identified in the pilot study can then be managed prior to the actual research taking place. This can significantly improve the quality of data obtained from the focus group interviews. In this study, a pilot was conducted for the focus group interview, with two registered nurses working in the paediatric inpatient setting. This provided opportunity for refinement of the focus group interview content, thereby potentially improving the quality of data collected.

3.8.5 Triangulation of results

Mixed methods study designs have an advantage over other approaches in that data from both sources may be triangulated in order to confirm the accuracy of the results (Andrew & Halcomb, 2009). After analysis of both study phases' results was completed, themes, trends and relationships were assessed for complementarity and data convergence/divergence. This confirmed that the study findings were similar across the two contrasting study approaches, thus supporting the validity of results.

3.9 Ethical considerations

Nursing research commonly involves the collection of responses, statistics, experiences and stories from human subjects. The process of collecting information from human subjects involves a degree of risk of harm to participants and opens up opportunity for potential misuse of information (Kvale, 2007). The identification and comprehension of ethical considerations therefore are extremely important in protecting human participants and ensuring safe research practices. Not only does addressing these issues ensure that the rights of both participants and researchers are protected, but it also enhances the integrity of study findings (Creswell, 2014).

As such, all research involving human participants conducted within the University of Auckland and the ADHB must first obtain ethical approval through an appropriate ethics committee (University of Auckland: Human Participants Ethics Committee, 2013). In the case of this research project, ethics approval was gained through application to the University of Auckland Human Participants Ethics Committee (UAHPEC) and approval was also gained from the ADHB Research Office via submission of the research proposal. Ethical issues were carefully identified and discussed so as to minimise their potential impact on any participant or on the integrity of the research project itself. Letters of research approval are included in Appendices D to G.

3.9.1 Confidentiality and privacy

In order to protect the confidentiality and privacy of all participants, no identifying information was requested of participants at any point during the questionnaire. Initial demographic data such as age and level of paediatric experience was collected; however, names and workplaces (i.e. inpatient units) were not identified. Contact details for members of the focus group interviews were collected specifically for the recruitment of participants. This, and demographic information collected during this process, was kept separate to the questionnaire data.

3.9.2 Cultural safety

Given that Māori participants were expected to be recruited for the study, it was acknowledged that the protection of the rights and interests of Māori was of high importance (Hudson, Milne, Reynolds, Russell, & Smith, 2010). The involvement of He Kamaka Waiora Māori Health Research Services in the ethics application process (provided by the ADHB) ensured that research met the requirements of the Treaty of Waitangi and was responsive to the specific needs of Māori (refer to Appendix F).

Within the understanding that cultural background and personal experiences have a degree of influence on the research process, the researcher endeavoured to ensure that information gathered will be an accurate representation of participants' own views and beliefs. In addition, the researcher acknowledged responsibility to protect and care for all participants in a way that promoted dignity and cultural sensitivity while protecting privacy and confidentiality.

3.9.3 Conflict of interest

As an employed registered nurse within Starship Children's Hospital, the researcher acknowledged a potential conflict of interest as her own opinions, relationships and experience within this organisation could have the potential to shape her understanding and analysis of results (Moule & Goodman, 2013). No funding was received from the ADHB or Starship Children's Hospital for the completion of this study, thereby minimising organisational influence on this research. In addition no power relationship existed between the researcher and potential participants which could create biased results.

3.9.4 Consent

Given the nature of the electronic questionnaire, there was no signed consent form required of questionnaire participants. However, participants were informed of study details through the Participant Information Sheet attached to the email invitation (Appendix A). Therefore, consent was implied by submission of the questionnaire. This was also stated explicitly at the beginning of the questionnaire.

Participants of the focus group interviews acknowledged that they agreed to participate in the study by signing a consent form at the commencement of the focus group interviews (Appendix C). The

Participant Information Sheet for this section was also attached to participants' email invitations (Appendix B).

3.9.5 Participants' right to withdraw

Questionnaire

Participants were informed of their right to withdraw from participation in the questionnaire at any time up until submission of answers. After submission, withdrawal of data was not possible due to the anonymous nature of the questionnaire. This was specified to participants in the Participant Information Sheet for the questionnaire.

Focus group interviews

Participants were informed of both their right to refuse to answer any questions, and their right to leave the focus group discussion at any time without having to give a reason. However, due to the nature of the group data, if participants withdrew from the research early, information contributed up to that point could not be withdrawn. This was specified in the Participant Information Sheet and Consent Form.

3.9.6 Research in own workplace

Ethical issues can arise when a researcher conducts his/her research project in their own workplace (George, 2016). Some of these issues are addressed below:

Consideration was given to performing this research in another setting. However, as the only children's hospital in the country, Starship Children's Hospital best represents all areas of inpatient paediatric nursing. Therefore, this project could not have been usefully carried out in any other setting to the same standard with respect to quality and generalisability of results.

As the researcher did not have a position of authority within the workplace, this minimised any conceived power relationships between her and participants. Participants could withdraw from the study at any time without fearing negative effects upon their employment within ADHB.

Given the importance of this subject to everyday nursing practice, the potential benefits to participants and (indirectly) patients were high. Potential risks to participants included stress related to disclosing information within a focus group interview that could include colleagues and constraints on time if the questionnaire or focus group interview was completed within participants' working hours. However, these were considered low risk issues and were minimised as much as possible through careful study design.

3.9.7 Koha

In order to avoid any perceived bribery/coercion of participants, the researcher offered participants of the questionnaire the opportunity to vote for a charity (from three selected by the researcher) to which the researcher donated up to \$30 on the participants' behalf (proportionate to the percentage of votes for each charity). The charities selected had no affiliation to Starship Children's Hospital or the University of Auckland. The donation opportunity was offered only to questionnaire participants, focus group participants instead received light refreshments during the interview as acknowledgement of their time and contribution to the study.

3.9.8 Incidental findings

This research project was highly unlikely to give rise to any incidental findings. However, this was acknowledged as a potential issue given the nature of focus group interviews. In the event that a participant disclosed dangerous or incorrect clinical practice during the focus group interviews, the researcher was prepared to speak to that participant after the focus group had ended and inform him/her of correct hospital policy. If necessary, the researcher had also acknowledged her responsibility to report such conduct to an appropriate authority in order to safeguard health consumers.

3.10 Summary

In this chapter, the methodological foundation of this research was explored within the context of a pragmatic philosophical worldview. From this foundation, a mixed methods study design was presented to fulfil the two aims of the study with respect to exploring current nursing fever management practices and investigating the influences to these. The two phases of the study were described in detail; a quantitative survey phase provided foundational understanding which was then utilised to construct a qualitative phase in which focus group interviews would be used to provide insight and further comprehension of nurses' fever management practices. Both quantitative and qualitative components were integrated within the data analysis section of the methods, to fully reflect and capitalise on the strengths of the mixed methods study design. The chapter concluded with an exploration of the means by which quality of data was ensured, and presented important ethical considerations related to conducting this research.

Chapter 4 – Findings

4.1 Introduction

This chapter presents the integrated findings from both quantitative and qualitative aspects of this study in three sections. These findings highlight the current picture of fever management within the paediatric inpatient setting and shed light on influencing factors to the decision-making processes of nurses working in this area.

The three sections presented below were derived from the consolidation of thirteen key themes emerging from qualitative data analysis presented in Table 3. The sections, namely current practice of nurses (section 4.3), external influences to practice (section 4.4) and internal influences to practice (section 4.5) align closely to the fundamental aims of the study: to understand current practice of nurses and gain insight into the influences of current practice. A mixed-methods design approach utilised the strengths of both quantitative and qualitative study to build robust, comprehensive and insightful understanding of the research topic. In order to capitalise on this strength of mixed-methods research design, quantitative and qualitative data were integrated throughout the findings chapter to present ideas.

To maintain the confidentiality of all participants, participants of the focus group interviews are referred to by pseudonyms.

4.2 Demographics

108 participants within Starship Children's Hospital took part in the quantitative questionnaire. These participants were asked to provide details regarding age, gender ethnicity, parental/caregiver status and nursing background.

Table 4: Quantitative study participant demographics.

Variable		
Age (mean, SD)		34.0, 11.0
Gender (n, (%))	Male	4, (3.7)
	Female	104, (96.3)
Ethnicity (n, (%))	NZ European	79, (73.1)
	Maori	3, (2.8)
	Other	26, (24.1)
Education -highest qualification (n, (%))	Hospital-trained	4, (3.8)
	Undergraduate Degree	28, (26.4)
	Postgraduate Certificate	42, (39.6)
	Postgraduate Diploma	21, (19.8)
	Master's Degree	11, (10.4)
Years Experience (mean, SD)		10.5, 10.3
Paediatric-specific Training (n, (%))	Yes	88, (81.5)
	No	20, (18.5)
Years Paediatric Experience (mean, SD)		8.4, 8.9
Participants with Children (n, (%))		33, (33)

Eight participants took part in the focus group interviews. The demographics of these participants varied similarly to the quantitative study, apart from ethnicity where seven out of eight participants identified as New Zealand European.

Table 5: Qualitative study participant demographics.

Variable		
Age (mean, SD)		33.6, 12.0
Gender (n, (%))	Male	1, (12.5)
	Female	7, (87.5)
Ethnicity (n, (%))	NZ European	7, (87.5)
	Maori	0, (0)
	Other	1, (12.5)
Education - highest qualification (n, (%))	Hospital-trained	1, (12.5)
	Undergraduate Degree	1, (12.5)
	Postgraduate Certificate	4, (50.0)
	Postgraduate Diploma	2, (25)
Years Experience (mean, SD)		8.9, 13.4
Paediatric-specific Training (n, (%))	Yes	7, (87.5)
	No	1, (12.5)
Years Paediatric Experience (mean, SD)		7.6, 12.5
Participants with Children (n, (%))		3, (37.5%)

Although most nurse participants from both the questionnaire and focus group interviews reported having between two and five years of nursing experience, a small number of participants with over 30 years of experience significantly lifted the mean. This resulted in wide standard deviations calculated for these demographic details.

4.3 Current nursing practice

In alignment with the first aim of this study, this section contains findings related to the current practice of nurses with regards to fever management. Aspects of current practice presented in this section include commonly used fever management methods, nurses' criteria for practice, use of clinical guidelines and the role of defensive practice in nurse decision-making.

4.3.1 Fever management methods

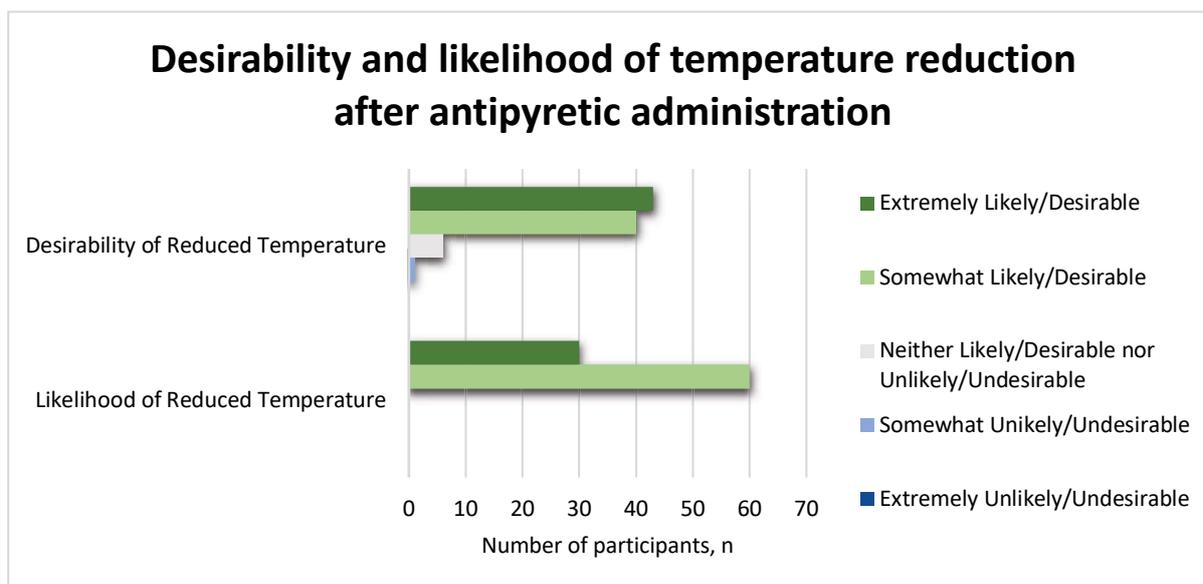


Figure 3. Nurse-perceived desirability and likelihood of temperature reduction after antipyretic administration.

All participants indicated belief that antipyretic medication reduces the temperature of febrile children as indicated in Figure 3. 92.2% of these participants also indicated that the reduction of temperature was a highly desirable function of antipyretic administration. This strong desirability of temperature reduction suggests that nurses place importance on the reduction of temperature in febrile patients.

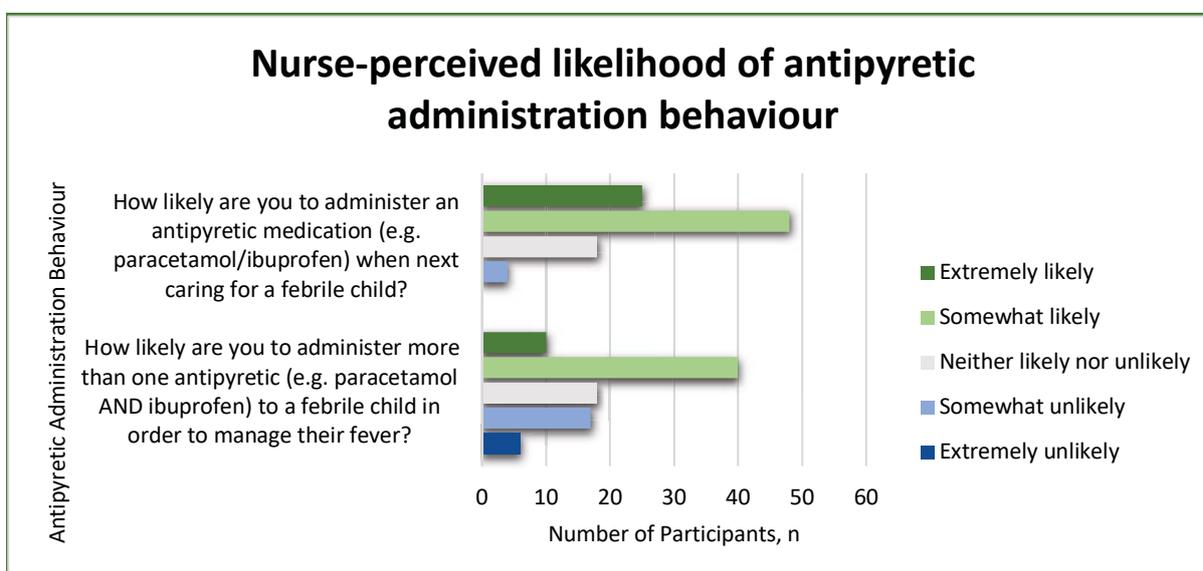


Figure 4. Nurse-perceived likelihood of antipyretic administration behaviour.

Figure 4 shows nurses' reported likelihood of antipyretic administration to their patients. These questions were asked without the provision of any other details regarding the patient, their condition or external situations. 78.5% of nurses reported being likely to administer an antipyretic medication to their next

febrile patient, with 53.8% likely to administer more than one antipyretic thereby supporting the use of combination therapy in children. 24.7% of nurses did not support the use of combination therapy in their own practice.

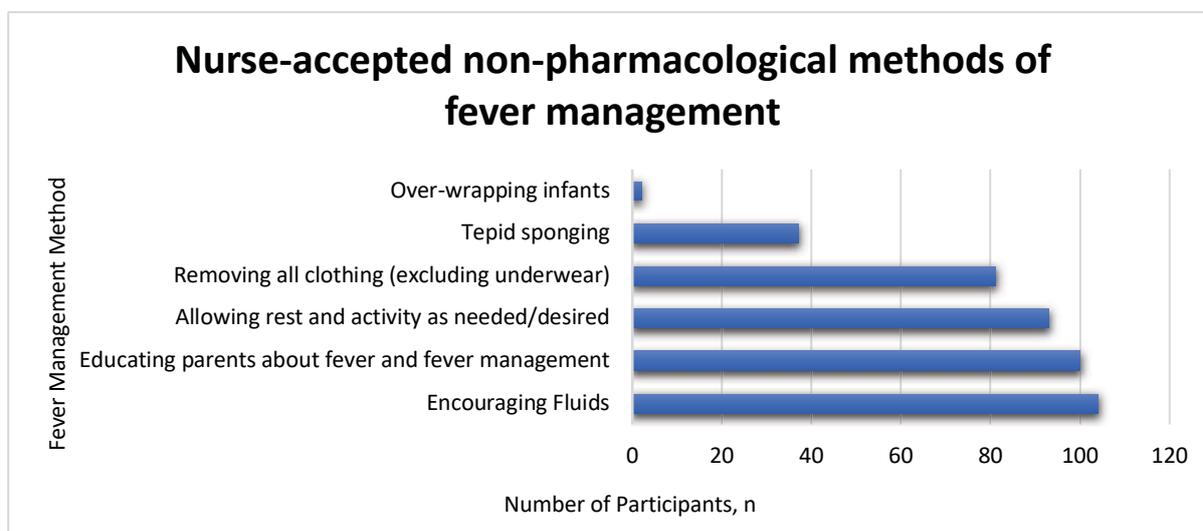


Figure 5. Nurse-accepted non-pharmacological methods of fever management.

