

PEDIATRIC ACUTE PAIN MANAGEMENT PRACTICES IN BOTSWANA

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## **DEDICATION**

This dissertation is dedicated to the children born in low-resource settings, where taking the first breath is a pledge to join the struggle for survival, fighting against the unseen forces from the very nature that nurtures them.

For those who believe that times change,  
like seasons, change comes to them like a dream,  
but for those that believe that time needs to change,  
change is the results of their sacrifices, sweat, tears, and determination.

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## **ABSTRACT**

### **PEDIATRIC ACUTE PAIN MANAGEMENT PRACTICES IN BOTSWANA**

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Pediatric acute pain is a serious global health issue and remains unexplored mainly in low and middle-income countries (LMIC). Children in LMIC are at high risk to suffer from inadequately managed acute pain, but it is challenging to quantify the magnitude of the problem, evaluate resource availability for acute pain management, and address possible factors influencing acute pain recognition, assessment and treatment. Pediatric acute pain management is complex, if not adequately managed could lead to life-long consequences. Therefore, the purpose of this dissertation is to examine pediatric acute pain management practices in Botswana. Using a three-article format, this dissertation in Chapter 2 presents a synthesis of existing literature to describe the state of the science of pain management practices in LMIC. Chapter 3 reports on pain prevalence, intensity and nature, and pain management practices in Botswana using observational data and a retrospective review of hospital health records. In Chapter 4, children's and parents/guardians' experiences and perceptions of pediatric pain management practices in Botswana are explored through a convergent mixed-method design, integrating data from a descriptive cross-sectional survey and descriptive qualitative study. The principle findings were: 1) critical gaps and limitations exist in the available literature, particularly in sub-Saharan Africa; 2) resource availability, children and parents/guardians' voices are mostly absent in literature, and healthcare providers are not prepared to adequately deal



with pediatric pain; 3) visible efforts are evident in the development and validation pain tools and novel treatment strategies, but not in clinical applications; 4) acute pain prevalence is high among hospitalized children, and acetaminophen is the drug of choice, despite a substantial proportion of children having moderate-severe pain; 5) reports of severe pain are rare and maximum pain intensity documented in health records is moderate pain; 6) pain assessment was not well documented; 7) children and parents/guardians were content with pain care, but expect adequate acute pain treatment and child comfort; and 8) children and parents/guardians demonstrate significant understanding of pediatric acute pain, child risk factors, consequences, and management strategies. Pediatric acute pain is a significant problem in Botswana and requires a comprehensive strategy to improve its management.

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# CHAPTER 1

## Introduction

Acute pain in hospitalized children is a significant health issue worldwide, especially in low and middle-income countries (LMIC), such as some regions on the African continent (1-3). LMIC are World Health Organization (WHO) member states categorized into six regions based on World Bank income categories and exclude all high-income countries (HIC)(4). The shift from the historical view of dismissing and often not treating pain in children, to the current understanding of the impact of untreated pain on children's health and developmental outcomes, has catapulted pediatric pain care to the forefront of global childcare-related debates (5, 6). Despite changes in views and mechanisms to manage children's pain, a significant proportion of children, particularly those in LMIC hospitals, continue to suffer from inadequately managed pain (7, 8). The documented evidence does not reflect the magnitude of pediatric acute pain in LMIC due to the substantial lack of documentation of child pain experiences in these settings (8, 9). Pediatric acute pain in LMIC is a significant issue, and it needs to be prioritized as part of a comprehensive pediatric care strategy.

The pain experience is complicated and inadequate pain management in children can lead to various negative short- and long-term health, developmental, and psychosocial consequences (10-12). Moreover, inadequate treatment of pain during childhood among the children in LMIC has a global effect on the overall population health owing to an increase in disabilities caused by acute pain complications (13). The cost of pain, including the outcome of missing school and work, has a significant negative impact on

the economy of LMIC (14, 15). The deleterious consequences of undertreated pediatric acute pain management in LMIC are severe and multifaceted; they can no longer be ignored.

Challenges exist in achieving pain control in children in all settings. Globally, the primary challenges are the subjective nature of pain and the inability of children to linguistically express pain owing to their varying developmental stages (16, 17). Additionally, children depend on the astuteness, experiences, perceptions (knowledge, attitudes, and beliefs), and actions of their adult caregivers, namely their parent/guardian and healthcare providers for pain management (18, 19). The child, parent/guardian, and healthcare providers have a unique partnership due to the family-centeredness of childcare, and each entity has a significant role in pediatric pain management process(es) and outcomes through their action or inaction (20, 21). Therefore, the child, parent/guardian, and healthcare providers, together, can be referred to as “child pain actors.” The term “actors” is usually used to denote stakeholders with unique characteristics who have associations and play roles that may be complementary, and have equal importance in influencing process(es) and outcomes related to pain (22, 23). Furthermore, children use various coping skills such as sleeping and playing, which may mislead their adult caregivers into believing that children are pain free when partaking into these activities and encourage them and, in turn, subject children to experience acute pain unnecessarily (6, 24). Therefore, it is vital to understand the pain-related experiences, perceptions, and interactions of child pain actors to identify possible factors that predispose children to suffer from inadequately managed pain in any given context.



Addressing acute pain among hospitalized children in LMIC in the sub-Saharan African region is essential. The milieu of LMIC, particularly in the African region, makes documentation of pediatric acute pain burden and the experiences, perceptions, and practices of child pain actors urgent due to socio-cultural and environmental challenges that are known to impede adequate pain management (1, 25-27). Factors such as competing priorities for resource allocation, weak health care systems, sub-optimal government policies, and an in-hospital culture seemingly indifferent to children's pain treatment needs predispose children to suffer from inadequately managed pain (1, 25-28). Some of the challenges unique to the African region include high illiteracy rates, multiple languages, societal norms, resource limitations, poverty and undernutrition, and famine, as well as intermittent religious and political conflicts (1, 27, 29, 30). Inadequate pain management among children in LMIC should be considered inhumane and needs to be promptly addressed to reduce related adverse consequences.

### **Purpose and outline of research**

The dearth of evidence on the prevalence of pediatric acute pain, as well as on the experiences, perceptions, and practices of child pain actors in most LMIC in the African region, such as Botswana, undermines pediatric acute pain management efforts (27). Botswana is an upper-middle-income country with a robust public health system; yet, there is insufficient data on pediatric acute pain management practices (31). According to the Botswana health guidelines, pediatric patients are children aged between zero days to 13 years, but this dissertation focuses on children aged two months to 13 years. The lack of data on child pain management practices in Botswana makes it difficult for child pain actors and other stakeholders to realize the magnitude of pediatric acute pain, and

understand the impact of their actions and inactions during pediatric pain management, as well as of lacking or inadequate policies on pediatric pain management. Studying pediatric acute pain prevalence and the experiences, perceptions, and practices of child pain actors in Botswana will not only address the existing gaps in the pediatric acute pain management practice literature, it will also likely facilitate an improvement in practices and policies on pediatric acute pain management in the country. Therefore, the overall purpose of this dissertation is to examine pediatric acute pain management practices in an LMIC by investigating the prevalence of acute pain among hospitalized children and exploring the experiences and perceptions of pediatric pain management among children and parents/guardians in Botswana.

### **Chapter aims and rationale**

A three-article format dissertation, with each article representing a chapter, is used to present a comprehensive representation of pediatric acute pain management practices in Botswana.

### ***Chapter 2***

*Aim:* Conduct an integrative review that critically evaluates and corroborates the current literature on pain management practices among children in LMIC.

*Rationale:* This integrative review synthesized evidence on the state of science in pediatric acute pain in LMIC to identify gaps in the literature and inform subsequent papers and future research.