Nurses were asked to identify all accepted non-pharmacological methods of fever management within their own practice. Figure 5 demonstrates the common use of non-pharmacological fever management methods in nursing practice; in particular undressing children, allowing rest/activity as desired by the child, educating parents (indirectly affecting fever management), and encouraging fluids. Over-wrapping and tepid sponging were not universally supported by nurses. While 34.3% of nurses would use tepid sponging in their fever management practices, only 1.8% of participants supported the use of overwrapping infants to manage their fever.

The use of antipyretic medication was reported by all participants within the focus group interviews, with a preference for the use of paracetamol over ibuprofen. Some participants offered rationale for this preference, citing the side-effects and risks associated with ibuprofen and indicating belief that these were more significant than the side-effect/risk profile of paracetamol.

Combination therapy (using paracetamol and ibuprofen concurrently) as an initial management approach was not supported by most participants in focus group interviews. However six participants agreed that this approach could be utilised in the event that the first-introduced medication did not lower a patient's temperature acceptably in the view of the nurse. Harriet commented:

Yeah, I'd normally give paracetamol and then if it's not worked with the next check... yeah, in the next hour or so I'd do brufen [ibuprofen]... And I guess if it becomes an ongoing high fever then maybe you'd just make sure you were doing paracetamol and brufen pretty much ongoing.
(Harriet)

The use of antipyretic medication for the management of fever was considered as a second-line approach, after the implementation of environmental methods such as undressing patients, removing blankets, or in some instances, tepid sponging. However, participants appeared to have an individually defined temperature threshold over which they commence pharmacological antipyretic therapy regardless of other environmental interventions. Additionally, participants reported that they would also administer antipyretics if a febrile patient was experiencing pain or distress associated with their condition/situation, regardless of their temperature. Claire explained:

I'd prefer to use other methods. But if they're miserable and in pain, I'd use paracetamol.
(Claire)

Participants however acknowledged child compliance as an issue for the administration of antipyretic medication, and suggested that in some cases the administration of antipyretic medication could be a contributing factor to a child's distress. The act of restraining children in order to administer oral medication was described by Georgia in discussing the distress of some children around the administration of antipyretic medications such as paracetamol:

If it gets to the point where you're having to hold that child to give them medicine it's really going - weighing up whether this is worth it or is there something else that we can do in the interim until mum settles the child. (Georgia)

In this quote Georgia demonstrated her risk-benefit analysis of the administration of antipyretic medication to her patients by discussing the way she weighed up the specific advantages and disadvantages for a specific child.

Participants across both focus group interviews discussed the idea of antipyretic therapy 'masking' fevers in their patients. The lowering of a patient's temperature was perceived to impair the investigative process of doctors related to the patient's underlying pathophysiology. Donna explained:

From where I come from we want to see where their fever is trending so you wouldn't want to stamp it out straight away, you'd want to see if it's going to progress further or... yeah, whereas if you give them brufen [ibuprofen] straight away, then you've really got no idea. (Donna)

In contrast to their own views towards masking, however, participants perceived an expectation from both doctors and nursing colleagues that antipyretic medication should be administered to febrile patients.

When discussing issues related to antipyretic medication over the course of the focus group interview, participants often reported inconsistent practices and attitudes towards the use of antipyretic medication. For example, in Focus Group One participants generally agreed toward the start of the interview that they would place importance on utilising environmentally-focussed fever management methods over pharmacological methods. However as the interview progressed participants appeared to adjust their stance to more support the use of medication in managing fever.

4.3.2 Criteria for practice

Nurses were found to use specific criteria when making decisions about the use of antipyretics.

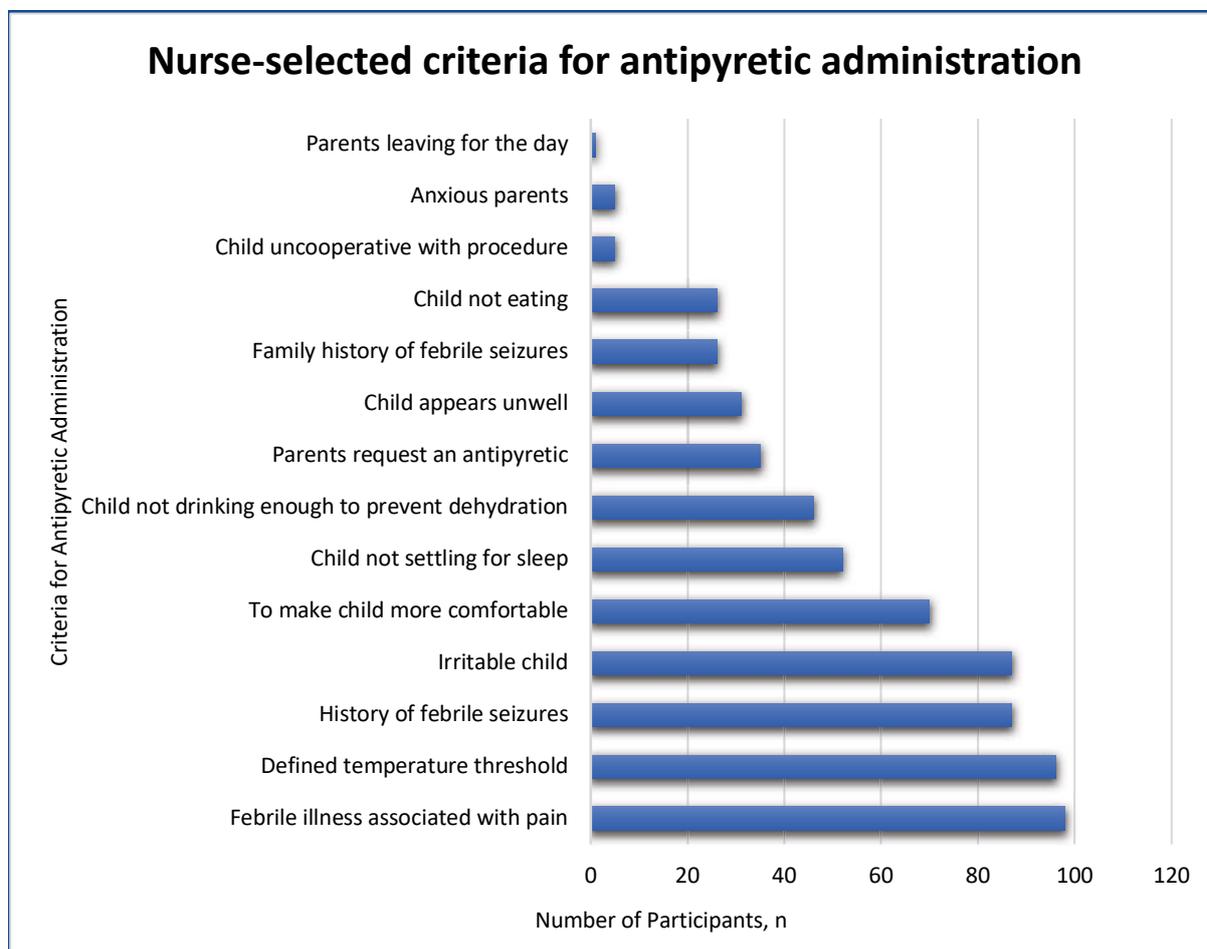


Figure 6. Nurse-selected criteria for antipyretic administration.

Figure 6 displays the proportion of nurses using a range of specific criteria when making decisions regarding administration of antipyretic medication to febrile children. Criteria related to patient comfort were most frequently selected by nurses. 80.6% of nurses viewed patient history of febrile seizures as a criteria for antipyretic administration. Most nurses (88.9%) defined a temperature threshold over which they would administer an antipyretic medication. These threshold values are described in more detail below (Figure 7).

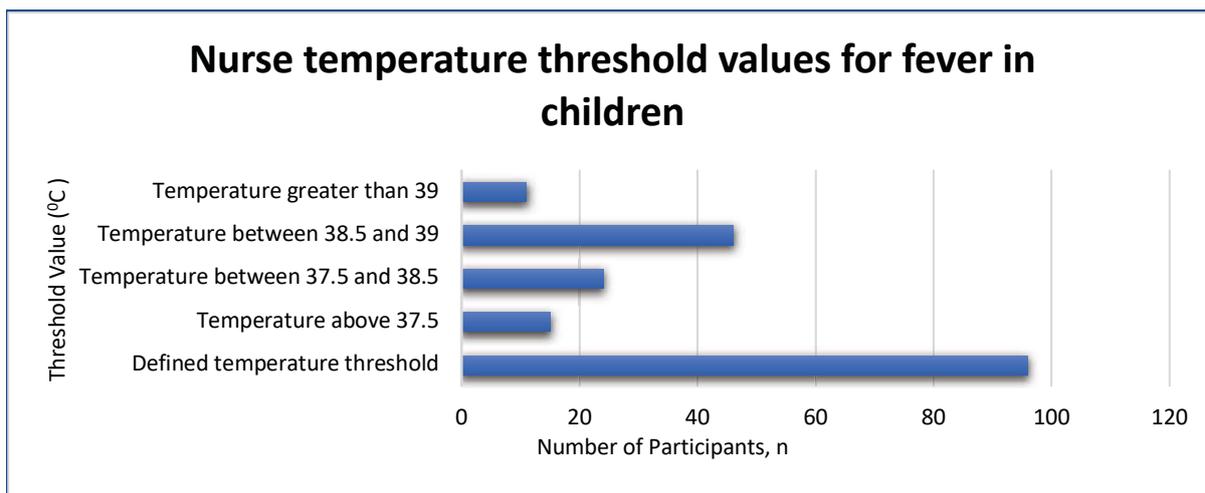


Figure 7. Nurse temperature threshold values for fever in children.

Figure 7 illustrates significant variation in the temperature threshold values given by 88.9% of participants. Almost half of the 96 participants (47.9%) who indicate using a temperature threshold as a criteria selected a value between 38.5°C and 39°C, over which they would administer an antipyretic medication to a febrile child.

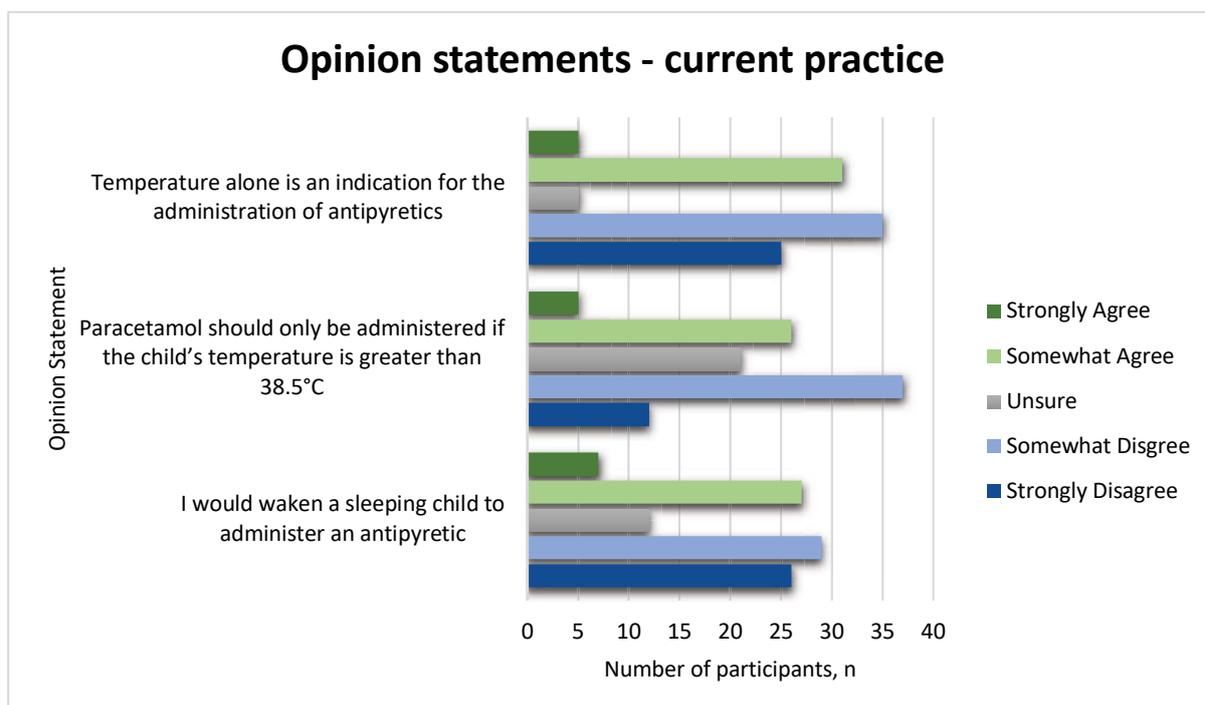


Figure 8. Opinion statements – current practice.

Figure 8 shows nurses' agreement with various opinion statements related to current practice. In contrast to the 88.9% of participants who specified a temperature threshold value for antipyretic administration, only 35.6% agreed that temperature alone was an indication for the administration of antipyretic medication. This suggests that nurses do not use temperature threshold values in isolation from other criteria, instead using them as one aspect of their decision-making process.

The further two opinion statements in Figure 8, that paracetamol should only be administered if a child's temperature is above 38.5°C, and whether a child should be woken to be given an antipyretic, show wide variability in nurse responses.

Focus group participants identified that they each had temperature threshold values over which they would implement interventions to reduce fever in children. These threshold values varied between nurses. Participants appeared to have two temperature critical values or tipping points that they used within their fever management decision-making process. In general, participants agreed that a temperature over 37.5°C constituted fever in a child. At this value, environmental management techniques were offered as suitable interventions for fever management. Donna explained:

If it's sort of above 37.5, I'd start looking at like, you know, undressing the patient and taking off blankets and, sort of looking at that first, to see if you can stop it from going further up. (Donna)

Donna suggested undressing patients and removing blankets as helpful methods to use. These two methods were also suggested by four other participants across the two focus group interviews.

A higher threshold value was given for the commencement of pharmacological antipyretic therapy; this value varied between nurses, but most considered 38°C – 38.5°C as this higher threshold. This is supported in a statement by Frederick:

I would, yeah, only undress for patients that are above 37.5, and I would look at other managements for over 38, definitely. (Frederick)

Variations to these thresholds were suggested by some participants. Erin and Amy explained that they would reduce these thresholds if the patient was an infant, appearing to consider temperature increases in infants to be more dangerous.

I feel a small infant, you tend to jump a little bit sooner, if they get to 38 and they're a neonate, I'm just starting to, to have more concern, than if they're maybe a toddler or an older child. (Erin)

On the contrary, Harriet offered the opposite response to infants, suggesting that her usually accepted threshold value of 37.5°C could be within normal temperature ranges for a newborn infant.

I sort of traditionally go 37.5, but I am flexi with it, like if it's a newborn or something I'll be a bit more lenient... I'm not gonna call 37.5 a fever in maybe a one or two week-old, but I am gonna say it's the start of a fever in a nine year-old. (Harriet)

Some participants also reported that they would be likely to 'respond to fever with antipyretic medication if a low grade fever was slowly 'creeping up' over time to 38°C or 38.5°C i.e. gradually increasing from 37.5°C – 38°C. In each case of variation, participants were still able to specify to an extent the particular threshold values they accepted for their own practice.

4.3.3 Use of clinical guidelines

We do have guidelines... sort of. (Brianna)

Focus group interview participants generally acknowledged the important role of guidelines in the provision of appropriate and effective nursing care. They also acknowledged their responsibility as New Zealand registered nurses to follow clinical guidelines. However, participants rarely reported actually using hospital clinical guidelines for fever management in their clinical settings. Many participants reported having never read a guideline related to fever management or to knowing its content. This was demonstrated during the first focus group interview in Claire's brief dialogue with Amy below:

Claire - What is the clinical guideline?

Amy - (whispers) I don't know!

During the second focus group interview, participants realised part-way through the discussion that they had not considered clinical guidelines when completing the exercise on influences to fever management. They agreed that clinical guidelines were the least influential factor to their fever management practice. Frederick stated that he could not remember whether he consulted guidelines at all when developing his fever management practice:

I think probably in the early stages I would have looked at the clinical guideline... maybe, or someone told me. I can't remember. At some stage I learnt it. Don't know how, sorry. (Frederick)

Participants who reported using fever management guidelines in their practice often referred to area/specialty-specific clinical guidelines, despite the absence of these in their hospital clinical guidelines library. These included guidelines specific to neurology, oncology and intensive care areas. However, through prompting it became clear that participants did not have a clear understanding of the definition of a clinical guideline. Participants would frequently discuss use of 'guidelines' for fever management practice, in particular when working in an unfamiliar specialty. However the term 'guidelines' in this instance was being used to describe both ward culture and advice from senior nurse colleagues. In recognising this during the discussion, Amy explained:

I've never actually looked at a proper guideline, but it's always been based on like what the advice you'd get from other nurses or other medical staff or nurse practitioners. (Amy)

In this quote, Amy demonstrated an indifferent attitude toward the use of 'proper' hospital-sanctioned guidelines within her own practice, instead showing preference to receive advice from other healthcare professionals within her specialty area.

4.3.4 Defensive practice

People give it [antipyretic medication] because they're worried that they're going to be judged or that the child may have negative consequences. (Erin)

Throughout the focus group interviews, participants frequently made comments to suggest that their practice was affected by their perceptions of responsibility and professional accountability. The concept of 'backing yourself' was raised, where participants spoke about practicing in a particular way to both protect themselves from conflict with others or allegations of wrongdoing so as to meet the expectations of both colleagues and parents of patients.