### ***Chapter 3***

*Aim:* Report the prevalence, severity, and nature of acute pain and management

practices, and describe associations among acute pain outcomes, and patient and family caregiver demographics in patients in two Botswana tertiary hospitals.

*Rationale:* This descriptive correlational prospective observational study addresses one of the gaps in the literature identified in chapter 2 on pediatric acute pain prevalence and severity using a sample of children hospitalized in two Botswana tertiary hospitals. It also addresses acute pain management practices through a retrospective health records review of these children for the 48 hours following enrollment in the study. The retrospective health records review identified patterns of assessment and documentation of pain severity, analgesic prescription and administration, and non-pharmacological strategies used. Lastly, the study identified associations between pain outcomes (experiencing pain and pain intensity) at different time points, and child and parent/guardians demographics to identify risk factors for pediatric acute pain.

#### ***Chapter 4***

*Aim:* To investigate the experiences and perceptions of children aged two months to 13 years hospitalized in Botswana and their parents regarding child pain management practices in two Botswana tertiary hospitals using a mixed-methods approach.

*Rationale:* This convergent mixed-method study investigated children and parents/guardians perceptions and experiences regarding pediatric pain and its management to address another gap in the literature identified in chapter 2. The study used an established survey with modifications to describe child and parent experiences and perceptions about pain management in children hospitalized in Botswana. The study also utilized guided interviews to describe child and parent experiences. The data from the two studies were collected concurrently, analyzed independently, and then merged to

generate meta-inferences to understand pediatric acute pain management practices in Botswana from both child and parent perspectives and experiences.

The dissertation will have long-term implications through advancing knowledge on the burden of pediatric acute pain and acute pain management practices in Botswana and sub-Saharan Africa. It will also add critical evidence on child and parent views on pediatric acute pain, its management, and possible barriers and facilitators in its management. The results will enable researchers to develop interventions that can improve child pain management practices in Botswana and other LMIC.

## **Background and significance**

### **Consequences of pediatric pain.**

Pain is defined as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage” (32). The pain experience is also associated with social components (33). Pain is generally described by terms nociceptive- activation of sensory neurons (nociceptors) in response to noxious stimuli and neuropathic-signal-processing changes in the central nervous system (CNS) (34, 35). Acute pain is mainly nociceptive pain. The pain experience is the culmination of processes that involve various neurotransmitters that act on the peripheral nervous system (PNS) and the CNS. The nociceptors and inflammatory factors in the PNS detect the noxious stimuli a process known as transduction (34, 35). The peripheral nerve fibers- A- $\delta$ , A- $\beta$ , and C transmit the impulses from transduction via the dorsal horn of the spinal cord through the ascending pathways to the brain, a process known as transmission (34, 35). The descending pathways - serotonergic and noradrenergic in the spinal cord modulate the impulses via a process known as modulation. The transduction,

transmission, and modulation processes produce the perception of pain, which is outwardly presented through the verbal and non-verbal expression of pain, change in physiologic parameters and behavior (34, 35). All individuals inadvertently suffer from acute pain in their lifetime, but those who had a compromised physical, physiological, and/or psychological state of health are at a higher risk of experiencing moderate to severe pain (10-12, 18).

Inadequately managed acute pain during high-stress level situations, such as illness and hospitalization, is often associated with both short- and long-term consequences (10-12, 36). The neurohumoral response to acute pain can lead to short-term physiologic complications, such as hemodynamic instability, metabolic alterations, and impaired immune response, as well as suffering (10-12, 36). Long-term, inadequately managed pediatric acute pain can lead to permanent central and peripheral neurologic changes, which can affect a child's future pain reactivity and put the child at risk of chronic pain syndromes-peripheral sensitization and central sensitization (10-12). Moreover, the under-treatment of pain can also result in psychosocial complications owing to the effects on stress hormone responses, which could lead to depression and poor adaptive behavior in children in the future (11, 36). Children are vulnerable to pain and its adverse effects due to inadequate pain regulatory ability and developmental predisposition (10-12). The consequences of inadequate pain management extend beyond individual child experiences because pain management involves financial and population health repercussions owing to increasing disability caused by pain and pain-related disorders during an individual's lifetime (14, 15). Therefore, adequate pain management in children is essential, owing to its numerous and far-reaching consequences.

### **Pediatric acute pain management.**

Pediatric pain management is intricate due to the subjectivity of pain, the unique characteristics, and roles of various stakeholders and the process(es) involved in child pain care. Many stakeholders are involved in pediatric pain management, but the most significant are the decision-makers at the point of care, namely the child, parent/caregiver, and healthcare providers (in other words, child pain actors) (20, 21). The child pain actors' actions or inactions in pediatric pain management are accomplished through an intricate process of trade-offs based on shared norms, perspectives of individual child pain actors, access to interventions, and their experiences (19, 20, 22). Therefore, the idiosyncrasies of child pain actors are essential to understanding the process(es) and outcomes of pediatric pain management.

Pain management is a process that involves the recognition and communication of pain, as well as the assessment, treatment, and reassessment of pain after the intervention. The process(es) of pediatric pain management is somewhat like that of adults (2, 18, 37). The salient difference is that generally, children cannot communicate their pain in ways that adult caregivers can understand - either owing to developmental capabilities or being preverbal, fearful, or for currently unknown reasons (18). Therefore, parents/caregivers and healthcare providers may need to proactively recognize the need for treating pain based on the expected pain from the scheduled procedures (18, 37). After the recognition of pain, the severity and source of pain are ideally assessed using age-appropriate validated pain scales (18, 37). After ascertaining the severity of child pain, the child pain actors need to work together to devise strategies to treat pain using either pharmacological or non-pharmacological methods (2, 18, 37, 38). Change in pain

assessment scores is the primary outcome of interest in pain practice, as demonstrated in studies to determine the status of pain and response to treatment (18). Other endpoints such as participation of the child in activities of daily living (ADLs), recovery time, quality of life, and child and parent/caregiver's satisfaction have also been considered as essential alternative outcomes in various studies (39-41). A reassessment of pain is required after interventions to ensure the effectiveness of the pain management strategy (18, 37). The documentation of both pain assessment and treatment processes over time represents gold-standard pain management practice in any given population and setting.

### **The magnitude of pediatric acute pain in LMIC hospitals.**

The prevalence of pediatric acute pain is not well documented in LMIC even though more than three-quarters of the global population of children reside in LMIC (8, 9, 13). The minimal evidence available on specific pediatric populations in the African region suggests a high burden of pediatric acute pain ranging between 40% and 80% (26, 42-44). These studies were conducted in pediatric subpopulations, and thus, they cannot be generalized to other pediatric populations or those of different geographic regions due to the diversity that exists within and across LMIC.

Although there is limited literature on the prevalence of pediatric pain in LMIC, the high prevalence of pediatric acute pain in the African region can be inferred from other sources that describe both the epidemiology of the underlying causes of acute pain, as well as factors that likely influence behavior toward pediatric pain management. The African region has a high prevalence of childhood diseases and mortality, which predisposes children to potential pain and suffering - although these phenomena are documented, the literature is still relatively sparse (1). Additionally, hospitalized children

are at increased risk of pain caused by illness or painful routine procedures (16, 17). Some of the reasons why hospitalization increases the risk of pediatric acute pain include limited knowledge and skills among healthcare providers, as well as perceptions, lack of resources, and ambiguous roles of child pain actors (45-47). Lastly, sociocultural and environmental factors in the African region in the context of intolerance and dismissal of the need for child pain management further increase the risk of inadequate pain management in children (29, 30, 48). Therefore, the lack of recognition and management of pain in children in LMIC hospitals predisposes children to potentially treatable pain and suffering.

### **Barriers toward adequate pediatric acute pain relief in LMIC.**

Inadequate pediatric pain management in LMIC can be attributed to multiple factors arising from the complexity of pediatric acute pain management process(es) and idiosyncrasies of the stakeholders involved. Some of the common factors that contribute to inadequate pain management include the nature of pain and children's developmental milestones and the socio-cultural and environmental contextual factors (16, 17, 19).

First, the subjective nature of pain makes it challenging to recognize and manage pain in children owing to the developmental stage-related limitations that impact the child's ability to use pain language that is well understood by adult caregivers (19). Another study suggests that the subjective nature of pain is the primary driver of misconceptions and myths regarding pain, thereby leading to poor child pain management (30). For example, Finley et al. explained that self-reports from children are often disregarded because healthcare providers do not trust children to report their pain experiences accurately (49).



Second, although family-centered care is desirable in pediatric pain care, it often acts as a barrier to the achievement of adequate pain relief in most LMIC, particularly in the African region. High levels of illiteracy and the use of multiple languages and dialects by parents/guardians often affect the interactions between the child, parent/caregiver, and health providers, which are central to family-centered care (30, 50, 51). Moreover, healthcare providers in LMIC are often poorly prepared to deal with children's pain, creating a level of complexity in the interactions, which risks worsening the child pain treatment and outcomes (1, 45, 52). The literacy levels and multiple languages are not the only pertinent factors for interactions among child actors, but they represent a subset of broader sociocultural factors that influence child pain management in LMIC.

Finally, the impact of the sociocultural context on child pain management cannot be ignored. The sociocultural factors for child pain management are complicated and affect various social processes related to child pain and directly impact pediatric pain outcomes (30, 53). The child pain-related social processes encompass the recognition and communication of pain among child pain actors, assessment of pain and the decision(s) to treat it, and the approach to be followed to treat pain effectively (18, 30). The sociocultural tapestry arises from the interactions among child characteristics, child-rearing practices, parent/guardian experiences and beliefs, and the healthcare provider's knowledge and perceptions toward pain management in children (53, 54). Barriers to pain management in LMIC mainly arise from child-rearing practices, perceptions, and beliefs of any of the child pain actors and can have an impact at any point during the social process in child pain management (30, 50, 53). For instance, Jongudomkarn et al. reported that children in LMIC are raised based on the principles of bravery and tolerance

to pain, which makes them appear tolerant to pain (51). Parents and children in LMIC are often receptive to healthcare providers because they respect them and consider them to be superior (54). Therefore, the perceptions of healthcare providers are essential in LMIC because as the primary drivers of child pain management practices, healthcare providers who are not well prepared to deal with child pain are likely to perpetuate poor child pain management.

### **Summary**

Pediatric acute pain is a significant problem in LMIC, mainly in African countries such as Botswana. Despite pediatric acute pain being a severe issue, it is rarely addressed in the literature; thus, it becomes challenging to quantify the magnitude of the problem, evaluate resource availability for its management, and address possible factors influencing its recognition and management. Therefore, the present dissertation intends to generate preliminary evidence on the prevalence and current practices relating to pediatric acute pain and identify views on pediatric pain management practices of both hospitalized children in Botswana, as well as those of their parents/guardians.

The long-term goal of this project is to provide evidence to raise awareness of pediatric acute pain and estimate its impact on child health outcomes and population health indicators in Botswana. Additionally, this project intends to elucidate how the unique challenges in LMIC that compound child pain experiences have an impact on the management of acute pain. Finally, the inclusion of the views of children and parents/guardians in this project will give stakeholders much-needed evidence about pain management process(es), which is currently lacking in LMIC. Therefore, some aspects of

this dissertation will establish foundational work addressing some of these gaps in the literature with Botswana as the focal country.

Botswana is a middle-income country in the African region with a robust public health system that is accessible to all its residents. Botswana is also an ethnically diverse country with a population of 2,039,000, of which 811,000 individuals are children under the age of 18 years, and 232,000 are under the age of 5 years (55), therefore this makes it a country of interest for child health outcomes. Also, the primary area of interest for the researcher and his future career prospects lie in working with pediatric populations in Botswana.

### **Theoretical approach**

A conceptual model driven from the tenets of the Symptom Management Theory (SMT) is used as the guiding framework for this dissertation work. SMT is a mid-range nursing theory addressing the management of various symptoms (56, 57). SMT was first developed as a model by the Symptom Management Faculty Group at the University of California San Francisco in 1994 (56-58). The SMT has three dynamic and bidirectional dimensions: symptom experience, symptom management strategies, and outcomes necessary for effective symptom management (56-58). The premise of SMT is that an individual's perception, evaluation of meaning, and response to symptoms or symptom clusters are influenced by personal factors, environmental factors, and family-, health- and illness-related factors (57). Personal factors include developmental, demographic, psychosocial, and physiological aspects; environmental factors comprise physical and sociocultural factors, and family-, health-, and illness-related elements include the phase of treatment, severity of illness, diagnosis, and the general state of health (57). SMT

considers self-report to be the gold standard for symptom measurement (56, 58). SMT is heuristic and reflects the multidimensional process of symptom management. Therefore, the SMT addresses all aspects of pain as conceptualized in this dissertation.

The three components of SMT and their associated factors are critical in pediatric pain experience and management and can be used to study pediatric acute pain management practices in LMIC. SMT has been tested mainly in adults and applied to a limited number of pediatric studies; therefore, SMT requires some modification in order to be applied to children, particularly in LMIC (56, 59). However, the advantages of SMT include a detailed description of the context in which symptoms occur and its ability to break-down the various factors that are involved in symptom management, hence making it easy for them to be studied individually or collectively (58). The weakness of SMT includes the assumption that the interpretation of symptoms by parents/guardians is adequate to initiate interventions, particularly, in children, in whom symptoms may be easily confused (56). For instance, parents/guardians in LMIC may fail to recognize the need for child pain treatment.

Additionally, SMT is presented in a detailed diagram demonstrating the intra- and inter-relationships of the concepts, which make it difficult to understand the relationship among various factors (58). For this dissertation, the SMT concepts are operationalized to demonstrate the relationship among the three concepts using the logic derived from studies of pediatric acute pain management practices as demonstrated in the Conceptual Model provided in Figure 1-1 (18, 37). Conceptualizing SMT in this fashion allows for temporality in the concepts and provides a clear roadmap on how various factors may contribute to numerous aspects of symptom management. It also helps bring into play the

role of various child pain actors and what they contribute to child pain care. The concepts under investigation in this study are presented in Figure 1-2.