Fear of negative consequences to the nurse or patient was seen to have a significant influence on the decision-making processes and actual practice of participants. With regards to negative consequences to the patient, some participants reported feeling a sense of obligation to 'do something' about their patient's fever. Frederick explained that he was uncomfortable to let a fever run its course without intervention, in case this led to the progression and deterioration of the patient's condition for which he may eventually be held responsible. He used the example of tepid sponging a child to illustrate this:

I encourage it [tepid sponging] because it might [help with fever], and I don't want to do something- or not do something that could help. (Frederick)

With regards to negative consequences to the nurse, participants often reported practicing in a particular way out of fear of perceived judgement from other nurses. This related to the concept of accepted ward culture (described in a later section), and the significant influence this had on participants' fever management practices. Georgia discussed this in depth during the second focus group interview, relating this fear to a defence of her professionalism:

At the end of the day, it comes back on you if you don't act to what is said to be done, then you need to back yourself up to be sure that you're OK in that you're safe, you know, for whatever you do. So I think that would be a pressure on me, if I'm going to not do anything, I would then be like, okay I need to be safe for my registration... So, the majority of the time I just do what I'm told. (Georgia)

Participants also reported practicing defensively in response to perceived parental pressure, to avoid breakdown in parent-nurse relationship or accusation of malpractice. Harriet explained the difficulty in incorporating her own understanding of fever management into the model of family-centred care that she and the hospital both valued:

We're doing family centred care so you do have to take into consideration obviously and, and so it should be, what the parents say... What you would professionally be inclined to do versus what they [the parents] adamantly want, that's when I guess it gets a bit tricky around family-centred care versus fever management. (Harriet)

When participants described ideas of professional accountability, they would often also describe following fever management practices which were socially, professionally, and culturally accepted in their area of work. This contrasts with participants' actual responsibility as New Zealand registered nurses to ensure their practice is evidence-based and to apply their own clinical judgement to develop a plan of care for patients. Two participants, Donna and Erin, did however acknowledge the role of the registered nurse to research and understand evidence-based practice, and they identified their responsibility to educate peers and parents when they observed fever management practices that were contrary to recommended best practice.

4.4 External influences on practice

This section presents findings related to the influences of external factors to nursing practice. External influences identified within this study include ward culture, influence from nurse colleagues, specific differences between specialty areas, and pressure of nurses from parents.

4.4.1 Ward culture

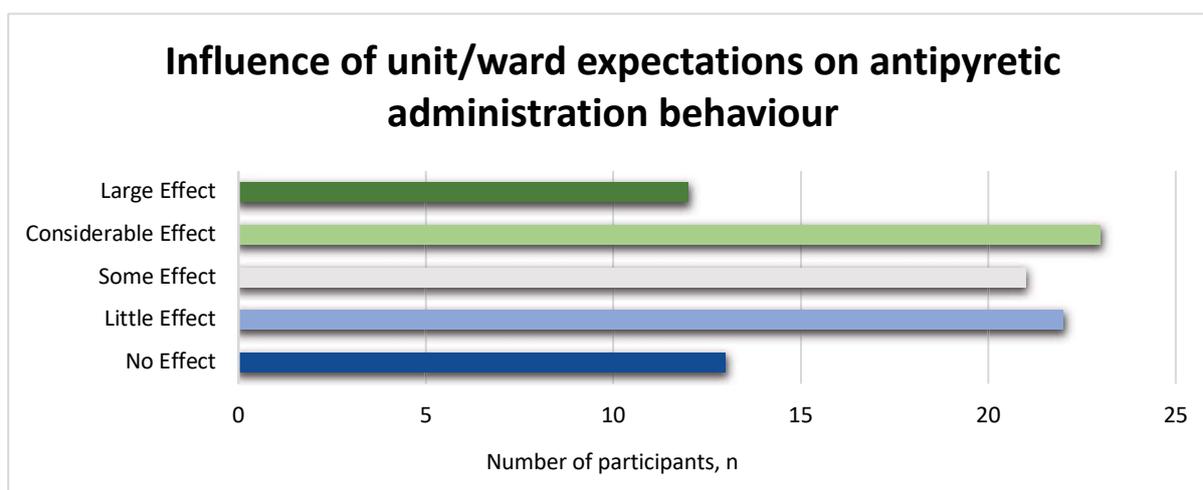


Figure 9. Nurse-perceived influence of factors on antipyretic administration behaviour.

As demonstrated in Figure 9, the majority (61.5%) of participants identified unit/ward expectations as influencing their antipyretic administration behaviours. 62.5% of those participants indicated that ward expectation, or culture, had a 'considerable' or 'large' effect to their antipyretic administration behaviour. This figure demonstrates the significant influence of ward expectation to the development of nurse decision-making process with regards to fever management.

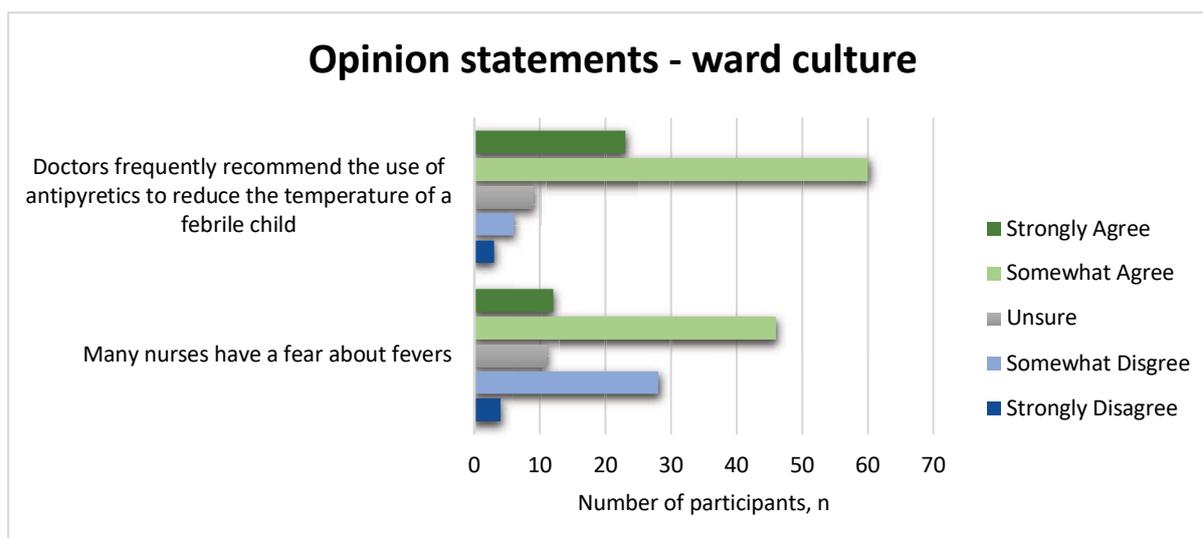


Figure 10. Nurse agreement with opinion statements regarding ward culture.

Figure 10 illustrates the opinion of participants towards the behaviour and attitudes of doctors and nurses within their area of work. 91.2% of participants identified that doctors frequently recommend the use of antipyretics to reduce temperature in febrile children in the inpatient setting. Similarly 63.7% of participants identified other nurses to have a fear related to fevers in children.

Throughout both focus group interviews, ward culture appeared to significantly influence participants' fever management practices. Participants reported adopting 'common practice' in their ward or unit as acceptable fever management practice. The term 'common practice' was used by Donna when sharing her experiences on a medical ward. In this area, she described the common practice of nurses of automatically administering regular paracetamol to febrile patients as a prophylactic antipyretic in an effort to prevent seizures despite the medication not being prescribed as a regular medication by doctors.

The development of ward culture was reported to be heavily influenced by input from medical staff such as doctors and surgeons within specialty areas. Georgia illustrated this in her story of personal experience on a surgical ward:

If it [child's temperature] was in the 38s, that would be the first question that the doctor would ask: 'Have you given paracetamol and brufen?' (Georgia)

This quote by Georgia demonstrated how an expectation from doctors within the ward had translated into a practice adopted into ward culture. Through the influence of ward culture, children with a fever higher than 38°C degrees were routinely administered antipyretic medications.

Harriet expressed her views on ward culture through sharing a story of her experiences with orthopaedic surgeons. This story demonstrated the influence of doctors on ward culture, and provided insight into the effect of an ever-present hierarchical structure of healthcare professionals within the hospital setting:

I think sometimes those orthopods, if that's what they want done, then that will become the ward culture. Because they're a very strong-willed breed of people, and they very much do decree. So it's not just necessarily the ward-level, it's that consultant level that's often driving it [ward culture]. (Harriet)

In connection with the influence from nurse colleagues discussed below, ward culture appeared to override participants' personal knowledge when determining fever management practice. At times participants indicated frustration over this. Georgia offered an example of a situation in which her own conservative attitude towards fever management conflicted with common practice within her specialty area:

I get a little bit frustrated with this because.. in [specialty area] there's very much a, like, automatic response if they've got a temperature you do something about it. You get on top of it... But it's never, let it ride out and see what happens, whereas, you know that's sort of where I come from is that it's, you're wanting the body to fight. (Georgia)

This story from Georgia highlights the significant influence that ward culture has on nurses' development of fever management practices. Ward culture dominated her decision-making process, superseding the application of her own knowledge and attitudes towards fever management practice.

4.4.2 Influence of nurse colleagues

Participants in the focus group interviews appeared to rely heavily on a team approach to problem-solving patient situations, as opposed to taking an autonomous approach. As described in Figure 10, participants within the quantitative survey demonstrated the belief that many nurses have a fearful attitude towards fever.

Participants often utilised advice from nursing colleagues as they developed their own fever management practices and attitudes. In many cases participants reported seeking advice from nurse colleagues preferentially before referring to hospital policy for guidance regarding decision making. Seeking advice from nurse colleagues was considered an automatic first response if participants were unsure on how to respond to a situation involving a febrile patient. Harriet explained:

I feel like if I was unsure and ran it past someone that they would be more than willing to discuss it. (Harriet)

Participants discussed their decision-making processes when they were required to work in different specialty areas. Claire reported that her first response would be to consult with nurse colleagues within that specialty area:

I'd probably actually just go to a senior nurse that works there and be like, 'What do you guys do for a temperature?' (Claire)

However, participants also identified one of the biggest barriers to effective fever management practice to be their nursing colleagues. Examples were given by participants of decision-making dilemmas in which their own attitudes toward fever management were opposed by their nurse colleagues. In these situations participants described finding it difficult to apply their own knowledge and attitudes to the patient's situation when faced with contradictory advice or pressure from other nurses in their specialty area. Both Claire and Georgia (from separate focus group interviews) related this difficulty to 'defensive practice'. In these cases, contradictory advice from nurse colleagues was followed in a defensive effort to avoid negative consequences to the participant; namely, perceived negative judgement from nurse colleagues.

Amy used a recent personal experience of nurse colleague pressure within her specialty area to illustrate:

I explained my reasoning [to a nurse colleague], but the first answer I actually got back before I gave my reasoning was, 'Just give them paracetamol, and then talk to the doctors.' (Amy)

During her focus group's discussion around defensive practice, Erin offered the following to describe her understanding of the concept:

Giving it [paracetamol] cause your colleagues expect you to or they're gonna judge you if you don't. (Erin)

This quote indicates the close and potentially challenging relationship between colleague pressure and nurses' defensive practice. Participants responded to pressure applied by nurse colleagues by changing their own practice to reflect the wishes of the nurse colleague. This relationship between nurse colleague pressure and defensive practice was evident throughout many of the discussions participants had regarding nurse colleagues and ward culture.

4.4.3 Specialty areas

Participants within the focus group interviews identified that several specialty areas had distinct fever management practices. These areas included oncology, neurology, medical specialties (i.e. renal, respiratory, transplant), emergency and intensive care. The differences in fever management practices across these areas were discussed by participants with particular emphases on the safety and risks of antipyretic medications to patients within the areas. Erin discussed these differences in depth specifically with reference to patients within her specialty areas:

Brufen's [ibuprofen]'s a cautious drug isn't it. It's not used in renal insufficiency, it's not used in bleeding post-op, they're [doctors within specialty area] very cautious about. And I would say respiratory-wise, asthma there's a link and concern over... so perhaps [ibuprofen] might not be your first line. (Erin)

Donna offered her experiences within the General Medicine specialty area:

I mean from where I come from we want to see where their fever trending, so you wouldn't want to stamp it out straight away. (Donna)

Georgia, however, shared contrasting views and experiences within her surgical specialty area:

In [ward name], there's very much a, like, automatic response- if they've got a temperature you do something about it. (Georgia)

These very different experiences highlight the variation in fever management practice across hospital specialties.

Although differences in practice between specialty areas were discussed, participants expressed unfamiliarity with these practices and often referred questions to other participants within the focus group interview when unsure. Some participants reported that they would initially seek advice from nurse colleagues regarding fever management if they were asked to work in a different specialty area to their usual place of work. When discussing the challenges of working within other specialty areas, Harriet asked about area-specific differences within the neurology ward:

In neuro, is neuro quite, they'd be quite... have quite sort of defined fever management things in place, would they? Just cause you can't see [the injury] and there's that risk element [referring to seizures]. (Harriet)

It was clear by Harriet's questioning that she was unfamiliar with the differences in fever management practice she suggested as existing for neurology patients. Claire and Frederick also expressed an assumption of differences in practice for neurology patients, however neither offered comprehensive rationale for this.

4.4.4 Parental pressure

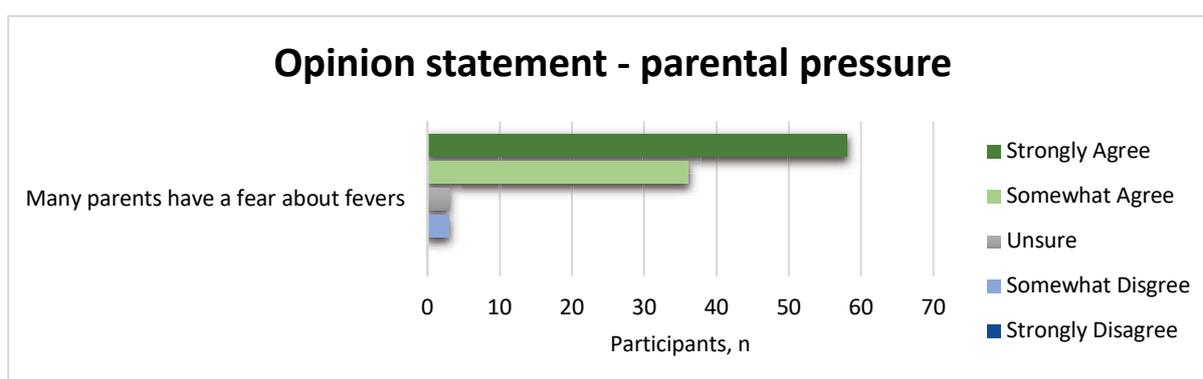


Figure 11. Nurse agreement with opinion statement regarding parental fear of fever.

This graph illustrates the agreement of most nurses (94% of participants) that parents have a fear about fevers. The majority of participants (58%) strongly agreed with this statement.

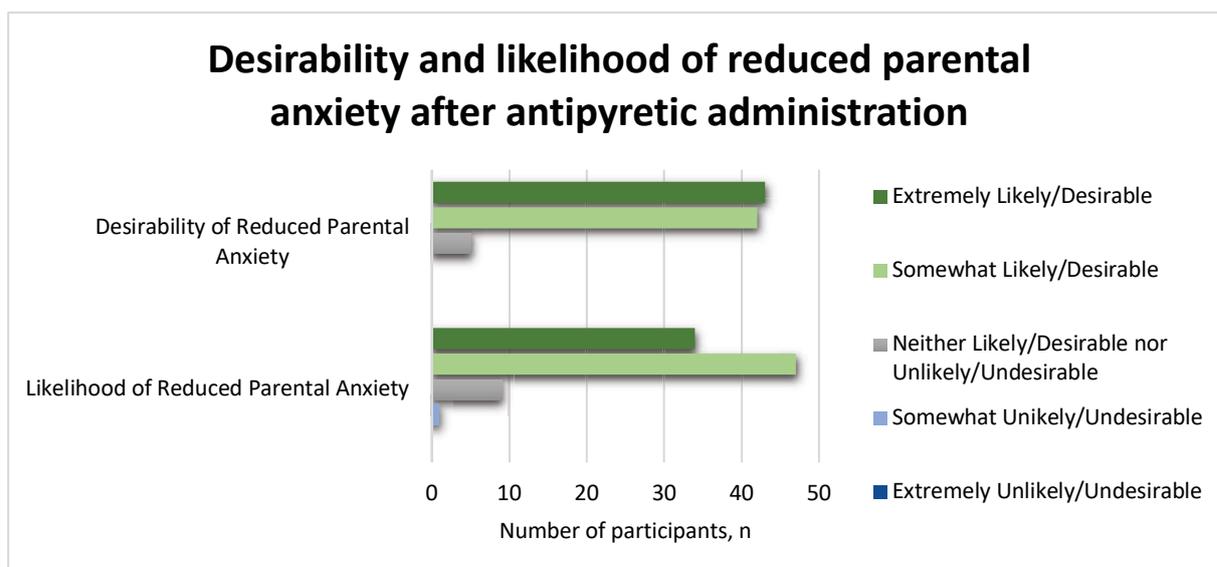


Figure 12. Nurse-perceived desirability and likelihood of temperature reduction after antipyretic administration.

94.4% of survey participants indicated that the reduction of parental anxiety was a highly desirable outcome of antipyretic administration. 90% of survey participants indicated belief that administration of antipyretic medication would be likely to reduce parental anxiety.

Sometimes you're treating the parents as well, aren't you. (Erin)

Parental pressure was considered by focus group interview participants to be a significantly influencing factor to their fever management practices. The second focus group interview in particular identified parental pressure as being the most important external influence on their practice.