**Figure 3-1. Conceptual Model: Pediatric acute pain symptom management**

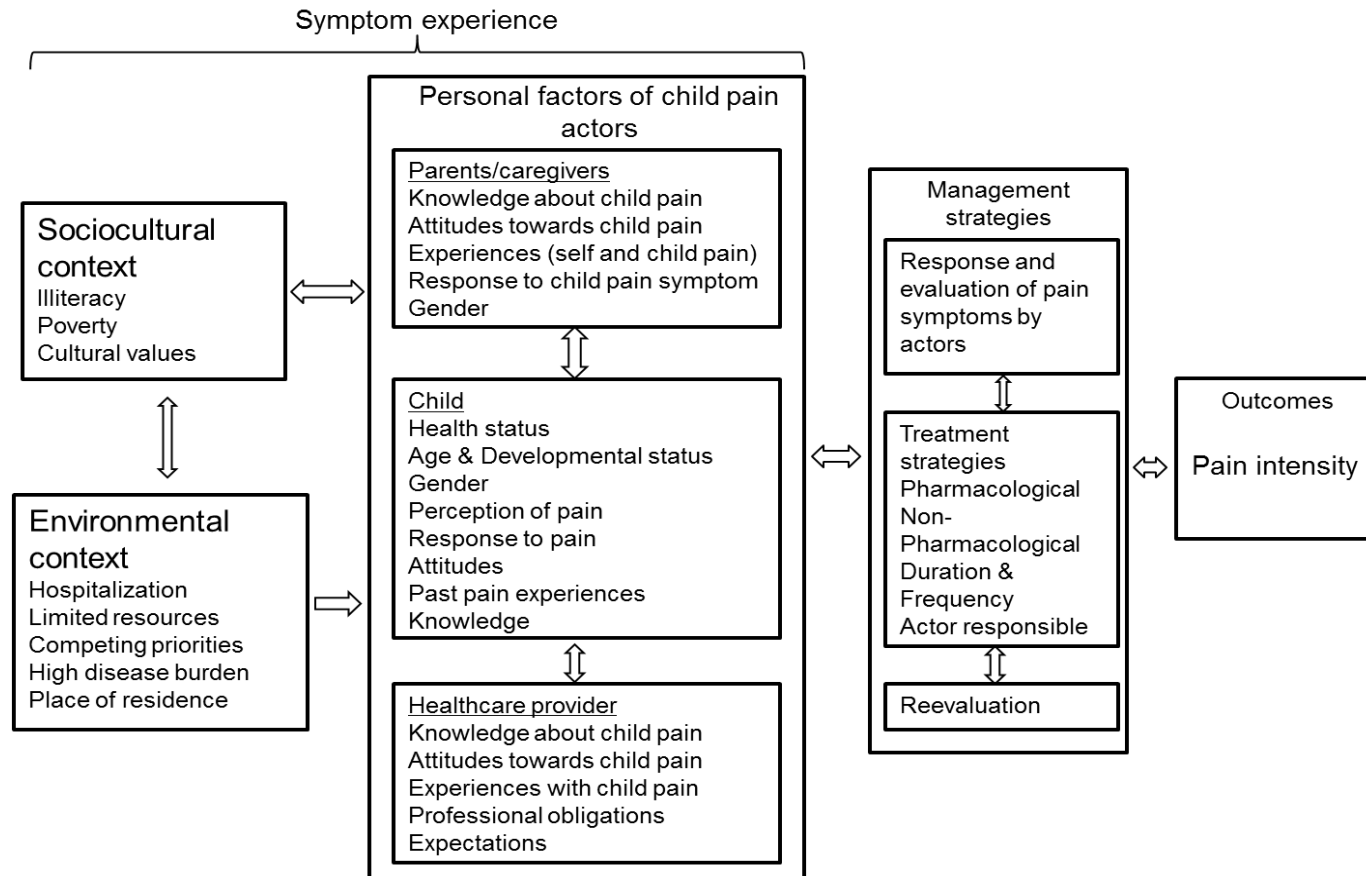


Figure 1-1. shows the conceptual model derived from the Symptom Management Theory by identifying factors under the broad three tenets of the theory. This complete model is used as a framework for chapter two.

**Figure 1-4. Conceptual model of factors under investigation in Chapter 3 and 4**

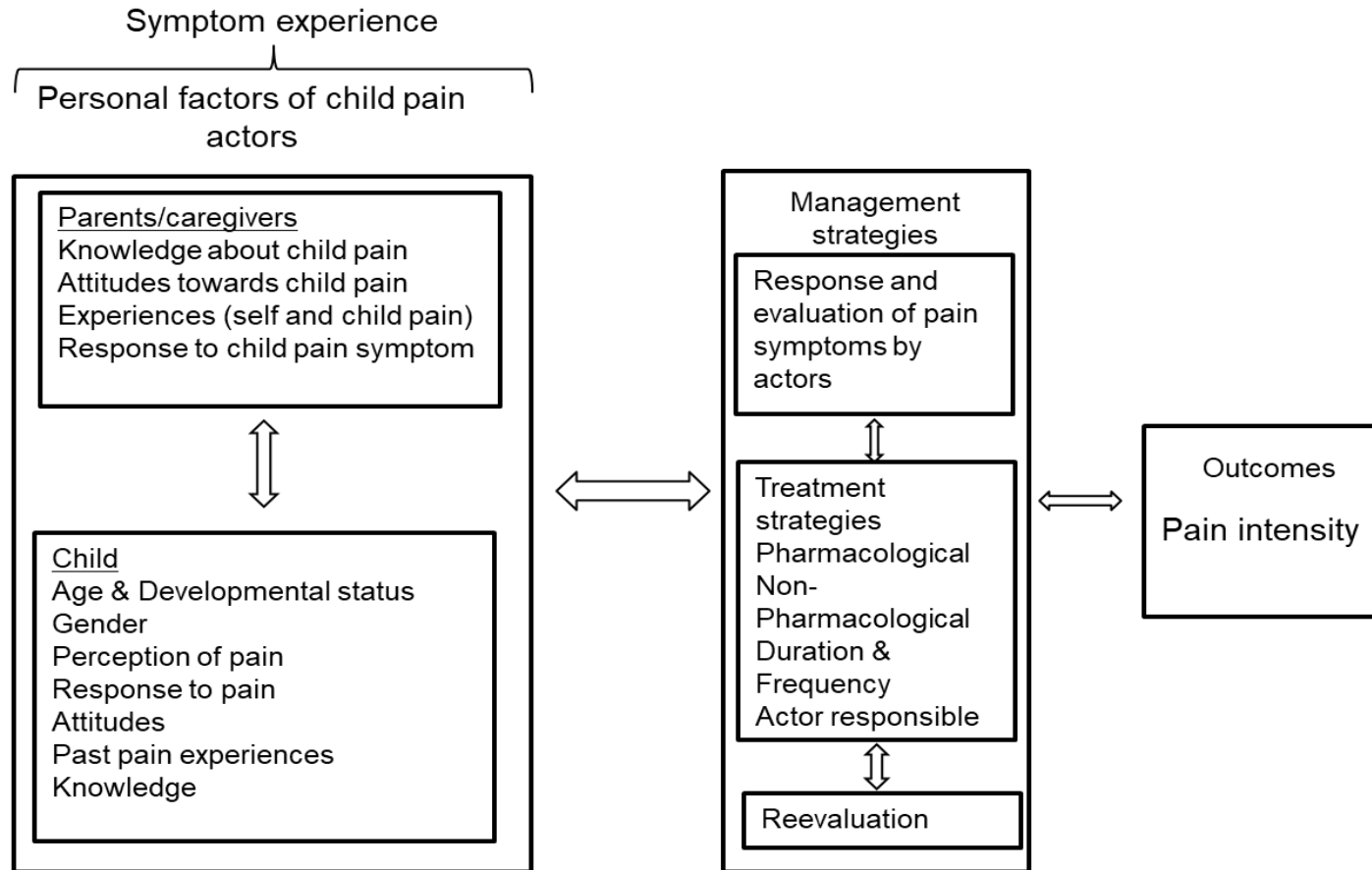


Figure 1-2. shows the conceptual model with factors under investigation in Chapter 3 and 4. These factors are dependent on other factors in the complete model not indicated here.

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## CHAPTER 2

### **The state of the science in pediatric pain management practices in low-middle income countries (LMIC): An integrative review<sup>1</sup>**

#### **Abstract**

**Aim:** Examine the state of the science for pain management in children living in low-middle income countries (LMIC).

**Background:** Significant challenges exist in pain management for children living in LMIC.

**Methods:** An integrative review was conducted using PRISMA guidelines for quality of reporting. Literature searches were completed using Medline, PubMed, Scopus, and CIHNAL databases between July 27 and August 25, 2016, using MeSH and primary search terms pain and LMIC. Full-text publications were evaluated using GRADE criterion and methodology of specific evaluation tools.