Participants reported pressure from parents to administer antipyretic medication to their children. This pressure was suggested to be the result of parental fever phobia. Participants introduced the concept of 'treating the parents' – this term was used to describe the defensive practice of nurses to administer antipyretic medication to febrile children on the request of parents, regardless of the nurses' own reasoning. Frederick illustrated this within his explanation of the influence of parental pressure to his practice:

I might have a comfortable patient who has a low grade fever and the parent wants me to give paracetamol and I would probably still end up giving it in that circumstance... but patient discomfort means you get more pressure from parents as well. (Frederick)

Participants also acknowledged the positive role of parents in providing family-centred care to patients. Some participants identified situations in which parents provided physical care to patients which was beneficial in relieving distress and anxiety. However, participants also identified parents as a barrier to effective fever management; participants' own judgement and fever management decision-making process was restricted by the views and beliefs of the parent.

Various causes of parental fever phobia were suggested by participants. Patient discomfort related to fever was believed to increase parental anxiety, thereby bringing about pressure on nurses to 'treat' the fever. This is described above in Frederick's statement on parental pressure (p.66). Claire also discussed the role of discomfort in creating parental pressure on nurses:

No parent wants to see their child in pain or discomfort. So I think that the pressure from parents also comes as a, 'My child's not happy and I don't like to see that, and what are you gonna do about it?' (Claire)

Culture was also suggested by participants as influencing the nature of parental pressure. Several participants offered stories of caring for families from different cultures who had different (negative) attitudes towards fever and its management. Erin shared a personal experience of caring for a family from a different culture, who would continue to over-wrap their febrile child against Erin's recommendations. Frederick also spoke about his understanding that parents from some cultures would become more concerned about a fever in their child than parents from other cultures. When asked whether culture had influenced his fever management practices, Frederick replied:

Only because it would shape pressure from parents. (Frederick)

The influence of television and media was also discussed by participants. Although they denied that the media had any influence on their own practice, participants in focus group interviews agreed that television and media had a significant influence on parents' attitudes and beliefs towards fever and its management. It was suggested that pharmaceutical advertising utilised fearmongering techniques to increase parents' fear of fever and therefore increase sales of antipyretic medication. One participant suggested that this promotion of fever phobia increases the risk of accidental overdose of children in the community with antipyretic medication.

In light of reported attitudes of parents towards fever, participants acknowledged that nurses play a key role in educating parents to better understand childhood fever and correct fever management practices.

4.5 Internal influences on practice

This section examines personal influences on nursing practice related to care for febrile children, including the impact of nurses' own knowledge and attitudes towards fever management practices. Aspects of personal influence covered within this section include nurses valuing patient comfort, attitudes towards (and fear of) febrile seizures, knowledge of fever physiology and management, nurses' personal experiences and the clinical reasoning process.

4.5.1 Valuing patient comfort

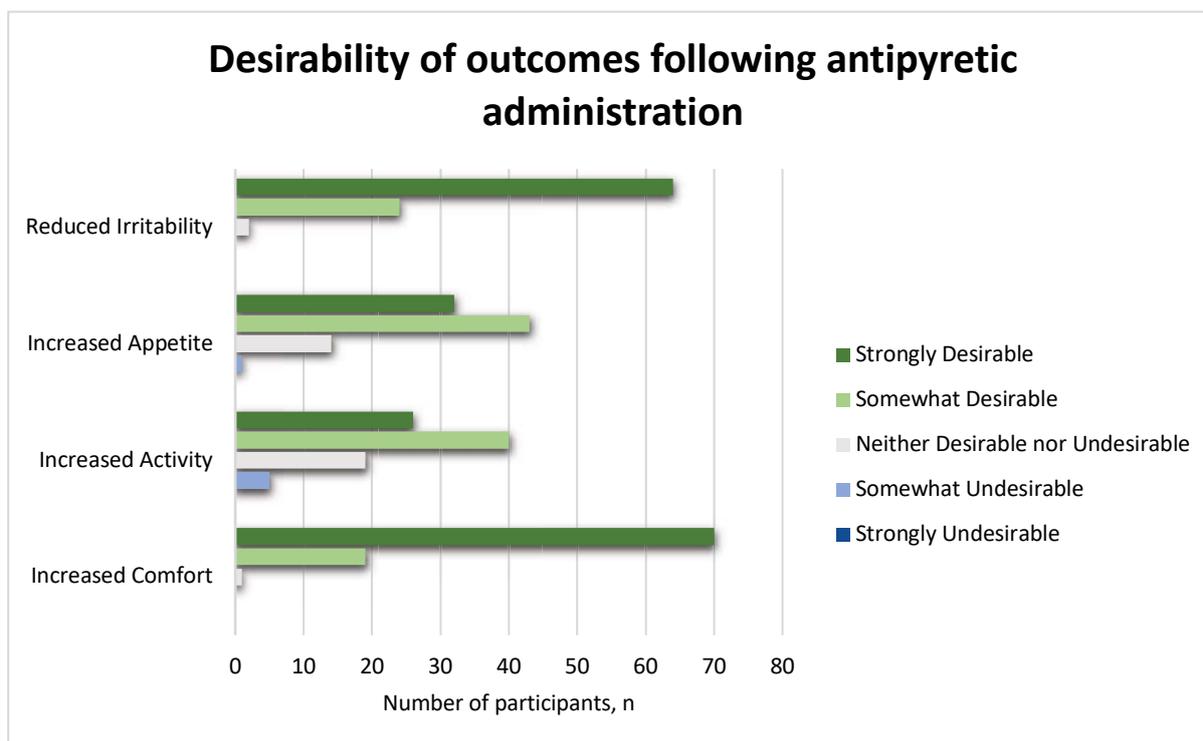


Figure 13. Nurse-perceived desirability of outcomes following antipyretic administration.

This figure illustrates participant desirability of patient comfort-related outcomes following antipyretic administration to febrile children. A significant majority of participants (73.3% - 98.9%) indicated their desire in the increase of patient comfort across all four patient comfort-related outcomes included in the survey. 77.8% of participants reported that increased patient comfort was a strongly desirable outcome following the administration of antipyretic medication. In addition, 71.1% of participants indicated that reduced patient irritability was a strongly desirable outcome.

Throughout the focus group interview, participants placed significant personal value on maintaining and promoting the comfort of their patients and this was reflected in their fever management practices. Participants across both focus groups agreed that patient comfort was one of the most significant internal factors influencing their individual fever management practice. Patient comfort therefore outweighed temperature thresholds in their decision-making process. Frederick offered the following opinion when discussing temperature threshold values with his other focus group participants:

Depending on the child, um, 38.5, above that I would start to think about it [antipyretic medication] unless they were uncomfortable with a temperature lower than that. (Frederick)

When asked to rank a range of fever management methods by order of importance, participants considered the comfort of each procedure for the child when determining the ranking of these methods. For example, cold water baths were rejected by both focus groups as a method for fever management.

Participants agreed that the process of bathing a child in a cold water bath would be too distressing for the child. Claire related this to her own experience of cold water baths as a child:

I remember getting cold water baths because I used to have febrile seizures. It's miserable.
(Claire)

With respect to antipyretic administration, participants generally agreed that they would administer medication to febrile patients who appeared miserable or in distress. Furthermore, participants spent some time discussing their use of paracetamol and ibuprofen in febrile patients for its analgesic as opposed to antipyretic properties, again demonstrating their prioritisation of patient comfort.

Participants also identified patient comfort as being a key contributor to pressure placed on nurses by parents. The second focus group elected to combine the two influencing factors 'patient comfort' and 'parental pressure' and place them towards the top of the importance rankings within the ranking exercise. Frederick explained:

I'd put patient discomfort and pressure from parent together, cause we get some families who want us to do something as soon as the temperature is above 37.5. And I would, because the parent is asking for it. (Frederick)

The role of the parent in promoting patient comfort was also considered. Participants identified for example that parents often utilise methods such as tepid sponging as a way to provide their child with physical touch and affection, in order to settle the child and improve comfort. In defending parents' use of tepid sponging, Harriet suggested:

Possibly the very nature of mum being there and stroking and soothing or something. That in itself may help settle [the child], rather than manage the fever. (Harriet)

Although Harriet did not use tepid sponging as a method for fever management in her own practice, she shows through this statement a willingness to change her practice and adopt other techniques in particular situations based on the comfort of her patient.

4.5.2 Febrile seizures

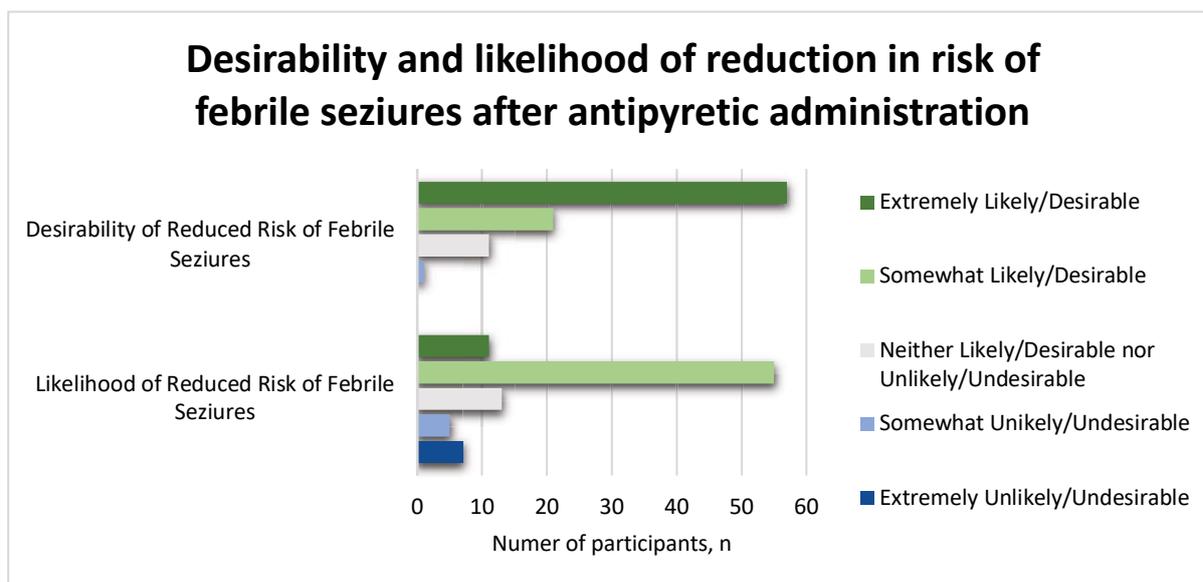


Figure 14. Nurse-perceived desirability and likelihood of reduction in risk of febrile seizures after antipyretic administration.

86.7% of participants indicated that a reduction in risk of febrile seizures was a desirable outcome from the administration of antipyretic medication. A similar but slightly smaller proportion of participants (77.3%) viewed reduced risk of febrile seizures as a likely outcome. Seven participants considered the reduction in risk of febrile seizures extremely unlikely following antipyretic administration, suggesting that these participants believed that antipyretic medication administration would not affect the incidence of febrile seizures in children.

During the focus group interviews, participants' fear of the occurrence of febrile seizures in patients was seen to significantly influence their reported practice. For the most part, participants identified febrile seizures to be dangerous, and to therefore require prevention. Participants reported aggressively 'treating' febrile patients with a history of febrile seizures through regular antipyretic medication administration, even if the patient was not prescribed this as a regular medication. This was contrasted to a more conservative approach suggested by participants for patients with no history of seizures. In discussing the preventative use of antipyretic medication, Donna shared her experiences on a medical ward to elaborate:

I come from medical and a lot of patients that come in with a diagnosis of febrile seizures from ED, a lot of them aren't actually charted regular [paracetamol]. But... it has been common practice for us to give them regular [paracetamol] to obviously avoid further seizures. (Donna)

Claire disagreed with this, explaining that she had been given conflicting information at the recent study day she attended. As discussed previously, Claire took an opposing stance towards febrile seizures stating (correctly) that antipyretic medication would not prevent a seizure in febrile patients.

Some participants also indicated some confusion regarding evidence-based best practice when caring for patients with a history of febrile seizures, evidenced by frequent questioning of one another with regards to their clinical practice.

Distress and anxiety was discussed by participants in relation to the occurrence of febrile seizures. They explained that febrile seizures caused feelings of distress and anxiety for patients, parents and health professionals alike. This personal reaction was given as rationale for implementing their chosen management practices. In particular, parental distress was discussed, with participants suggesting that fear of febrile seizures was a significant contributing factor to parental pressure on nurses. This was elaborated through personal stories from participants. Harriet shared this story with her focus group:

*I've had friends have kids who have had febrile seizures, and it freaked them out. And friends that are in the medical profession! Like, 'I don't know what to do, I thought they were dying'.
(Harriet)*

Despite being educated healthcare professionals, the participants spoken about in this narrative expressed significant fear of febrile seizures based on their personal experience of seizures with their own children.

4.5.3 Knowledge of fever

Figure 15 illustrates the agreement of participants with five opinion statements regarding fever knowledge. 92.1% of participants correctly identified that increased metabolic demands related to fever could compromise children with cardiac, respiratory or metabolic conditions. Although there appeared to be more variation in opinions regarding the masking of infective processes, 60.2% of participants agreed that the use of antipyretic medication could mask a progressive infective process. Interestingly, 65.3% of participants also correctly identified fever's potential physiological benefit for children. This provides contrasting information to the findings discussed above in section 4.3.4 with regards to nurses' defensive practice.

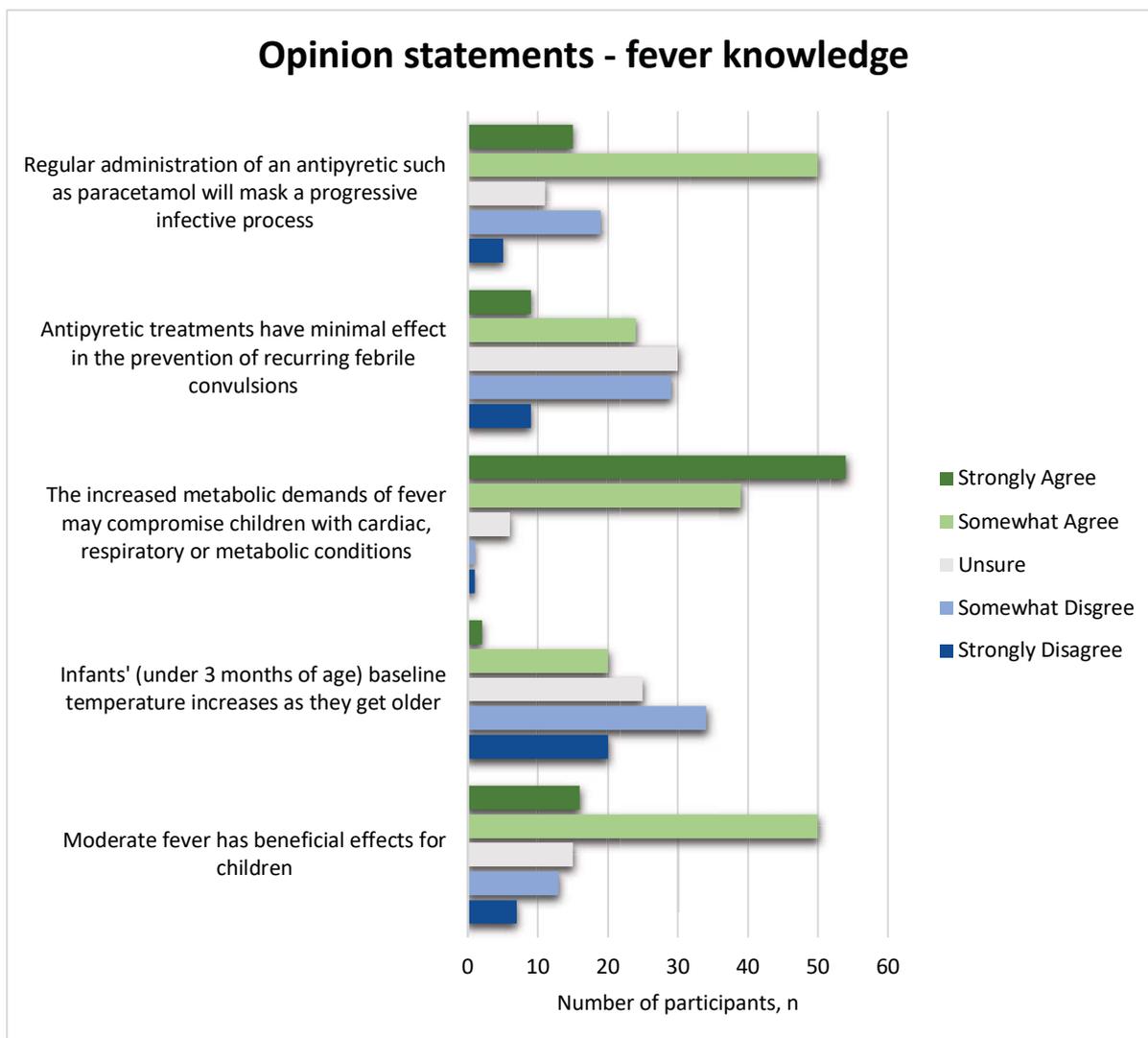


Figure 15. Nurse agreement with opinion statements regarding fever knowledge.

There was significant variation in participant response with regards to the effect of antipyretic medication on the incidence of febrile seizures. Approximately even proportions of participants agreed, disagreed or were unsure as to the effect of antipyretics on preventing the occurrence of febrile seizures.

Table 6: Fever Knowledge – Multiple Choice Questions.

Item	Correct Answer	
	n	%
The most common side effect of fever is <i>mild dehydration</i>	1	0.9
The primary concern of fever (excluding underlying cause) is <i>dehydration</i>	30	27.8
Sponging febrile children may be implemented: <i>Tepid sponging is not recommended</i>	65	60.2
Antipyretics reduce fever by <i>decreasing the temperature set-point of the hypothalamus</i>	106	98.1
Please select the best answer regarding fever management in children over 3 months of age: <i>Fever in (normally healthy) young children should be allowed to run its course</i>	40	37.0

Table 6 presents the results of five multiple-choice questions asked of participants with regards to fever pathophysiology and management. Most participants (98.1%) correctly identified the method by which antipyretic medication reduces fever. 60.2% of participants also correctly identified that tepid sponging was not a recommended fever management technique. This finding has similarities to results in Figure 5 within section 4.3.1, in which 65.7% of participants did not identify tepid sponging as an accepted method for fever management.