**Results:** Of 1,510 publications identified, 31 met the criteria for inclusion. Data were categorized into three broad themes: 1) magnitude of the pain problem with subthemes describing the burden of and resources for pediatric pain management; 2) perceptions, experience, and practices for managing pain in children residing in LMIC with subthemes addressing healthcare providers, parent/caregiver, and children, respectively; and 3) pain management practices with pain assessment and treatment strategies as subthemes.

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**Conclusion:** Current data on pediatric pain management in LMIC are limited with respect to describing the burden of pain, children's pain perceptions and experiences, and pain management practices. Rigorous investigations are needed to expand knowledge and address the pervasive problem of pain for children in LMIC.

## Summary Statement

What is known about this issue?

- There is a consensus that inadequate pain management is a major global challenge, particularly for children residing in Low-Middle Income Countries (LMIC).
- Evidence suggests that limited pain management resources are a significant barrier towards managing pediatric pain in LMIC.

What does this paper add?

- Report on the current state of the science of pediatric pain management in LMIC
- Elucidates on the evidence and the gaps regarding the identification of the burden of pain for children living in LMIC.
- Explore the available evidence and discuss additional gaps in the contribution and impact of environmental and socio-cultural beliefs and practices related to pain assessment and management for children in LMIC.

The implications of this paper:

- Provides a synthesis of the available data to inform the development of evidence-based practices and policies to address pediatric pain in LMIC.
- Identify limited studies and the existing gaps in research related to pediatric pain management that urgently need to be addressed to facilitate change in practice and policy development.

*Keywords:* pain, pain management, pediatric pain, low-middle income countries (LMIC), nursing, integrative review

## **1.0 Introduction**

Despite ample evidence and prioritization of resources to eliminate pain, children, particularly in Low-Middle Income Countries (LMIC) suffer from pain unabated. The lack of recognition, dismissal of the existence of pain, and denial of pain treatment are major reasons children in LMIC suffer from inadequate pain management (Mathews, 2011; World Health Organization, 2012). The consequences of inadequately managed pediatric pain extend beyond physical and physiologic responses and can affect the child's ongoing developmental and psychosocial outcomes (Henschke, Kamper, & Maher, 2015; Schwaller & Fitzgerald, 2014).

Globally, pediatric pain management is a clinical challenge. The primary challenges being; the subjective nature of pain, the child's psychosocial stage of development and the complicated process(es) of interpreting the child's expression of and response to pain (Aziznejadroshan, Alhani, & Mohammadi, 2015; Czarnecki et al., 2011). Children in LMIC face additional unique challenges emanating from the socio-cultural and environmental contexts affecting the child, parents/caregivers and healthcare provider's experiences, perceptions and interactions (Finley, Kristjánsdóttir, & Forgeron, 2009). These challenges include; substantial burden of childhood diseases, limited access to healthcare resources, poverty, hunger, conflicts, child-rearing practices based on stoicism, high levels of illiteracy and inadequate pain knowledge and multiple languages (Albertyn, Rode, Millar, & Thomas, 2009; Global Burden of Disease Pediatrics Collaboration et al., 2016; Sasaki, Bouesseau, Marston, & Mori, 2017).

A paucity of research exists on pediatric pain management practices in LMIC. In a recent scoping review, the quality of pain management for palliative care in children

was found to be poorer to that of developed countries (Sasaki et al., 2017). Similar results were emphasized in a review of studies worldwide on headache and migraine prevalence in children noting a lack of data from LMIC (Wöber-Bingöl, 2013). Also, application of evidence from developed countries is limited in LMIC due to differences in environmental and cultural contexts. Therefore, it is necessary to appraise and synthesize evidence from LMIC to inform pediatric pain care and research in LMIC. This integrative review presents the current state of the science related to pain in children residing in LMIC, and critically evaluates the available evidence to inform clinical practice, direct future research and facilitate policy development to improve children's pain management in LMIC.

The Symptom Management Theory (SMT), a heuristic and mid-range nursing theory comprising three components of the symptom experience, symptom management strategies and patient outcomes is used to frame the problem of pediatric pain management in LMIC (Humphreys et al., 2008).

## **2.0 Review Methods**

### **2.1 Aim**

The aim of this integrative review is to synthesize the existing evidence to describe the state of the science of pediatric pain management practices in LMIC.

### **2.2 Design**

This inquiry uses an Integrative Review (IR) approach based on the framework by Soares and colleagues (2014) to provide a comprehensive approach to the interpretation and synthesis of available pediatric pain literature related to the pain management practices in



LMIC (Soares et al., 2014; Whitemore & Knafl, 2005). An advantage of the IR method is that it allows for the inclusion of diverse sources of evidence, providing a holistic view of the topic of interest (Soares et al., 2014). A limitation of the IR method can be systematic bias. However, the step-by-step guide employed by the Soares framework minimizes such bias and enhances rigor when performing IRs.

### **2.3 Search Methods**

The literature search was conducted between July 27 and August 25, 2016, using MEDLINE, SCOPUS, and CINAHL databases. Search terms included MESH terms pain and LMIC and related terms as presented in Table 2-1. The search was limited to articles published in English from January 2006 through August 25, 2016, a ten-year span, which reflects the current evidence in pediatric pain management in LMIC. Reverse bibliography search was also employed on relevant publications to identify additional citations. Citations were further subjected to the inclusion and exclusion criteria presented in Table 2-2.

### **2.4 Search Outcome**

The literature search results and selection are reported using the PRISMA flow diagram (Moher, Liberati, Tetzlaff, Altman, & The PRISMA Group, 2009). A total of 1,510 citations were identified; 31 met the inclusion criteria (Figure 2-1).

### **2.5 Quality Appraisal**

All studies were appraised for quality using the GRADE criteria (GRADE Working Group, 2004). Due to the breadth of the topic and efforts to ensure variability of the studies needed for IRs, studies that scored low and very low-quality according to GRADE criteria were further subjected to methodologically specific quality appraisal

(Whittemore & Knafl, 2005). The methodology specific tools recommended by the National Institute of Health, National Heart, Lung, and Blood Institute (NIH-NHLBI) for quantitative studies (National Institute of Health, 2014) and the Critical Appraisal Skills Programme (CASP) checklist (Critical Appraisal Skills Programme (CASP), 2013) for qualitative studies were used.

## **2.6 Data Abstraction/Synthesis/Presentation**

The primary author (STM) read each article twice with a lag of at least three days between each reading. Independent notes were generated during each reading and then compared to reduce bias. When the two-notes sets were not reflective of each other, the article was re-read a third time to generate a consensus entry. The entries were used to create categories and subcategories (Table 2A-1, Appendix 2A). A thematic approach was used for data synthesis and presentation because it allows for literature comparison across primary sources (Whittemore & Knafl, 2005). Following the descriptive analysis of the citations by geographic location (Figure 2-2) and population focus (Figure 2-3), the categories and subcategories were synthesized into themes and subthemes. To enhance rigor, STM consulted with other authors for data abstraction and synthesis.

## **3.0 Results**

A summary of the studies included in this review is presented in the evidence table (Table 2-3).

### **3.1 Themes of evidence on pain management in LMIC**

Three major themes each containing two subthemes were deduced from the evidence gathered from the studies included in this review. The first major theme addresses the magnitude of pediatric pain problem in LMIC, through a synthesis of the evidence

relating to the prevalence of pediatric pain and reflect the challenges related to pain management resources in LMIC. The second major theme- child pain management stakeholder's perceptions, experience, and practices reflect the sociocultural aspects of child pain management in LMIC. In this theme, findings related to child pain actor's perceptions, experiences, and practices are described. The last major theme - pain management practices, portrays evidence related to pain management strategies. The subthemes are described in detail below.

### **3.1.1 The magnitude of pediatric pain in LMIC**

#### **3.1.1.1 Subtheme: Pediatric pain burden in LMIC**

The overall theme of the magnitude of pediatric pain in LMIC is exemplified through the pain burden subtheme that emerged from evidence relating to the prevalence of pediatric pain in LMIC. Azam, Campbell, & Ross (2012) explored the burden of pain in children and suggested that pain is a significant unaddressed problem in children with HIV/AIDS. Several studies indirectly estimated the burden of pediatric pain in LMIC by examining healthcare provider's knowledge, attitude, and experiences in pediatric pain management (Dongara, Shah, Nimbalkar, Phatak, & Nimbalkar, 2015; Ekim & Ocakci, 2013; Finley, Forgeron, & Arnaout, 2008; Forgeron et al., 2009; He, Vehviläinen-Julkunen, Pietilä, & Pölkki, 2008; He et al., 2010; Huth, Gregg, & Lin, 2010; Katende & Mugabi, 2015; Lunsford, 2015; Mathew, Mathew, & Singhi, 2011). The results from these studies suggest a low level of knowledge, unfavorable attitudes toward children's pain and pain management, and high prevalence of myths and misconceptions, which are often associated with inadequate pain management. Some studies also addressed the sociocultural aspects of child pain that predispose them to suffer from unmanaged pain

such as parental beliefs, stoicism and the dynamics of decision-making regarding the assessment and management of pain (Clancy, 2014; Forgeron et al., 2009; He, Vehviläinen-Julkunen, Pölkki, & Pietilä, 2007; He, Vehviläinen-Julkunen, Pölkki, & Pietilä, 2010; Jongudomkarn, Forgeron, Siripul, & Finley, 2012). Evidence from studies that looked at socio-cultural aspects suggests that with few exceptions, the need for pain management is dismissed in LMIC. Despite the existing evidence suggesting that pediatric pain is a problem, it lacks rigor and does not provide enough evidence to adequately describe the prevalence or the extent of pediatric pain in LMIC.

#### 3.1.1.2 Subtheme: Pain management resources

The theme of the magnitude of pediatric pain in LMIC is further explained by the subtheme of pain management resources. This subtheme emanates from studies that explored the availability and access to pain management resources as well as the financial implications of pain management for children in LMIC. Only two studies addressed the availability of pain management resources in LMIC (Clancy, 2014; Ughasoro et al., 2014). Ughasoro et al. (2014) studied the parent willingness to pay for pain services inclusive of medications and found overwhelmingly positive support for the use of pain medications from parents of all social backgrounds. Conversely, Clancy (2014) reported sources of healthcare provider's frustrations in pediatric pain management in LMIC to emanate from the constant shortage of essential pain medications, lack of formulations for children, and insufficient knowledge of appropriate dosages which can lead to inadequate treatment of pain. The evidence from these studies suggests there is a significant gap in the literature relating to pain management resources for children in LMIC.

### **3.1.2 Child pain management stakeholder's perceptions, experiences, and practices**

#### **3.1.2.1 Subtheme: Parents and children perceptions, experience and practices**

The child pain management stakeholder's- parent/caregiver, healthcare providers, and the children themselves have a significant impact on pain management for children in LMIC.

The subtheme of parents' and child perceptions, experiences, and practices emanated from studies that considered children and parent/caregiver knowledge, attitudes, experiences, and practices regarding child pain management. Evidence related to parents and children's experiences reflects the influence of sociocultural factors on the perception of pain and its management for children in LMICs. Jongudomkarn et al., (2012) and He et al., (2006; 2010) suggest that parental challenges related to their overall understanding of pain may be due to a conflict between cultural beliefs and science. Parents indicated they often struggle to communicate or seek resources for child's pain due to language barriers and out of respect of healthcare providers. Also, Jongudomkarn and colleagues (2012) suggest that balancing the cultural child-rearing practices and child's pain needs is intricate, and parents and children often favor cultural values over pain management. Evidence from these studies demonstrates the critical role played by the sociocultural context in pediatric pain management in LMIC.

None of the studies reviewed directly addressed children's pain experience in LMIC. A study by He and colleagues (2007) reported that children in LMIC are aware of their pain and often with the support of parent/caregiver and nurses, employ non-pharmacological methods to relieve pain. Parent/caregiver knowledge and attitudes on children's pain were identified as important aspects of pediatric pain management in

LMIC. Olaogun, Ayandiran, Olalumade, Obiajunwa, & Adeyemo, (2008) and He et al., (2010) studied parent/caregiver' attitudes relating to children's pain, reporting lack of knowledge on pain management strategies as a hindrance in providing pain relief for their children. Also, He et al. (2006; 2010) and Jongudomkarn et al. (2012) reported that parents often use non-pharmacological strategies to alleviate their children's pain regardless of pain intensity. The evidence from these studies suggests that parent/caregiver and children's pain experiences, perceptions, and practices are vital in understanding the burden of pediatric pain and its management in LMIC.

#### 3.1.2.2 Subtheme: Healthcare provider's perceptions, experience, and practices

A second subtheme stemming from the literature relating to child pain actors, addresses healthcare providers' perceptions, experiences, and practices associated with children's pain management in LMIC. The inferences from the majority of studies on perceptions suggest that in general, healthcare providers in LMIC are not well educated in pediatric pain management and may exhibit hostile attitudes towards children's pain experiences (Dongara et al., 2015; Ekim & Ocakci, 2013; Enskär et al., 2007; Finley et al., 2008; He et al., 2008; Huth et al., 2010; Lunsford, 2015; Mathew et al., 2011). Misconceptions on side effects of opioid analgesics - (respiratory depression, addiction) and skepticism about child pain self-reports and related experiences were reported to be prevalent among healthcare providers (Dongara et al., 2015; Finley et al., 2008; Forgeron et al., 2009). Strong evidence that suggests pain education programs are effective interventions to address healthcare provider's knowledge deficiencies and unfavorable attitudes regarding pediatric pain exist (He et al., 2008; Huth et al., 2010; Lunsford, 2015). However, Finley and colleagues (2008) cast doubt on the long-term effectiveness of pain education

programs without a change in policy. Overall, variables such as age, sex, years of experience, and pain education were largely uncorrelated with healthcare provider's knowledge and attitudes towards pediatric pain management (Ekim & Ocakci, 2013; Huth et al., 2010; Mathew et al., 2011).

Healthcare providers' child pain management experiences and practices were less frequently addressed in the literature, often reported as secondary objectives (Clancy, 2014; Finley et al., 2008; Forgeron et al., 2009; He et al., 2008; Katende & Mugabi, 2015). The evidence on healthcare providers' pediatric pain experiences varied across studies. Clancy (2014) studied six healthcare providers from sub-Saharan Africa and found negative expressions of anger, frustration, and despair in determining the healthcare provider's role in the treatment of children's pain. The complexity of interactions and communication among healthcare providers was highlighted as a basis for their experience in pediatric pain management (Finley et al., 2008; Forgeron et al., 2009). Evidence also suggests that healthcare providers use a combination of non-pharmacological and pharmacological therapies to alleviate children's pain (He et al., 2008; Katende & Mugabi, 2015). Despite this, Finley and colleagues (2008) report that healthcare providers prefer to use non-pharmacological strategies even for severe pain, as these often do not require unique skills and are deemed safe. Evidence from this subtheme emphasizes the influence of sociocultural factors, including experience, unique to LMICs, in the shaping of healthcare providers' perceptions and practices in children's pain management.