The proportion of participants that answered the other three questions correctly was very low. Question One had the lowest proportion of correctly answering participants; however, the majority of participants selected the answer 'all of the above' to include all named side effects, including mild dehydration, in their response. The other named side effects included 'Chills' and 'Discomfort/Irritability'.

Focus group participants demonstrated significant gaps and inconsistencies in knowledge of pathophysiology and evidence-based recommended best practice. This was evidenced through participants' frequent questioning of one another within discussion in an apparent effort to understand correct practice or validate their own beliefs about, and understanding of, fever management. Questions raised in the interviews related to content of clinical guidelines, febrile seizures, tepid sponging, antipyretic medication regimen and area-specific variances.

Participants at times offered very particular opinions on acceptable/unacceptable fever management techniques. Examples of these included support of antipyretic medication administration over a threshold temperature value, or for children with a history of febrile seizures. However, participants were unable to provide full rationale for this opinion aside from the suggestion that it was 'common practice' in their area. This was illustrated well by Harriet; when asked whether she would always start with paracetamol, Harriet replied:

Interestingly I do, and I don't know if I've got any particular rationale for that. (Harriet)

Harriet's inability to provide rationale for her choice of antipyretic medication demonstrates a gap in knowledge with regards to both pharmacology and fever physiology.

Participants also reported being confused by conflicting views towards appropriate fever management. This was often discussed in relation to febrile seizures. Erin demonstrated her confusion in the following statement addressed to the rest of participants:

What are you taught now, are you taught that fever causes seizures? Or that.. No... (Erin)

During this discussion, Claire also revealed some confusion regarding febrile seizures despite having attended a study day on febrile seizures the previous week. She explained:

When I was trying to find out about febrile seizures, cause I was confused about them, there's so much conflicting research out there. (Claire)

As a result of gaps and inconsistencies in knowledge, participants reported that they would often turn to doctors and nurse colleagues for advice as opposed to relying on their own incomplete knowledge of appropriate fever management. Erin talked about such this behaviour in this explanation of her practice:

If you can see somethings happening, have a discussion with the team and just say look I think they've developed a fever, is this something you're expecting? Do you want me to, um, at what point do you want me to jump? How significant is it? (Erin)

This tendency to turn to others to seek advice and information regarding fever management indicates that nurses seek to fill gaps in her own knowledge through interaction with their colleagues.

4.5.4 Personal experience

Personal experience, both at home and in the workplace, was seen to be an influencing factor on the development of fever management practices in nurse participants. As described above (section 4.5.1) one participant referred to her childhood experiences of fever management to support her disapproval of tepid sponging and cold water baths as fever management techniques. In particular, she described the experience as 'miserable'.

Two participants, Claire and Harriet, referred to fever management experiences at home with their own children. In reflection during the interview process, Harriet suggested that her choice of paracetamol as a first-line antipyretic medication was a result of her child's allergy to ibuprofen. When asked whether her personal experience of managing fever at home with her own children had influenced her practice, Harriet replied:

Well I didn't think it had but I'm starting to think now that, yeah it probably has, actually... I've got one [child] that's allergic to brufen, which is probably why I default to pamol [paracetamol] all the time. (Harriet)

In acknowledging her personal experience with her children as an influence to her own conservative approach to fever management, Claire explained:

At home, with my own kids, I try to avoid Panadol [paracetamol] and brufen [ibuprofen], and I'd prefer to use other methods. But if they're miserable and in pain, I'd use paracetamol. (Claire)

These two quotes demonstrate the influence of experiences with children outside of the work environment on the development nurses' fever management practices.

Participants offered stories of personal experience to provide rationale for their own fever management practice often throughout the focus group interviews. These stories included experiences with families of different cultures, experiences of pressure from other health professionals, and experience of being unwell personally. When asked directly, one participant (Amy) denied that her personal experience significantly influenced her clinical practice. Nevertheless, it was clear that personal experience is an important influence for most nurses' development of their own fever management practices.

4.5.5 Clinical reasoning

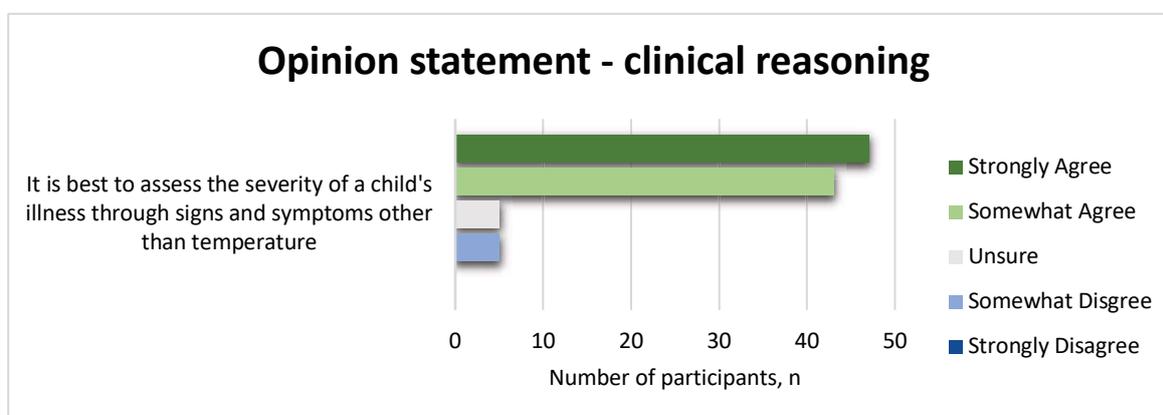


Figure 16. Nurse agreement with opinion statement regarding clinical reasoning.

Figure 16 demonstrates the strong support of nurses for the incorporation of clinical reasoning into their decision-making processes regarding fever management. 90% of participants agreed that it was best to undertake holistic assessment of children with respect to signs and symptoms apart from temperature. No participants indicated strong disagreement with the opinion statement in Figure 16, and only five participants indicated some/mild disagreement.

In explaining fever management practices, focus group participants described the importance of applying sound clinical reasoning to their decision-making processes. Participants emphasized the importance of understanding the reason behind their patients' fevers, including the underlying

pathophysiology. They offered suggestions of investigative procedures (such as blood cultures) required in order to diagnose the underlying condition responsible for the fever.

At times participants reported using vital signs and patient assessments to more comprehensively understand a patient's condition before making decisions regarding fever management. However this seemed to contradict earlier statements from participants, in which participants appeared to have an intrinsic pre-existing framework (outside of personal clinical reasoning) to base fever management decisions upon. For example, participants explained that fever management was 'not all about the number' (referring to the temperature) despite having identified a temperature threshold value above which they would implement antipyretic therapy. When discussing the use of temperature thresholds in decision-making, Claire offered the following view:

I agree at watching trends, watching what's going on environmentally, all that stuff, not just looking at the one thing. That's why we do the vital signs- it's not just, we don't just do the temperature. (Claire)

Claire's statement demonstrates effort to incorporate a holistic approach when caring for a febrile child. Information such as the child's vital signs and environmental factors are considered when building a clear picture of a child's situation and specific needs.

4.6 Summary

This chapter has presented integrated findings from both the quantitative and qualitative components of this fever management study. These findings were organised into three main sections to reflect the specific aims of the study. In reviewing all findings, five summary findings statements were identified from this integrated mixed-methods data. These are presented below:

1. Nurses manage fever inconsistently both within and across clinical settings.
2. Nurses are overcomplicating their fever management practice.
3. Nurses have a specific framework for the implementation of management methods, based on individually adopted criteria.
4. Nurses derive criteria for fever management based on personal values and knowledge, as well as sociocultural factors.
5. The tension between these influencing factors creates decisional conflict for nurses, which contributes to variation in practice.

In the following chapter I discuss these summary findings with respect to the literature.

Chapter 5 – Discussion

5.1 Introduction

In this chapter, the five summary findings statements identified at the conclusion of the Findings chapter are discussed with respect to this study's research question:

“How do nurses manage fever in the paediatric inpatient setting?”

The discussion of these statements provides further insight into the findings of this study by considering them within the broader context of paediatric nursing practice. In particular, inconsistencies in fever management practice, the tendency of nurses to overcomplicate their practice and factors that guide the nurses' development of a system of criteria for decision-making are discussed in relation to research reported elsewhere. Limitations of the study findings are then presented. Implications and suggestions for further research are discussed with specific emphasis on the establishment and implementation of standardised, evidence-based best practice for fever management. Finally the thesis will close with a conclusion of the key findings of this study and their contribution to the further understanding of nursing management of paediatric fever.

To ensure clarity between this study's findings and those from previous research, the term 'this study' will be used to identify the study reported on in this thesis. Findings from other sources i.e. previous research and literature will be referred to by the author's name.

5.2 Inconsistent fever management

Throughout this study, inconsistencies were identified in fever management practices between nurses, between specialty areas, and between actual and recommended practices. The inconsistencies were evident in both the survey data and the focus group interviews. For example, almost all nurse participants identified at least one non-pharmacological technique as being an acceptable method of fever management in children despite the lack of literature to support their use (Sullivan & Farrar, 2011). This shows inconsistency between current nursing practice and recommended best practice from literature.

Inconsistencies in practice have been identified previously in a number of key studies of nurses' fever management including those of Edwards et al. (2001, 2003), Greensmith (2013), Poirier et al. (2000) and Walsh et al. (2005). These researchers identified inconsistency as a significant characteristic of nurses' fever management practices. The findings reported here align with those of Edwards et al. (2001, 2003), Greensmith (2013), Poirier et al. (2000) and Walsh et al. (2005), suggesting that practice inconsistency remains a current issue for paediatric nurses' fever management today.

Inconsistency of practice is also described by Thompson et al. (2013) in their literature review of nurse decision-making and judgement. In this review, multiple studies were identified that showed that when faced with the same information and same decisional situation, nurses will and frequently do make different judgements and decisions from one another. In a related study by Greenwood, Sullivan, Spence and McDonald (2000) investigating clinical reasoning of neonatal nurses, inconsistencies were demonstrated by both experienced and inexperienced nurses. Similarly, within this study, inconsistencies in practice were identified in nurse participants across a range of ages and experience levels within the focus group interviews.

Healthcare professionals' understanding of fever and fever management practice has historically oscillated between viewing fever as beneficial and viewing fever as harmful (El-Radhi et al., 2009). This is reflected in a corresponding oscillation between conservative and aggressive approaches towards fever management by healthcare professionals. In the last four decades, however, fever management strategies reflecting both views have existed simultaneously within the clinical setting (El-Radhi et al., 2009). The inconsistent practice identified in the findings of this study reflect this range of views and resultant confusion.

The inconsistencies discussed above appeared to be related to variation in the influence of a number of factors affecting nurses' fever management decision-making. Factors (discussed below) include the use of personal systems of criteria to direct decision-making, the significant impact of a range of specific influencing factors, and the tension created by decisional conflict.

5.3 Overcomplication of decision-making

Despite current research evidence supporting a simple, uniform and conservative approach to the management of fever in children, the findings of this study suggest that nurse participants overcomplicate their own fever management practices. This was demonstrated through nurse participants' individualisation of fever management approaches to specific patients, their adoption of specialty-specific differences in practice and their tendencies towards practicing in a defensive manner.

Nurse participants within the study demonstrated a tendency to individualise patient care based on a large number of criteria. Current evidence supports a conservative approach to the management of fever with intervention indicated only if a patient exhibits signs of pain or discomfort associated with the fever process. Contrary to this, however, study participants reported using a wide range of criteria to determine their use of antipyretic medication for fever management as opposed to acting on the presence of pain or discomfort alone as recommended in the clinical guidelines. This finding was consistent across both the quantitative survey and the focus group interviews, and echoes the qualitative findings of Edwards et al. (2001) in which the individualisation of fever management towards particular patients was identified. Edwards et al. discussed nurses' significant adaptation of fever management practices depending on patients' condition, co-morbidities and demographics (Edwards et al., 2001).

Individualisation of care is an important component of nursing practice, and this was evident in nurses' fever management practices within this study. It is important for nurses to be flexible, utilise critical thinking, and adapt to specific situations to cater to the unique needs of patients (Greenwood et al., 2000). Individualisation is especially important for aspects of healthcare in which not one clear solution has been confirmed as the best or most effective way of managing a particular situation. However, Thompson et al. (2009) suggests that problems arise when agreed and research-informed best practice approaches exist for a given situation. It can become dangerous when standardised policies are abandoned in favour of individualisation of care, particularly in the complex and time pressured environment of a hospital inpatient unit (Greenwood et al., 2000). With regards to fever management, there is a wealth of evidence to support the conservative management of fever, indicating that the best management approach (being a conservative approach) *is* well known. This gives strong support for the standardisation of nurses' fever management practices and highlights the issues arising from the individualised and inconsistent practices found here.

The findings of this study showed differences in management practices between specialty areas. Focus group participants discussed the risks associated with antipyretic medication use in children within various specialty areas including oncology, neurology, renal, respiratory, transplant, cardiac, emergency and intensive care departments, and described how these risks influenced their fever management practices. The cited differences in management between these specialties contrasts with current evidence-based recommendations and standardised hospital policy, which advocates for conservative management of fever in children, with the exception of those suffering from a cardiac or metabolic condition affecting their functional reserve (El-Radhi, 2012; Sullivan & Farrar, 2011).

The practice differences between specialty areas identified in this study are consistent with the findings of several other studies of decisional complexity in nursing (Gillespie, Chaboyer, St John, Morley, & Niewenhoven, 2014; Thompson et al., 2013). Thompson et al. described nurses' clinical environment as 'noisy' and full of superfluous information which is often utilised by nurses in their decision-making, but adding little to what is required to make effective decisions (Thompson et al., 2013). Knowledge, skills and experience related to specific specialty areas can cloud what should be straightforward decisions and contribute to nurses' tendencies to overcomplicate decisions. This appears to be what is happening in nurses' fever management practice.

Overcomplication could be the result of a perceived professional obligation to adjust practice to meet the specific needs of each patient with respect to their specific condition. During the past three decades, the practice of nursing has transitioned from a tasked-based role to one in which nurses are required to think more critically, possess a higher level of knowledge and expertise in their area, and apply current evidence (Thompson et al., 2013). Rycroft-Malone et al. (2009) described healthcare practitioners as 'rationale agents' (p. 1498) when explaining the responsibility of appraising and utilising research in practice. This adds to the complexity of nurse decision-making, creating perceived pressure on nurses to rationalise and justify, or defend, their actions leading to them overcomplicating decision-making processes. Overcomplication was demonstrated particularly clearly in the findings where one participant

discussed the use of ibuprofen, providing justification for not using the drug based on its safety profile, specialty-specific information and (incorrect and incomplete) reference to evidence opposing its use. In this example we see a nurse appearing to overcomplicate her decision-making process in an effort to defend her position against the use of ibuprofen to the other nurse participants in the focus group interview through the use of multiple justifying statements.

5.4 Nurses' decision-making processes

5.4.1 Framework for decision-making

Nurse participants within this study appeared to have a specific framework, or system of criteria, for their decision-making processes and their implementation of fever management methods. This framework appears to have been constructed from an individually-devised set of criteria, based on their own personal values, attitudes and experiences. These systems enable nurses to maintain consistency within their own practice, in spite of the variations in practice seen between nurses.

Although nurse participants acknowledged the importance of clinical guidelines in the delivery of evidence-based practice, it was found that most did not use these in their own fever management practices. Participants of the focus group interviews reported that clinical guidelines were the least influential factor affecting their own practice, some participants admitting to not having read the guidelines at all.

This finding complements what was found by Rycroft-Malone et al. (2009) in a study of the effect of protocol-based care in nurse decision-making. In their study, despite the availability of evidence-based protocols (or guidelines), nurses were rarely found to use these in their decision-making. Nurses instead relied on their own knowledge and experience to guide their decision-making processes, reporting that they used 'mental flowcharts' or checklists, not linked specifically to any evidence or hospital guidelines. Nurses within Rycroft-Malone et al.'s study (2009) referred to protocols as 'guides', and used them with significant flexibility and adaptation. The concept of protocol adaptation was discussed with respect to the danger of nurses assuming responsibility to form 'best practice', this resulting in a lack of standardised healthcare delivery. The flexible use of protocol as a 'guide' for practice was clearly evident during the focus group interviews.

In spite of the clear relevance of understanding what influences nurses' decision-making, there appear to be few reported studies into the use of personal frameworks, or 'mental flowcharts', other than those reported above. There is considerable potential for further research into this area.

5.4.2 Deriving decision-making criteria

Nurse participants appeared to use information gleaned from personal attitudes and values, specialty experience and external influences to inform their approach to the management of fever. This information contributed to a nurse's decision-making process through the prioritisation of criteria and

development of a management framework based on the specific values of a nurse. Prioritisation of criteria appeared numerous times throughout the findings. For example, nurse participants within the focus group interviews described the decision-making process with consideration to delivering family-centred care (specifically discussing parental wishes), professional inclination and personal experience. The weight placed on each criterion appeared to be shaped by the personal priorities of the individual nurse and contributed to variation in decisions and judgements between nurses faced with a similar situation. Variations were evident predominantly within the focus group interviews in which participants talked about specific influences as being of particular significance to them. For example, one nurse participant identified that her personal experiences of managing her own children's fevers meant that she avoided using ibuprofen when managing febrile patients given her children's negative experiences with ibuprofen. This clearly demonstrates the effect of personal experience on the development of a nurse's fever management criteria.

The findings of this study indicate that nurses' decision-making processes can be defined as an incorporation and prioritisation of information from a number of sources, and the subsequent development of this information into criteria for practice. This explanation of nurses' decision-making processes echoes the foundational clinical decision-making study of Hammond, Kelly, Schneider and Vancini (1967), describing nurse decision-making as nurses' combination and filtering of information from various sources (utilising a variety of types of reasoning) in order to reach a judgement.

In a quantitative study on paediatric nurse participants' fever management behaviours by Walsh et al. (2005), the Theory of Planned Behaviour was used as the theoretical framework for the study. The theory was described by Walsh et al. as being founded on the understanding that "people rationally consider all the information available to them when making behavioural decisions" (p.455). The three elements identified in the theory as affecting decision-making were a 'personal/attitudinal factor' (the values and beliefs of the person), a 'social factor' (the perceived expectation from others couples with a person's desire to comply with these) and a 'control factor' (the person's perceived control over the situation) (Ajzen, 1991). These three elements are also reflected within the criteria that nurses utilised in their reported decision-making processes within this current study.

The following section discusses the effect of several key internal and external influences on fever management practice, and the decisional conflict that appeared to arise from the convergence of these factors.

Knowledge and attitudes

Several internal influences emerged from findings as being of particular significance to the decision-making processes of nurses. These included valuing patient comfort, attitudes towards (and fear of) febrile seizures, knowledge of fever physiology and management, and nurses' personal experiences. In this section, the two key influences of knowledge and attitudes relating to patient comfort will be discussed.

Knowledge

Nurses' knowledge of fever and evidence-based fever management practices appears to influence the development of fever management criteria and consistency of practice across both specialty areas and nurse colleagues. The findings of this study indicate that nurse participants have significant gaps in their knowledge of both fever physiology and fever management techniques. This is demonstrated through poor knowledge scores in the multiple-choice knowledge test (Table 6), inconsistent agreement with opinion statements regarding fever knowledge (Figure 15) and confusion and disagreement related to fever physiology and management within the focus group interviews. These findings complement those in studies by Greensmith and Walsh et al., where nurses' poor knowledge levels were linked to inconsistent practices (Greensmith, 2013; Walsh et al., 2005).

In studying nurse decision-making, McCaughan, Thompson, Cullum, Sheldon and Thompson (2002) discussed the effect of poor knowledge on nurses' abilities to make evidence-based decisions confidently. It was suggested that decreased confidence in decision-making stemmed from an inner conflict between wanting to use up-to-date clinical evidence and not having the knowledge to do so. In reverse, increased education and preparedness of nurses with regards to knowledge was demonstrated to increase nurses' confidence in decision-making (McCaughan et al., 2002).

Value of patient comfort

Nurses were found to value patient comfort and strive to prioritise this when managing fever; this was a recurrent finding throughout the study. Criteria related to patient comfort were frequently selected by nurse participants in their decision to administer antipyretic medication to febrile children (see Figure 6). Within the focus group interviews, nurse participants often reported patient comfort as the single most significant personal influence towards fever management practice. Survey findings also indicated that patient comfort was of paramount importance to nurse participants when devising a fever management approach. For example, in Figure 13, 73-99% of participants reported a strong desire to increase patient comfort across four patient comfort-related outcomes, through administration of antipyretic medication.

Interestingly, the importance of patient comfort was not specifically identified as a central finding within any of the four key studies on paediatric fever management discussed within the literature review. Patient comfort was briefly discussed within the study by Greensmith (2013) with regards to participants' antipyretic administration behaviours to children sleeping comfortably. In Greensmith's quantitative survey, 73.9% of participants indicated that they would wake a sleeping child to administer antipyretics (Greensmith, 2013). Greensmith's finding demonstrated an inappropriate use of antipyretic medication for fever management, showing that nurses were not administering antipyretics as recommended for the sole purpose of treating patients with pain and discomfort associated with the fever process. Similarly, within this current study, 55% of nurse participants indicated that they would wake a sleeping child to administer antipyretic medication. Findings for this single survey response are similar to those in Greensmith's study (2013). Edwards et al. (2003) also discussed findings related to the issue of waking sleeping children to administer antipyretic medication. However, in contrast to the current study's

findings, nurses were reported in Edwards et al.'s study to be 'reluctant' to wake children to administer antipyretic medication.

The value placed by nurses on patient comfort is not surprising. At the core of its identity, nursing is a profession fundamentally based on caring (Falk, 1996). Reverby (1987) described the origin of nursing as stemming from women's historical role in caring for the family and those vulnerable within their community, developing into a practice involving attending to comfort and promoting the wellbeing and health of patients. Therefore, the value of patient comfort could be argued to be an expected attitude of nurses based on their professional identity.

Sociocultural factors

Although nurse participants identified several key personal factors which influenced the development of fever management criteria, the findings of this study suggest that external influences had a more significant effect on decision-making with regards to fever management. Sociocultural factors such as elements of ward culture, specialty area influence and pressure from parents and nurse colleagues were seen to strongly impact nurses' ultimate approach to fever management.

The effect of external influences on clinical practice was discussed by Smith, Higgs and Ellis (2007) in their writing on factors influencing clinical decision-making. Social influences were highlighted as being of particular significance to clinical decision-making. Practitioners were seen to rely on their interactions with other people (such as colleagues, or parents) to check their decision-making. Rycroft-Malone et al. (2009) described decision-making as a 'social activity' for nurses, and identified that two key influences to decision-making were nurse colleagues and ward ('workplace') culture. These two influences were also identified to have significant effect on decision-making in the findings of this study. With respect to the findings of this study, it could be inferred that nurses tend to be influenced by social influences around them as opposed to making decisions autonomously.

Ward culture was a particular external influence that nurse participants identified (both directly and indirectly) as having significant influence on their decision-making. Nurse participants reported themselves to be more inclined to adopt ward-accepted practices into their own practice than rely on standardised hospital policy or their own clinical judgement. Similar findings were reported in a study of decision-making with regard to wound management (Gillespie et al., 2015). The study examined the decision-making of health professionals (including nurses) working in wound management. 'Workplace culture', or ward culture, was reported to be a highly influential factor in the decision-making process. Ward culture has not been explicitly acknowledged as an influencing factor in literature specific to nurse fever management practices but the influence of nurse colleagues has been identified frequently (Edwards et al., 2001, Edwards et al., 2003; Greensmith, 2013; Walsh et al., 2005).

The influence of sociocultural factors can contribute to both positive and negative outcomes in decision-making. Cross-checking knowledge with colleagues can positively affect the decision-making process through sharing of knowledge, skills and experience. However, significant social influence can also

negatively affect the decision-making process (Smith et al., 2007). This is seen in examples from this study's findings, where pressure from others within the work environment (parents, doctors, nurse colleagues) overrode nurse participants' own knowledge and attitudes towards fever. For example, nurse participants almost unanimously indicated that the reduction of parental anxiety was a highly desirable outcome of antipyretic administration, and focus group interview participants admitted to administering antipyretic medication to patients against their own clinical judgement on request of parents to do so.

5.5 Decisional conflict

In this study, decisional conflict was found to be a significant issue for nurses in managing fever. Nurses were seen to derive criteria for fever management based on a number of influencing factors; as a result, it was evident in the findings that nurse participants frequently faced dilemmas when these factors competed for priority. In the valuing of patient comfort, for example, nurse participants identified discord between their own value of patient comfort and their externally influenced perception of 'what should be done' to manage fevers (e.g. whether to wake children and administer antipyretic medication). Nurse participants indicated frustration several times within the focus group interviews when discussing discordant factors. Discord between factors can complicate the decision-making process and create decisional conflict within nurses' active use of personal fever management frameworks (Gillespie et al., 2015; Thompson et al., 2013).

Gillespie et al. (2015) discussed the decisional conflict, or 'tension', experienced by healthcare professionals. Decisional conflict was described as commonplace within the clinical setting, resulting from a combination of time pressure, multiple-decision goals, an overwhelming availability of (sometimes conflicting) treatment choices and the contradictory opinions of colleagues.

Evidence of decisional conflict was present within many of the key findings of this study. An example can be seen in nurse participants' internal conflict between their own personal knowledge of correct fever management practices, and an expectation of their ward to 'treat' fever in children. The effect of ward culture/expectation appeared to override nurse participants' personal knowledge when the nurse came to a final decision. Additionally, nurse participants within the focus group interviews described following advice from nursing colleagues that contradicted their own attitudes towards fever management. These findings are similar to those of Greenwood et al. (2000) who conducted a qualitative study investigating clinical reasoning in neonatal nurses. The influence of ward culture was seen to subvert efforts towards promotion of evidence-based critical thinking, particularly in complex and high-risk clinical situations.

Furthermore decisional conflict can be seen in nurse participants' decision-making with respect to defensive practice. Conflict can arise from the struggle nurses face between practicing in a particular way in order to protect themselves, and practicing in a way that they believe minimises harm to the patient (Thompson et al, 2013). Defensive practice in the health profession is a term that describes the

adaptation of practice in order to avoid, or defend, against negative consequences to either oneself or patients (Whittaker & Havard, 2016). In focus group discussions, participants raised the concept of defensive practice with regards to fever management. Participants frequently spoke about 'backing' themselves to both protect themselves from allegations of wrongdoing and to protect the patient from harm or unnecessary suffering. Defensive practice was particularly demonstrated by nurse participants in their response to questions related to febrile seizures.

As an example of defensive practice, nurse participants frequently reported their intention to manage fever (through use of antipyretic medication) for the purpose of preventing febrile seizures. 81% of survey participants identified febrile seizures as a criteria used when making decisions regarding antipyretic administration. In focus group interviews, participants described their beliefs that the use of antipyretic medication reduced the chances of a febrile seizure. This conflicts with current evidence indicating no statistically significant reduction in febrile seizures with antipyretic administration (El-Radhi, 2012). However, nurse participants (appearing unfamiliar with this evidence) encouraged antipyretic intervention with the rationale that they did not want to "*do something- or not do something, that could help*" (Frederick).

5.6 Realities of practice

This section draws key elements of this chapter together and discusses them with respect to the reality of how nurses currently practice within the clinical setting.

Within the realities of the clinical setting, the findings of this study demonstrate that nurses do not always utilise guidelines despite understanding their importance and significance with respect to professional responsibility and patient outcomes. In some instances, nurse participants reported having never accessed the fever management guidelines, and some admitted to not having an understanding of the information that it contained. Findings showed that differences in fever management practices between specialty areas appeared to be developed by nurses and adopted into ward culture without any specific evidence or hospital-endorsed guidelines to support them. Nurses frequently referred to using ward-specific 'guidelines' for fever management throughout the focus groups; however it became clear that nurses were referring to specific behaviours within the ward culture of the specialty area. Behaviour such as this illustrates a gap between evidence-based practice and current nursing practice, parallel to findings in other studies of evidence-based practice utilisation (Gillespie et al., 2014; Greenwood et al., 2001; Thompson et al., 2009).

The standardised use of evidence-based practice in nursing is known to promote and improve patient outcomes in the hospital setting (Fink, Thompson & Bonnes, 2005). There is therefore an expectation held by health organisations/systems that nurses utilise evidence-based protocols provided. Rycroft-Malone et al. (2009) describes the goal of protocol-based care as to improve patient outcomes through provision of effective standardised care. Findings of this study affirm the findings of Rycroft-Malone et

al.; nurse participants from the focus group interviews often identified a sense of responsibility that they should practice in accordance with hospital guidelines.

In explaining the dissonance between evidence-based recommended best practice and the current reality of nursing practice, several studies offer suggestions. Gillespie et al. (2014) related dissonance to the tension and decisional conflict experienced by health professionals, as discussed earlier within this chapter. Furthermore it was suggested that the reality within the clinical setting is that nurse decision-making is focussed towards pragmatism, or a practical approach focussed on the solving of problems (Gillespie et al., 2014). In discussing the same phenomenon, Thompson et al. (2009) explained that nurses tended to favour intuitive decision-making processes over analytical, evidence-supported decision-making. Within explanations from both studies, attention was drawn to the complex and high pressure environments that nurses practice within. Complementary to the findings of this study, Gillespie et al. (2014) and Thompson et al. (2013) identified that complex sociocultural, environmental and organisational factors all contribute to the gap seen between evidence-based recommended best practice and current practice reality.

5.7 Summary

The integrated findings from both the survey and focus group interviews answer the two aims of this study with respect to the research question: *“How do nurses manage fever in the paediatric inpatient setting?”*

Firstly, the current fever management practices of New Zealand paediatric nurses can be described. Nurses strive to practice in a way that reflects the value they place on promoting patient comfort, however this value can be challenged when other influencing factors impact the decision-making process. Inconsistencies in nurses' fever management practices are seen both across specialty areas, and between nurse colleagues working within the same area. These inconsistent practices relate to the tendency of nurses to both overcomplicate the issue of fever management and rely on their own decision-making criteria rather than recommended guidelines to direct practice.

With regards to influences on the decision-making processes of New Zealand paediatric nurses, nine key influences were identified within the findings as being significant to fever management practices: ward culture, nurse colleagues, specialty areas, parental pressure, the value of patient comfort, febrile seizures, nurse knowledge, personal experience and clinical reasoning. These influences could be distinguished into two main groupings; those generated from external sources i.e. parents, colleagues, ward environment, and those relating to a nurse's own beliefs and attitudes. Influencing factors formed the basis for the frameworks nurses developed for their management of fever, and the significance of these factors varied between each individual nurse. Differences existed between evidence-based recommended best practice and current nursing practice reality. These differences contribute to the inconsistencies seen in fever management practices and demonstrate nurses' minimal use of standardised hospital policy to direct practice. The findings overall confirm that nursing decision-making

practices are complex, and not as simple as applying clinical knowledge or implementing clinical guidelines. Decisions are made based on the prioritisation of different elements and are context-specific, bound together by the personal lens of the nurse.

Chapter 6 – Conclusion

6.1 Introduction

This chapter will begin with an examination of the implications of this study to nursing practice, in particular the use of standardised clinical guidelines, and implication for improving nurses' fever management knowledge and practice. This will be followed with a description of some limitations related to the study design. Finally, suggestions for further research will be proposed, and the thesis will then conclude with a summary.

6.2 Implications

6.2.1 Use of standardised clinical guidelines

The study findings clearly demonstrated inconsistencies in the way that nurses manage febrile children in the hospital setting. This study also highlighted the poor use of clinical guidelines to direct fever management practices. This is concerning, as fever management is part of many nurses' everyday practice within the hospital. Standardisation of care promotes consistent, effective and efficient nursing practice with regards to the management of fever, thereby improving patient outcomes and reducing time burdens on nurses. The development of up-to-date policies regarding recommended fever management practice is therefore crucial. These provide standardised direction for nurse decision-making and improve uniformity of nursing practice in the hospital (Kowalak et al., 2003). In addition, there is need for change in the way that nurses view and implement clinical guidelines. Nurses appear to be under-utilising current guidelines available to them; the attitude of nurses towards the use of clinical guidelines can have a significant impact on the delivery of standardised evidence-based best practice.

6.2.2 Improvement of knowledge and practice

Nurse education is a fundamental component of ensuring that evidence-based practice is kept current in the clinical setting (Kowalak et al., 2003). Therefore it is imperative that nurses improve their knowledge and practice related to fever management. Providing consistent, regular and up-to-date education on common management situations such as fever management needs to become a priority of health organisations. As a result, nurses will be better supported to provide effective, efficient and excellent care to their paediatric patients. The findings of this study may be reviewed with the intention of providing paediatric nurses with the education required.

6.3 Limitations

One challenge of studying nursing fever management behaviour is the difficulty in ensuring that true nursing behaviour is investigated. In order to capture what is truly occurring within the clinical setting, nurses' fever management practices would have to be observed in real-time. This is almost impossible to do without either neglecting the informed consent process, or influencing the behaviour of nurses through researcher presence and questioning nurses' personal decision-making process. Walsh et al. (2005) identified this limitation within their quantitative study (a clinical chart audit). It was impossible for Walsh et al. to assess nurses' rationale for antipyretic administration from previous clinical notes as this practice is not generally recorded by nurses (Edwards et al., 2003).

Based on this, the study gained understanding of fever management behaviours through studying nurse-reported nurse behaviour. This may have created some subject bias within the design, however was deemed by the researcher to be the most ethically appropriate way to gain an understanding of behaviour. Subject bias was of particular significance in the facilitation of focus groups; participants began by providing answers they thought were 'correct' instead of volunteering information regarding poor or unconventional practices. Effort was made by the researcher to minimise this through careful choice of words within the group introduction and several prompting statements.

Through the process of analysis and presentation of findings, key conclusions were identified. However, the study was solely analysed through the lens of the researcher and therefore it is accepted that researcher views are integral to the interpretation of findings; as a result of this, other relevant findings may have been overlooked or underplayed. A number of strategies were used to ensure the credibility of the study. These included triangulation of data, liberal use of direct quotes and the use of pilot studies and a pre-validated survey tool. In this way, nurses and their practices were represented as accurately as possible throughout the study.

Due to time constraints, a limited number of focus groups was able to be facilitated by the researcher and the survey had to be conducted within a constrained period of time. Additionally, only one hospital was contacted for participation within the study. These factors may have affected the generalisability of findings and therefore findings should be interpreted using caution.

6.4 Suggestions for further research

This study highlighted several possible areas for further research into nurses' fever management practices in the paediatric inpatient setting.

There is need for further inquiry into the reason behind nurses' poor use of clinical guidelines for the management of fever in children. This information is fundamental to understanding better ways to provide and implement uniform, standardised, evidence-based best practice across the hospital setting.

Nurse education with respect to appropriate evidence-based fever management practices has been identified to be an important requirement heading forward. The development of education tools with regards to fever management, and the evaluation of their effectiveness, could play a significant role in improving nurse practices.