### **3.1.3 Pain management practices**

#### **3.1.3.1 Subtheme: Tools for pain measurement**

Pain management involves assessment and treatment, and the evidence from LMICs in support of these is sparse. The subtheme on the use of instruments for pain measurement is comprised of studies focusing on tool development and validation for children's pain measurement in LMICs. Two studies focused on the development and validation of children's pain measurement tools (Badr Zahr, Puzantian, Abboud, Abdallah, & Shahine, 2006; Jongudomkarn, Angsupakorn, & Siripul, 2008), while three studies adapted and validated existing children's pain tools for use in LMICs. The existing instruments used for validating the new pain management tools include the FACES pain scale-revised (FPS-R) and the Numeric Rating Scale (NRS). Jongudomkarn et al. (2008) developed and validated a pain assessment tool for children aged 6-12 years and their parents/caregivers to reflect cultural norms, the Khon Kaen University (KKU) Pediatric Pain Assessment Tool. The KKU uses the FPS-R concept in a semicircle plastic with six Thai children faces printed on the semicircle with a moving pointer fixed on the center of the horizontal side. Badr and colleagues (2006) modified the FPS-R to develop the DOLLS tool from locally made dolls with faces depicting pain intensity as described in the FPS-R for children aged 4 to 10 years. To measure pain intensity, children selected dolls, which best reflects their pain intensity. Both the KKU Pediatric Pain Assessment Tool and DOLLS were found to be valid and reliable but were not superior to the pain scales they were being compared with, the FPS-R and NRS (Badr Zahr et al., 2006; Jongudomkarn et al., 2008).

The instruments adapted and validated among distinct children populations in the LMICs include the: FPS-R, Color Analogue Scale (CAS) (Subhashini, Vatsa, & Lodha, 2008); COMFORT-Behavior scale, Face, Legs, Activity, Cry, Consolability (FLACC)



scale (Bai, Hsu, Tang, & van Dijk, 2012); the OUCHER scale, Visual Analogue Scale (VAS) and NRS (Eyelade, Oladokun, & Fatiregun, 2009). All studied pain tools were found to be reliable and valid to measure pain in children in LMIC. Despite the pain instruments being adapted and validated in LMIC, Forgeron et al. (2009) and Finely (2008) reported that healthcare providers in LMIC rarely use pain assessment tools due to skepticism about children's ability to self-report pain and lack of policies support. There is evidence of validation and development of pain measures in LMIC; however, there is no evidence on the use of child pain scales for the day-to-day assessment and management of pain in the care of children in LMIC.

#### 3.1.3.2 Subtheme: Pain treatment approaches

The subtheme of pain treatment approaches consists of studies focusing on developing novel ways of treating pain and testing known pain treatment strategies in various age groups. This category represents the largest set of interventional studies included in this review. Evidence suggests that methods requiring less time and fewer skills to implement are commonly used in LMIC (He et al., 2007; He et al., 2008; He, Pölkki, Pietilä, & Vehviläinen-Julkunen, 2006). A series of studies conducted by He and colleagues (2006; 2007; 2008) suggests that non-pharmacological approaches particularly cognitive, behavioral, and physical pain treatment strategies are common among child pain actors. Similar inferences can be drawn from the number of interventional studies addressing the effectiveness of various distraction techniques which demonstrated effectiveness in different children population (Özdemir & Tüfekci, 2012; Sadeghi, Mohammadi, Shamshiri, Bagherzadeh, & Hossinkhani, 2013; Tüfekci, Çelebioglu, & Küçükoglu, 2009). Other physical pain-relieving strategies studied include, the effect of Valsalva

maneuver using balloon inflation, the results showed that balloon inflation is more effective than either distraction only and no pain control (Gupta et al., 2006). Also, Ozcetin et al., (2011) examined the impact of parental presence on child pain among three to six-year-olds and found that it was an effective pain strategy during a procedure. Furthermore, Celebioglu, Akpinar, & Tezel, (2010) compared pain response from different injection sites (vastus lateralis versus deltoid muscles) and reported no differences in pain response among children aged 14 to 19 months. Lastly, Kassab, Sheehy, King, Fowler, & Foureur, (2012) evaluated the efficacy of oral 25% glucose solution in controlling procedural pain for infants at two months of age and found it to be efficacious. There is evidence for physical pain treatment strategies while other non-pharmacological pain management strategies such as cognitive and behavioral methods remain primarily unexplored in LMIC.

The only study that addressed the use of a pharmacological approach to treat pediatric pain included in this review was an RCT performed by Machoki et al. (2015). In an innovative approach, these researchers investigated the efficacy of using a subfascial continuous local anesthetic (bupivacaine 0.2%) wound infusion (CLAWI) technique compared to traditional epidural bupivacaine and intermittent intravenous morphine in post-surgical pain management. The CLAWI approach was efficacious with the intervention group reporting lower pain scores and requiring fewer morphine sulfate dosages compared to the control group. Also, the CLAWI group exhibited two days decrease in time to mobility and no wound infections suggesting faster-wound healing (Machoki et al., 2015). Although there is good evidence to support pediatric pain treatment strategies in LMIC, there is a dearth of data on the diversity of non-

pharmacological approaches and limited studies on pharmacological approaches to pediatric pain management in LMIC.

#### **4.0 Discussion**

This integrative review presents a comprehensive synthesis of the available evidence on the magnitude of pediatric pain, the influence of sociocultural context on pediatric pain management practices to reflect the current state of the science on pediatric pain management in LMICs. To the knowledge of these authors, this is the first IR specific to children in LMIC regions that includes the available evidence on the role of sociocultural context on child pain management. Previous reviews on pain management practices in LMICs focused on the use of analgesics (Madadi et al., 2012), barriers in specific LMIC regions (Albertyn et al., 2009) and the assessment and treatment of pain for children in developing countries (Mathews, 2011).

The evidence presented suggests that children's pain burden in LMIC is a substantial issue that is not adequately addressed in the literature. Knowledge of the burden of pain among children along with resource availability and use, is critical to advance knowledge on pediatric pain and its management, has the potential for improving clinical care and in the development of policies on pain management for children in LMICs. Acknowledging the problem of pain management in LMICs is a crucial step in closing the gap in pediatric pain care and challenges the existing misconceptions about child pain in LMICs (Forgeron et al., 2009). Studies that explore the prevalence of pain among various and common pediatric conditions in LMIC are urgently needed. From this review, the overarching theme of the magnitude of children's pain reflects the pain burden, symptom assessment, and management in LMICs.

The second theme of child pain management stakeholder's perception identified in this review is directly related to the symptom experience component of SMT. Laudable efforts have been dedicated to addressing experiences, perceptions, and practices of all the child pain actors. This is important because the sociocultural context is critical in understanding child pain management practices particularly in LMICs where the cultural climate acts as a barrier in child pain alleviation (Batista et al., 2012; Finley et al., 2009; Fortier, Martin, Kain, & Tan, 2011). Despite the significance of the interaction of all child pain actors in the pain management clinical decision-making processes, there is a shortfall in evidence related to understanding the decision-making process in LMIC. The level of the evidence addressing child pain actor's experiences, perceptions, and practice need observational studies. The strength of observational studies in this environment will reflect the actual behavior observed against proxies of behaviors such as knowledge, attitudes and self-report and potentially impact care delivery (Twycross A & Finley GA, 2014). This review revealed an urgent need for studies exploring the pain experience from the perspective of the child to acknowledge and strengthen the voice of children living with pain in LMIC. Kortessluoma and colleagues (Kortessluoma, Nikkonen, & Serlo, 2008) suggest that inclusion of the child's experiences is necessary, as children are expert at their pain experience.