The concept of 'overcomplicating practice' is not new. However most evidence available to support this concept describe the practice of other healthcare professionals – there appears to be a lack of current literature to explicitly describe the overcomplication of practice by nurses. Further research into this area could provide insight into the complex way in which nurses make decisions and direct the development of nursing education to best address this.

6.5 Conclusion

This study aimed to identify the behaviours and attitudes of New Zealand paediatric nurses' fever management in the inpatient setting and to explore influences on their decision-making process. This was achieved through answering the research question:

How do nurses manage fever in the paediatric inpatient setting?

To answer this question, a mixed-methods research design was employed utilising a quantitative survey and qualitative focus group interviews. Nurse participants from Starship Children's' Hospital participated in an online-based questionnaire investigating fever management attitudes, knowledge and practices. A number of nurses then self-selected to participate in focus group interviews where ideas related to current practice methods and influencing factors were discussed. The results of both components of this study were then integrated and analysed collectively.

The findings of this thesis confirm that fever management is inconsistent both between nurses and across the hospital setting. These inconsistencies are related to nurses' tendencies to rely on their own, often overcomplicated, decision-making processes that determine their fever management practices.

Within the inconsistencies seen across the hospital, some patterns of behaviour were observed. Nurses tended to administer antipyretic medication liberally to febrile patients, reflecting an aggressive approach to the management of fever that contrasts with the conservative approach recommended within current literature. Participants also reported using a wide range of non-pharmacological methods to manage fever despite a lack of evidence to support these practices.

Nursing decision-making practices are complex, and not as simple as applying clinical knowledge or implementing simple, standardised clinical guidelines. Decisions are made based on the prioritisation of different elements and are context-specific, bound together by the personal lens of the nurse.

Nurses derive criteria for decision-making as they process information from various sources. These sources include knowledge and education, personal attitudes, experiences and outside influences (for

example, ward culture) and can incorporate both sound and flawed understandings of evidence-based recommended best practice. Nurses then apply a specific framework to fever management situations based on the personal importance they place on various criteria. While some of the criteria were found in common for nurses in this study, their effects were distinctive and idiosyncratic for each nurse, reflecting the complexity of the decision-making process for fever management.

This study provides unique insight into the practices of New Zealand paediatric nurses with regards to fever management. It builds on the foundation of previous studies (Edwards et al., 2001, Edwards et al., 2003; Greensmith, 2013; Poirier et al., 2000; Walsh et al., 2005) investigating this everyday aspect of nursing practice and contributes to both New Zealand and global understanding of fever management practices and decision-making processes. The findings of this study suggest a need to review nurse fever management practices with regard to nurse decision-making and with a view to moving practice more towards recommended best practice, in support of the optimisation of paediatric patient outcomes.

Appendices

Appendix A: Participant Information Sheet – Survey



School of Nursing
Faculty of Medical and Health Sciences
Private Bag 92019
Auckland
New Zealand
Ph: +64-9-373-7599 ext 8935

PARTICIPANT INFORMATION SHEET – ONLINE SURVEY

Fever management: Current nursing practices in a paediatric inpatient population.

Name of researcher: Stephanie Clark
Name of Supervisors: Michael Crossan
Dr. John Parsons

Researcher Introduction

My name is Stephanie Clark- I am a research Master's Degree student at the University of Auckland. I am also currently a registered nurse at Starship Children's Hospital. I am completing a research project on the current nursing management of fever in children, supervised by Michael Crossan and Dr. John Parsons within the University of Auckland School of Nursing.

The Project

Fever management in Child Health is an element of everyday nursing practice within the hospital setting. Management of fever can have a significant impact on both the length of hospital stay and the recovery time of patients. However there appears to be limited research available on current practice.

This study aims to achieve a more comprehensive understanding of how New Zealand nurses manage paediatric fever in the inpatient setting. The results of this study may lead to the update and development of guidelines/policies to provide better guidance of nurses' fever management practice and ensure uniformity of practice within Starship Children's Hospital. This study may also provide opportunity for nurses to receive further education specific to the area of paediatric fever

management if need for this is identified. In this way, the study will directly benefit both the participants of the study and all nurses within Starship Children's Hospital.

The study will continue for 12 months, after which the results will be used in the development of my research thesis for the degree of Master of Nursing.

Invitation to Participate

You are invited to participate in this research because you are a paediatric nurse working clinically within Starship Children's Hospital. All paediatric nurses within Starship Children's Hospital have been invited via email to participate in this survey, with the intention of recruiting 80-100 nurses to participate. The expected time commitment from you will be approximately 10-15 minutes. Your participation is voluntary and you may decline this invitation to participate without penalty. Participation, or otherwise, in this survey will be anonymous.

Project Procedures

If you choose to participate, you will be asked to answer a questionnaire regarding your attitudes and behaviours with regards to paediatric fever management. This is expected to take you approximately 10-15 minutes to complete.

Data Storage, Retention, Destruction and Future Use

I will collect anonymous questionnaire data from the online tool. This will be stored on a password-protected University of Auckland computer drive for a period of six years, after which the data will be permanently deleted from the drive.

Right to Withdraw from Participation

You have the right to withdraw from participation in the questionnaire at any time until you have submitted your answers. After submission, withdrawal of data is not possible due to the anonymous nature of the questionnaire.

Anonymity and Confidentiality

The preservation of confidentiality is paramount. The information you provide through answering this questionnaire will remain anonymous to all researchers who have access to the data. You will not be required to provide any identifying information such as your name or contact details. Given that the questionnaire will be anonymous, submission of the questionnaire will be taken as giving consent.

A copy of the research findings will be available to you, if you wish. These will be available as a one-page summary emailed to you at the conclusion of the study, and also once the thesis is published through the University of Auckland.

Access to Support Services

If completion of the questionnaire or focus group causes you undue stress, please contact the ADHB Employee Assistance Programme for support (0800 SELF HELP).

For support, talk to your whānau in the first instance. Alternatively you may contact the administrator for He Kamaka Waiora Māori Health Team on 09 486 8324 ext 2324.

If you have any questions or complaints about the study, you may contact the Auckland and Waitematā District Health Boards' Māori Research Committee or Māori Research Advisor by phoning 09 486 8920 ext 3204.

CONTACT DETAILS AND APPROVAL

Student Researcher name and contact details	Supervisors' names and contact details	Head of Department name and contact details
Stephanie Clark sedw036@aucklanduni.ac.nz	Michael Crossan School of Nursing m.crossan@auckland.ac.nz 09 923 2245	Sandie McCarthy School of Nursing alexandra.mccarthy@auckland.ac.nz 09 923 2897
	Dr. John Parsons School of Nursing j.parsons@auckland.ac.nz 09 923 8871	

For any concerns regarding ethical issues you may contact the Chair, the University of Auckland Human Participants Ethics Committee, at the University of Auckland, Research Office, Private Bag 92019, Auckland 1142. Telephone 09 373-7599 ext. 83711. Email: ro-ethics@auckland.ac.nz

Approved by the University of Auckland Human Participants Ethics Committee on 24-Oct-2017 for three years. Reference number: 020176.

Appendix B: Participant Information Sheet – Focus Group Interview



School of Nursing
Faculty of Medical and Health Sciences
Private Bag 92019
Auckland
New Zealand
Ph: +64-9-373-7599 ext 8935

PARTICIPANT INFORMATION SHEET – FOCUS GROUP

Fever management: Current nursing practices in a paediatric inpatient population.

Name of researcher: Stephanie Clark
Name of Supervisors: Michael Crossan
Dr. John Parsons

Researcher Introduction

My name is Stephanie Clark- I am a research Master's Degree student at the University of Auckland. I am also currently a registered nurse at Starship Children's Hospital. I am completing a research project on the current nursing management of fever in children, supervised by Michael Crossan and John Parsons within the University of Auckland School of Nursing.

The Project

Fever management in Child Health is an element of everyday nursing practice within the hospital setting. Management of fever can have a significant impact on both the length of hospital stay and the recovery time of patients. However there appears to be limited research available on current practice.

This study aims to achieve a more comprehensive understanding of how New Zealand nurses manage fever in the inpatient setting. The results of this study may lead to the update and development of guidelines/policies to provide better guidance of nurses' fever management practice and ensure uniformity of practice within Starship Children's Hospital. This study may also provide opportunity for nurses to receive further education specific to the area of paediatric fever management if need for this is identified. In this way, the study will directly benefit both the participants of the study and all nurses within Starship Children's Hospital.

The study will continue for 12 months, after which the results will be used in the development of my research thesis for the degree of Master of Nursing.

Invitation to Participate

You are invited to participate in this research because you are a paediatric nurse working clinically within Starship Children's Hospital. All paediatric nurses within Starship Children's Hospital have been invited via email to participate in this focus group. The expected time commitment from you for this will be approximately 60 minutes. Your participation is voluntary and you may decline this invitation to participate without penalty. Participation, or otherwise, in this focus group will be anonymous.

Project Procedures

If you choose to participate, you will be asked to participate in a focus group. Participants of the focus group will be asked to discuss attitudes and behaviours with regards to paediatric fever management. This is expected to take you approximately 60 minutes to complete. Light refreshments will be provided during the focus group.

Data Storage, Retention, Destruction and Future Use

The focus group discussion will be audio-recorded. The recording will be stored on a password-protected University of Auckland computer drive for a period of six years, after which the data will be permanently deleted from the drive.

Right to Withdraw from Participation

You may refuse to answer any questions and are free to leave the group discussion without having to give a reason. However, because of the nature of the group situation, any amendments to the collective data may change the contextual meaning of the remaining data. Therefore if you withdraw from the research, information you have contributed up to that point cannot be withdrawn.

Anonymity and Confidentiality

The preservation of confidentiality is paramount. The information you provide through participating in this focus group will remain confidential to the researchers, and any reports/publications related to your information will be done in a way that does not identify you as its source. You and all other members of the group will be asked to maintain confidentiality of other participants and their information; however it cannot be guaranteed by the researcher that all participants will comply with this.

A copy of the research findings will be available to you, if you wish. These will be available as a one-page summary emailed to you at the conclusion of the study, and also once the thesis is published through the University of Auckland.

Access to Support Services

If completion of the questionnaire or focus group causes you undue stress, please contact the ADHB Employee Assistance Programme for support (0800 SELF HELP).

For support, talk to your whānau in the first instance. Alternatively you may contact the administrator for He Kamaka Waiora Māori Health Team on 09 486 8324 ext 2324.

If you have any questions or complaints about the study, you may contact the Auckland and Waitemātā District Health Boards' Māori Research Committee or Māori Research Advisor by phoning 09 486 8920 ext 3204.

CONTACT DETAILS AND APPROVAL

Student Researcher name contact details	Supervisors' names contact details	Head of Department name and contact details
Stephanie Clark sedw036@aucklanduni.ac.nz	Michael Crossan School of Nursing m.crossan@auckland.ac.nz 09 923 2245	Sandie McCarthy School of Nursing alexandra.mccarthy@auckland.ac.nz 09 923 2897
	John Parsons School of Nursing 09 923 3935	

For any concerns regarding ethical issues you may contact the Chair, the University of Auckland Human Participants Ethics Committee, at the University of Auckland, Research Office, Private Bag 92019, Auckland 1142. Telephone 09 373-7599 ext. 83711. Email: ro-ethics@auckland.ac.nz

Approved by the University of Auckland Human Participants Ethics Committee on 24-Oct-2017 for three years. Reference number: 020176.

Appendix C: Consent Form – Focus Group Interview



School of Nursing
 Faculty of Medical and Health Sciences
 Private Bag 92019
 Auckland
 New Zealand
 Ph: +64-9-373-7599 ext 8935

CONSENT FORM

This form will be held for a period of six years

Project title: **Fever management: Current nursing practices in a paediatric inpatient population.**

Supervisors: Michael Crossan
 Dr. John Parsons
 Student researcher: Stephanie Clark

I have read the Participant Information Sheet, and I have understood the nature of the research and why I have been selected. I have had the opportunity to ask questions and have them answered to my satisfaction.

- I agree to take part in this research.
- I understand that my participation is voluntary.
- I understand that I will be participating in a focus group interview with 4-6 registered nurses, and that the named researchers above will have access to this data.
- I agree to not disclose any information revealed by members of the focus group to any other person.
- I understand that this interview will be audio-recorded and transcribed by the researcher, and I consent to this.
- I understand that I have the right to leave the interview at any time without giving a reason; however, I will be unable to withdraw data as any amendments may change the contextual meaning of the remaining data.
- I understand that I have the right to not answer any particular questions without needing to provide a reason.
- I understand that data will be kept for 6 years, after which time all data will be securely destroyed.
- I understand that my participation in this study is confidential and that no material that could identify me will be used in any reports on this study. I understand that any information gathered will not affect my employment.
- I consent for information collated from my responses to be included in academic publications and/or conference presentations.

Optional: I wish to receive a summary of findings, which can be emailed to me at this email address: _____

Name: _____

Signature: _____

Date: _____

Approved by the University of Auckland Human Participants Ethics Committee on 24-Oct-2017 for three years.
 Reference number: 020176.

Appendix D: Ethical Approval from the University of Auckland

Research Office
Post-Award Support Services



The University of Auckland
Private Bag 92019
Auckland, New Zealand
Level 10, 49 Symonds Street
Telephone: 64 9 373 7599
Extension: 63711
Facsimile: 64 9 373 7432
ro-ethics@auckland.ac.nz

UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE (UAHPEC)

24-Oct-2017

MEMORANDUM TO:

Dr Elissa McDonald
Nursing

Re: Application for Ethics Approval (Our Ref. 020176): Approved with comment

The Committee considered your application for ethics approval for your study entitled **Fever management: Current nursing practices in a paediatric inpatient population..**

Ethics approval was given for a period of three years with the following comment(s):

1. Please review the wording in the PIS and CF about not being able to withdraw data if a participant wishes to leave the focus group. Rather than saying this is because the data is on the same tape, it would be better to state that any amendments may change the contextual meaning of the remaining data.
2. Please include in the email invitations why the student is doing this research (for a Masters in Nursing).
3. Please consider shortening the PIS for the online survey, as outlined in the pre-screening comments.
4. Please proofread the PIS for the focus group and amend appropriately (sections appear to have been cut and pasted inappropriately from the PIS for the survey).
5. Please forward a copy of the ADHB approval when received to ro-ethics@auckland.ac.nz.

The expiry date for this approval is 24-Oct-2020.

If the project changes significantly you are required to resubmit a new application to UAHPEC for further consideration.

If you have obtained funding other than from UniServices, send a copy of this approval letter to the Activations team in the Research Office, at ro-awards@auckland.ac.nz. For UniServices contracts, send a copy of the approval letter to the Contract Manager, UniServices.

The Chair and the members of UAHPEC would be happy to discuss general matters relating to ethics approvals if

you wish to do so. Contact should be made through the UAHPEC Ethics Administrators at u-ethics@auckland.ac.nz in the first instance.

Please quote Protocol number **020176** on all communication with the UAHPEC regarding this application.

(This is a computer generated letter. No signature required.)

UAHPEC Administrators
University of Auckland Human Participants Ethics Committee

c.c. Head of Department / School, Nursing
Mr Michael Crossan
Mrs Stephanie Clark

Additional information:

1. Do not forget to fill in the 'approval wording' on the Participant Information Sheets, Consent Forms and/or advertisements, giving the dates of approval and the reference number. This needs to be completed, before you use them or send them out to your participants.
2. At the end of three years, or if the study is completed before the expiry, you are requested to advise the Committee of its completion.
3. Should you require an extension or need to make any changes to the project, please complete the online Amendment Request form associated with this approval number giving full details along with revised documentation. If requested before the current approval expires, an extension may be granted for a further three years, after which time you must submit a new application.

Appendix E: Amendment of Approval from the University of Auckland

Research Office
Post-Award Support Services



The University of Auckland
Private Bag 92019
Auckland, New Zealand

Level 10, 49 Symonds Street
Telephone: 64 9 373 7599
Extension: 83711
Facsimile: 64 9 373 7432
ro-ethics@auckland.ac.nz

UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE (UAHPEC)

06-Dec-2017

MEMORANDUM TO:

Dr Elissa McDonald
Nursing

Re: Request for change of Ethics Approval (Our Ref. 020176): Amendments Approved

The Committee considered your request for change for your study entitled **Fever management: Current nursing practices in a paediatric inpatient population**, and approval was granted for the following amendments on 06-Dec-2017.

The Committee approved the following amendments:

1. To allow Charge Nurses to forward email invitations to registered nurses within their unit.

The expiry date for this approval is 24-Oct-2020.

If the project changes significantly you are required to resubmit a new application to the Committee for further consideration.

In order that an up-to-date record can be maintained, it would be appreciated if you could notify the Committee once your study is completed.

The Chair and the members of the Committee would be happy to discuss general matters relating to ethics approvals. If you wish to do so, please contact the UAHPEC Ethics Administrators at ro-ethics@auckland.ac.nz in the first instance.

Please quote reference number **020176** on all communications with the UAHPEC regarding this application.

(This is a computer generated letter. No signature required.)

Appendix F: Research Approval from the Auckland District Health Board



10th November 2017

Stephanie Clark
16/14 Lovelock Avenue
Mt Eden
Auckland 1024

Dear Stephanie,

Re: Research project A+7849 (UoA HPEC020176) Fever management: current nursing practices in a paediatric inpatient population

The Auckland DHB Research Review Committee (ADHB-RRC) would like to thank you for the opportunity to review your study and has given approval for your research project. The term of this approval is one calendar year from the date of this letter. If you wish to extend the approval after that date contact the Research Office.

Your Institutional approval is dependent on the Research Office having up-to-date information and documentation relating to your research and being kept informed of any changes to your study. It is your responsibility to ensure you have kept Ethics and the Research Office up to date and have the appropriate approvals. ADHB approval may be withdrawn for your study if you do not keep the Research Office informed of the following:

- Any communication from Ethics Committees, including confirmation of annual ethics renewal
- Any amendment to study documentation
- Study completion, suspension or cancellation

More detailed information is included on the following page. If you have any questions please do not hesitate to contact the Research Office.

Yours sincerely

On behalf of the ADHB Research Review Committee Dr Mary-Anne Woodnorth
Manager, Research Office
ADHB

c.c. Dawn Tucker, Sarah Little

.../continued next page

Auckland DHB

Research Office
Level 14, Support Bldg
Auckland City Hospital
PB 92024, Grafton, Auckland
Phone: 64 9 307 4949 Extn. 23854
Fax: 64 9 307 8913
Email: mwoodnorth@adhb.govt.nz
Website:
<http://www.adhb.health.nz/health-professionals/research/>

Institutional Approval



He Kamaka Waiora
Waitematā and Auckland DHB
Level 2, 15 Shea Terrace,
Auckland 0740,
New Zealand
Private Bag: 93-503

08/11/2017

Stephanie Clark
16/14 Lovelock Avenue
Mt Eden
Auckland 1024

Re: Fever management: current nursing practices in a paediatric inpatient population.

Thank you for providing the following documents the:

- RRC application
- Study protocol
- PIS/CF
- HDEC application

This is a local study that focuses on fever management and nursing practices in a paediatric inpatient population. There will be between 80-100 participants recruited from within the Auckland DHB region. It is estimated that the number of Māori participating in the study may be between 4-6.

Māori responsiveness:

The study does not pose any significant cultural risks. The research team have modified the design of the study to include ethnicity data collection.

The research team have stated that the study may contribute to improvements in treatment and that these improvements will reduce opportunity for health inequity. This is seldom the case in terms of improvements in treatments given that we know Māori are less likely to access treatments compared (largely) to Pākehā in Aotearoa.

It is important to note that improving treatments without addressing access issues can increase health inequity. This includes treatment inequity that occurs after the patient has entered a hospital service. This is because treatment improvements are more likely to benefit those who are already accessing services at a higher rate and those who are less likely to experience treatment inequalities when using hospital services.

On behalf of the Waitematā and Auckland District Health Boards Māori Research Committee the study has been approved.

Appendix G: Research Approval from Starship Children's Hospital



Service: GENERAL MANAGEMENT
Phone: (09) 307 4949
Fax: (09) 631 0761
Address: Level 5 Administration Centre
Auckland City Hospital
Private Bag 92-024
Auckland 1142
Email: sarah.little@adhb.govt.nz

10 August 2017

To whom it may concern

RE: Research Thesis Stephanie Clark

How do New Zealand paediatric nurses currently manage fever in children?

This letter is to provide my endorsement for the research study being undertaken by Stephanie Clark, a registered nurse at Starship Child Health as part of her Master's degree in Nursing. This research will be undertaken in inpatient wards and units at Starship Child Health.

The research project has a mixed methods research design. It will involve both a quantitative questionnaire delivered via email to all nurses working in clinical roles within Starship Children's Hospital, and a focus group interview comprising of 4-6 nurses from within the same sample population. Participation in either study is voluntary and anonymous. The study aims to identify current practice of New Zealand paediatric inpatient nurses with regards to fever management, and explore influences on fever management decision-making behaviour.

The research will advance understanding of how nurses currently manage fever, and could provide a base for implementation of strategies to improve this area of nursing practice in the future.

Yours sincerely

Sarah Little
Nurse Director
Starship Child Health
Auckland District Health Board

Appendix H: Online Questionnaire Content

Fever management: Current nursing practices in a paediatric inpatient population.

Q1 Thank you for your interest in taking part in this 10-15 minute questionnaire! The aim of this questionnaire is to achieve a more comprehensive understanding of how New Zealand nurses manage paediatric fever in the inpatient setting. The information you provide through answering this questionnaire will remain anonymous to all researchers who have access to the data. You will not be required to provide any identifying information such as your name or contact details. Given that the questionnaire will be anonymous, submission of the questionnaire will be taken as giving consent, and after submission, withdrawal of data will not be possible.

I am 16 years or older (1)

I have read and understood the Participant Information Sheet (2)

I understand that submission of this questionnaire constitutes consent to participating in this research (3)

Q33 Section One - Demographic Information

1 Age at last birthday:
(Insert number of years)

2 Gender:

Male (1)

Female (2)

Other (3) _____

3 Which ethnic group do you belong to?
(Select all that apply)

- New Zealand European (1)
 - Māori (2)
 - Samoan (3)
 - Cook Island Māori (4)
 - Tongan (5)
 - Niuean (6)
 - Chinese (7)
 - Indian (8)
 - Other (9) _____
-

4 Qualifications:
(Select all that apply)

- Hospital-trained (1)
 - Nursing Diploma (2)
 - Undergraduate Degree (3)
 - Postgraduate Certificate (4)
 - Postgraduate Diploma (5)
 - Masters Degree (6)
 - Other (7) _____
-

5 Length of time you have worked as a **Registered Nurse**:
(Insert number of years e.g. 2.5 years)

6 Have you completed any paediatric-specific training courses?

Yes (1)

No (2)

7 Current level of employment:

Level 1 (New Graduate) (1)

Level 2 (2)

Level 3 (3)

Level 4 (4)

Level 5 (5)

8 Length of time you have worked in a **paediatric setting**:
(Insert number of years e.g. 2.5 years)

9 Length of time you have been working in your **current position**:
(Insert number of years e.g. 2.5 years)

10 Work role:

- Ward Nurse (1)
 - Nurse Specialist (2)
 - Nurse Practitioner (3)
 - Clinical Charge Nurse (4)
 - Nurse Educator (5)
 - Management position (non-clinical) (6)
 - Other (7) _____
-

11 **Number of dependants** under the age of 16 years:
(Insert number of dependants)

End of Block: Section One - Demographic Information

Start of Block: Section Two - Nursing Management of a Febrile Child

Q34 Section Two - Nursing Management of a Febrile Child

1 The most common side effect of fever is:

- Chills (1)
 - Mild dehydration (2)
 - Discomfort or irritability (3)
 - All of the above (4)
-

2 The primary concern of fever (excluding underlying cause) is:

- Brain damage (1)
 - Febrile seizures (2)
 - Dehydration (3)
 - None of the above (4)
-

3 Sponging febrile children with tepid water may be implemented:

- 30 minutes after administration of an antipyretic (1)
 - When the temperature is below 40°C (2)
 - When irritability and crying are present (3)
 - Tepid sponging is not recommended (4)
-

4 Antipyretics reduce fever by:

- Decreasing the temperature set-point of the hypothalamus (1)
 - Reducing shivering (2)
 - Eliminating viral activity (3)
 - Decreasing bacterial response (4)
-

5 Please select the **best** answer regarding fever management in children over 3 months of age:

- All children with increased temperatures require antipyretic therapy (1)
 - A fever of 38 °C necessitates antipyretic therapy (2)
 - Paracetamol is the preferred antipyretic for children (3)
 - Fever in (normally healthy) young children should be allowed to run its course (4)
-

6 Please select **all recommended** everyday non-pharmacological methods of fever management:

- Encouraging fluids (1)
 - Tepid sponging (2)
 - Removing all clothing (excluding underwear) (3)
 - Allowing rest and activity as needed/desired (4)
 - Over-wrapping infants (5)
 - Educating parents about fever and fever management (6)
-

7 We are interested to know what influences **your decision-making process** for administering an antipyretic to a febrile child as a health professional.

Please select **all** the criteria listed below that you generally use in antipyretic administration:

- Temperature above 37.5°C (1)
 - Temperature between between 37.5°C and 38.5°C (2)
 - Temperature 38.5°C and 39.0°C (3)
 - Temperature greater than 39.0°C (4)
 - History of febrile seizures (5)
 - Family history of seizures (6)
 - Irritable child (7)
 - Child not eating (8)
 - Child not drinking enough to prevent dehydration (9)
 - Child has a febrile illness that is associated with pain e.g. tonsillitis, otitis media (10)
 - Child not settling for a sleep (11)
 - Parents leaving for the day (12)
 - Child uncooperative with medical examination/procedure (13)
 - To make the child more comfortable (14)
 - Child appears 'unwell' to me (15)
 - Anxious parents (16)
 - Parents request an antipyretic (17)
 - Please specify any other criteria you generally use: (18)
-

End of Block: Section Two - Nursing Management of a Febrile Child

Start of Block: Section Three - General Opinions about Fever Management

Q35 Section Three - General Opinions about Fever Management

8 Please select the response which best describes your **general opinion**:

	Strongly disagree (1)	Somewhat disagree (2)	Unsure (3)	Somewhat agree (4)	Strongly agree (5)
Moderate fever has beneficial effects for children (1)	<input type="radio"/>				
Infants' (under 3 months of age) baseline temperature increases as they get older (2)	<input type="radio"/>				
The increased metabolic demands of fever may compromise children with cardiac, respiratory or metabolic conditions (3)	<input type="radio"/>				
Many parents have a fear about fevers (4)	<input type="radio"/>				
Many nurses have a fear about fevers (5)	<input type="radio"/>				
Temperature alone is an indication for the administration of antipyretics (6)	<input type="radio"/>				
Doctors frequently recommend the use of antipyretics to reduce the temperature of a febrile child (7)	<input type="radio"/>				

9 Please select the response which best describes your **general opinion**:

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
I would waken a sleeping child to administer an antipyretic (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is best to assess the severity of a child's illness through signs and symptoms other than temperature (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Paracetamol should only be administered if the child's temperature is greater than 38.5°C (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Regular administration of an antipyretic such as paracetamol will mask a progressive infective process (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The administration of antipyretics is nurse-initiated in paediatric settings (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Antipyretic treatments have minimal effect in the prevention of recurring febrile convulsions (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

End of Block: Section Three - General Opinions about Fever Management

Start of Block: Section Four - Antipyretic Administration to Febrile Children

Q36 Section Four - Antipyretic Administration to Febrile Children

1 When you administer antipyretic medication (e.g. paracetamol or ibuprofen) to a febrile child, how **likely** is it that the following **consequences** will occur?

	Extremely Unlikely (1)	Somewhat Unlikely (2)	Neither Likely nor Unlikely (3)	Somewhat Likely (4)	Extremely Likely (5)
Increased comfort (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased activity (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased appetite (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduced irritability (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduced temperature (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduced risk of febrile seizure (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduced parental anxiety (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduced temperature set-point (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How likely are you to administer an antipyretic medication (e.g. paracetamol/ibuprofen) when next caring for a febrile child? (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

2 How **desirable** do you feel each of the following **consequences** would be for a febrile child who receives antipyretic medication (e.g. paracetamol or ibuprofen)?

	Strongly undesirable (1)	Somewhat undesirable (2)	Neither desirable nor undesirable (3)	Somewhat desirable (4)	Strongly desirable (5)
Increased comfort (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased activity (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased appetite (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduced irritability (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduced temperature (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduced risk of febrile seizure (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduced parental anxiety (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduced temperature set-point (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3 How much **effect** does each of the following factors have on your decision to administer antipyretic medication (e.g. paracetamol or ibuprofen) to a febrile child?

	No Effect (1)	Little Effect (2)	Some Effect (3)	Considerable Effect (4)	Large Effect (5)
Unit/Ward expectations (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The degree of the child's fever (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The child's reason for admission (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
History of previous febrile seizures (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The child's demographics (e.g. age) (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The child's temperament (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4 Please select the one answer that best corresponds with your current practice:

	Extremely Unlikely (1)	Somewhat Unlikely (2)	Neither Likely nor Unlikely (3)	Somewhat Likely (4)	Extremely Likely (5)
How likely are you to administer more than one antipyretic (e.g. paracetamol AND ibuprofen) to a febrile child in order to manage their fever? (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4 Please provide rationale for your answer above:

End of Block: Section Four - Antipyretic Administration to Febrile Children

Q30 Thank you for participating in this questionnaire! Optional: I wish to receive a summary of findings, which can be emailed to me at this email address:

.....

Q31 Please cast a vote for one of these three charities for a donation to me made to on your behalf:

- Image:Mission (1)
 - Image:Zoom442x196z100000cw442 (2)
 - Image:Spca new zealand default image (3)
-

Q32

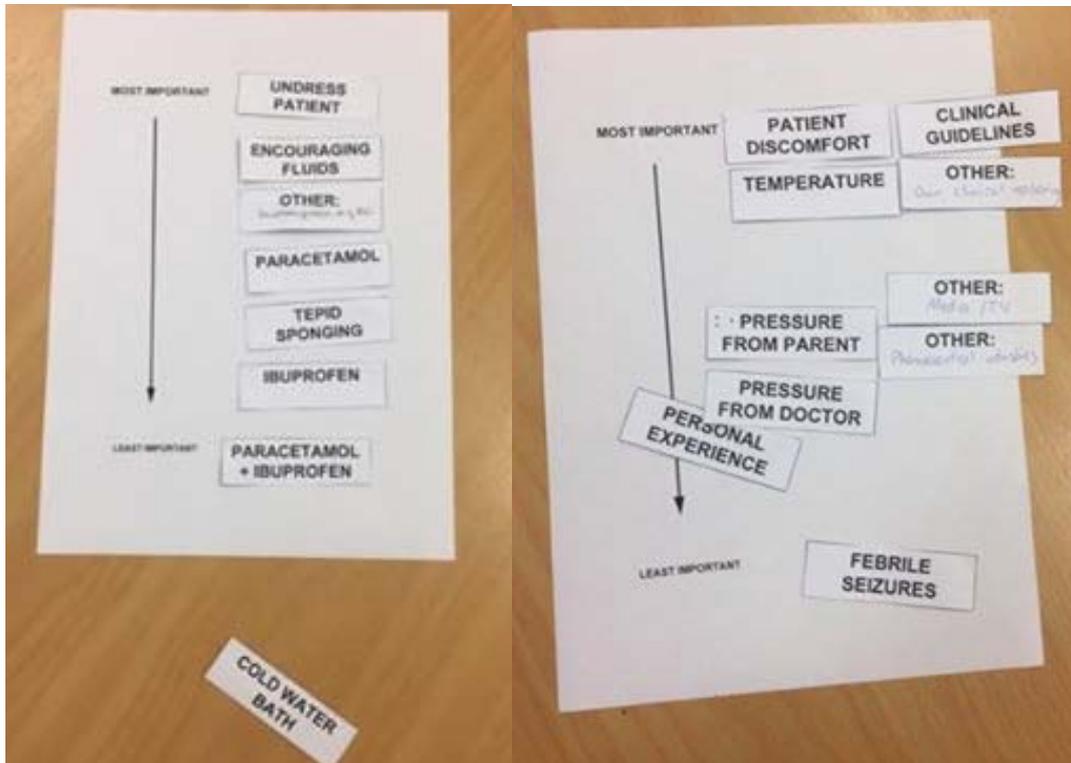
End of Survey

(Approved by the University of Auckland Human Participants Ethics Committee on 24-Oct-2017 for three years. Reference number 020176)

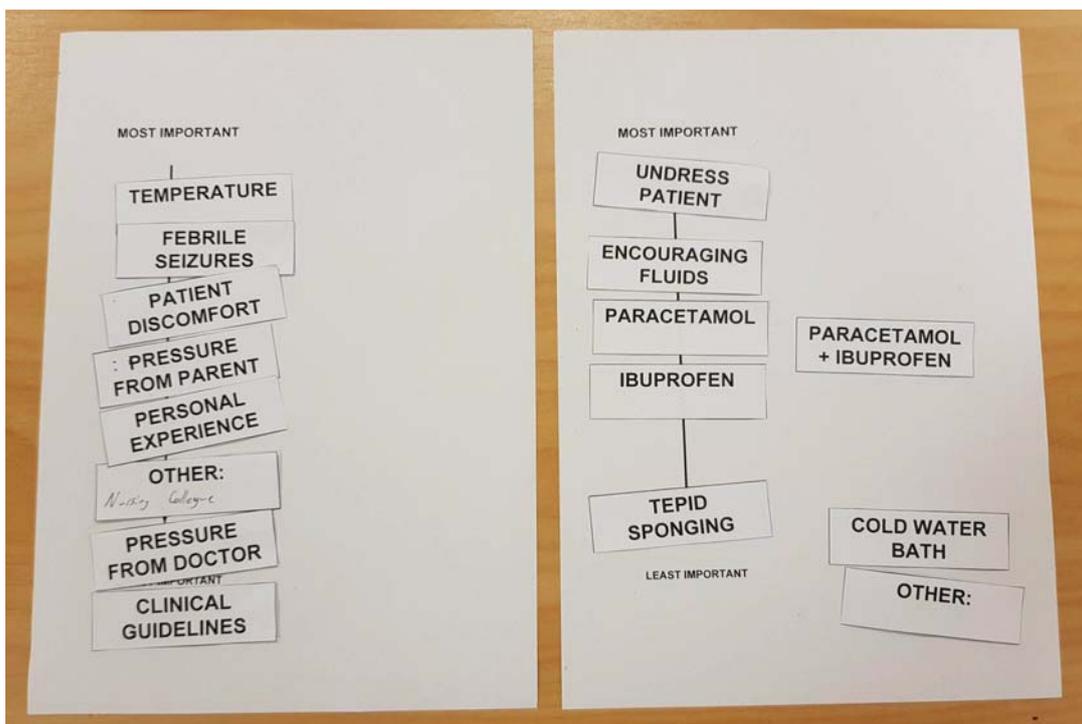
End of Block: Block 5

Appendix I: Focus Group Interview Exercises

Focus Group One – Fever Management Methods and Influences



Focus Group Two – Fever Management Methods and Influences



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