The theme of pain management practices overlaps with symptom management strategies in the SMT. Although there are visible efforts in LMICs towards developing and validating various pain assessment instruments and pain treatment strategies for children, there is still a gap in evidence relating to the clinical use of validated pain instruments. There is also a dearth of evidence exploring the pharmacological treatment

of pain in children in LMICs despite the frequent claims by healthcare workers of erratic medication use. In contrast to the pharmacological treatment of pain, there is high-level evidence on non-pharmacological pain methods for children in LMICs. Much of this evidence relates to distraction, demonstrating a need to explore culturally relevant distraction approaches to indigenize pain treatment for children in LMICs. Lastly, studies on pain treatment methods for children in LMICs should include additional outcomes variables such as, onset and duration of pain, time to recovery from underlying illness or procedure, length of hospital stay and cooperativeness of child during painful procedures to demonstrate the impact of pain and its treatment. The clinical applicability of innovative and evidence-based pain assessment and treatment methods that could be used in LMICs has been largely ignored in the literature.

This review has limitations. First, there is the inherent methodological bias of an IR, and one author (STM) was responsible for the literature search, data abstraction, and synthesis while consulting with other authors. Secondly, 21 of the total 31 studies included were considered low-level evidence based on GRADE standards; this could not be avoided due to the nature of an IR and the available literature that addresses this topic. Lastly, only English language citations were considered.

## **5.0 Conclusion**

Although there is a commendable effort of documenting evidence relating to pediatric pain management practices in LMIC, the gaps in evidence undermine the existence and the impact of pain in the lives of children in LMIC. The strength and quality of evidence on pain management practices for children in LMIC are low to moderate, limiting its applicability in clinical practice. Therefore, we recommend observational and

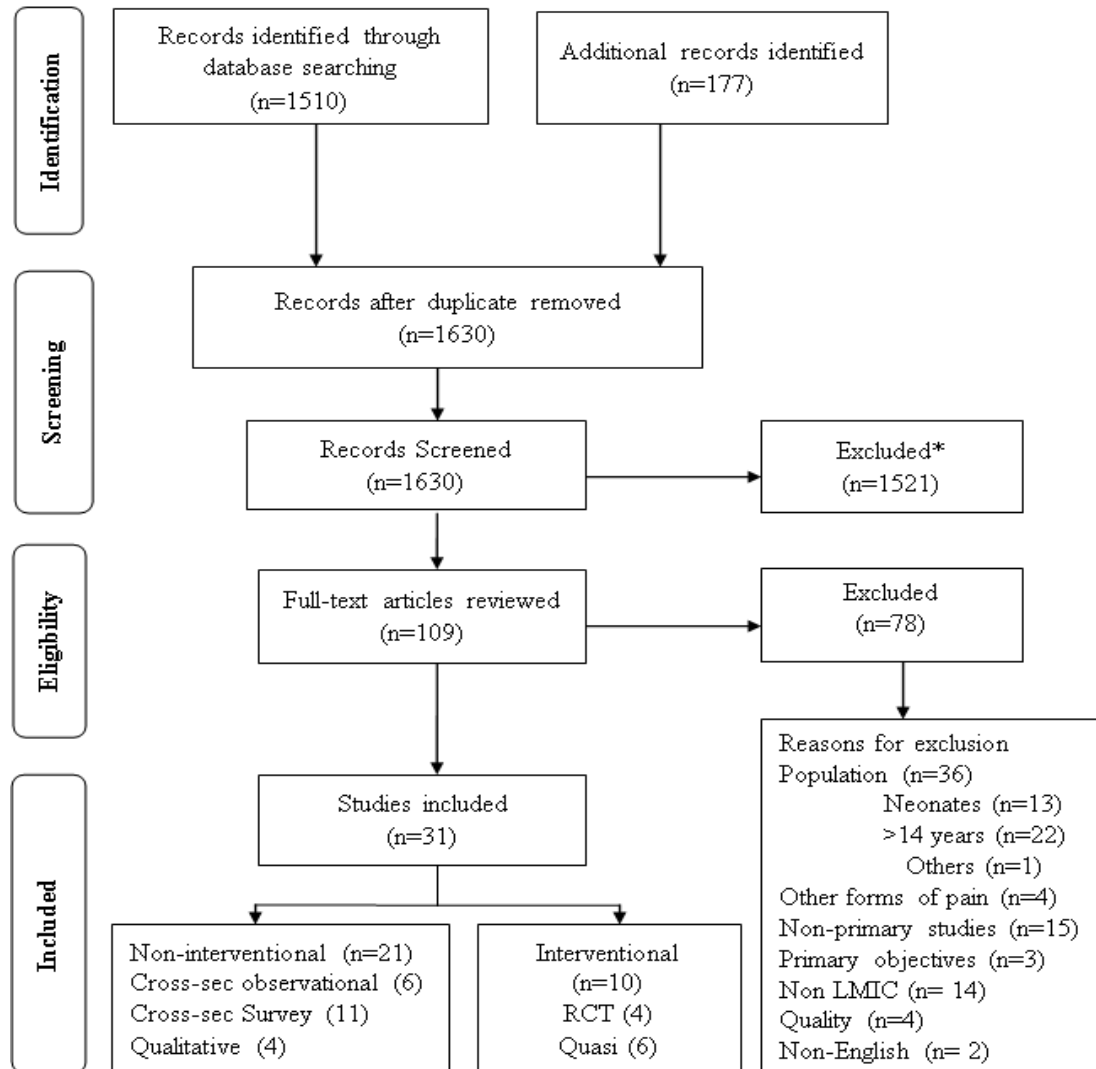
interventional studies addressing the roles, experiences, and behaviors of child pain actors and context-specific pain treatment modalities to improve understanding and pain treatment in this vulnerable population.

<b>Table 2-1. Search terms and strategies</b>				
<u>Search terms</u>		<u>Concept</u>		<u>Total</u>
Pubmed MESH terms	Pain "pain management" "Pain clinics" "pain perception" "pain threshold" "pain measurement" "Pain"	LMIC "Africa" "Asia" "Americas" Individual LMIC	Age Infant: birth 23 months Infant 1-23 months Preschool child: 2-5 years	1,087 citations
Pubmed keywords		"developing countries" "low income countries" "third world" "western pacific" "Eastern Mediterranean"	Child: 6-12 years	
CINAHL MM terms	"pain" "pain clinics" "Pain measurement" "Nociceptive pain" "Treatment-related pain" "Chronic pain" "Pain threshold" "Postoperative pain" "Visceral pain"		Infant 1-23 months Child, Preschool; 2-5 years Child: 6-12 years	26 citations
CINAHL keywords	"Pain Management" "Pain Perception"	"developing countries" "low-income countries" "third world" "Africa" "Western Pacific" "Eastern Mediterranean" "Asia" "Americas" "South Asia" "Southeastern Asia" "Latin America" "Caribbean" "South America" "Central America"		
SCOPUS keywords	"pain management" "Pain clinics" "Pain perception" "Pain threshold" "pain measurement" "Pain"	"developing countries" "low-income countries" "third world" "Africa" "Western Pacific" "Eastern Mediterranean" "Asia" "South Asia" "Americas" "Southeastern Asia" "Latin America" "Caribbean" "South America"	Children Child Pediatric Peadiatric Infant, Preschool children school going children	397 citations

<b>Table 2-2. Inclusion and exclusion criteria</b>	
<b>Inclusion Criteria</b>	<b>Exclusion Criteria</b>
Conducted in LMIC	Focuses exclusively on neonates (0-30 days of age)
Focuses on children one month to 14 years (legal definition of a child (Stewart, 2006))	Focuses on children with known neurological disorders
Focuses on parent/caregivers/ healthcare providers of children aged 1 to 14 years	Dental and dental procedural pain
The primary objective related to pediatric pain	Functional pain
English language	Lower back pain
	Review articles and case reports



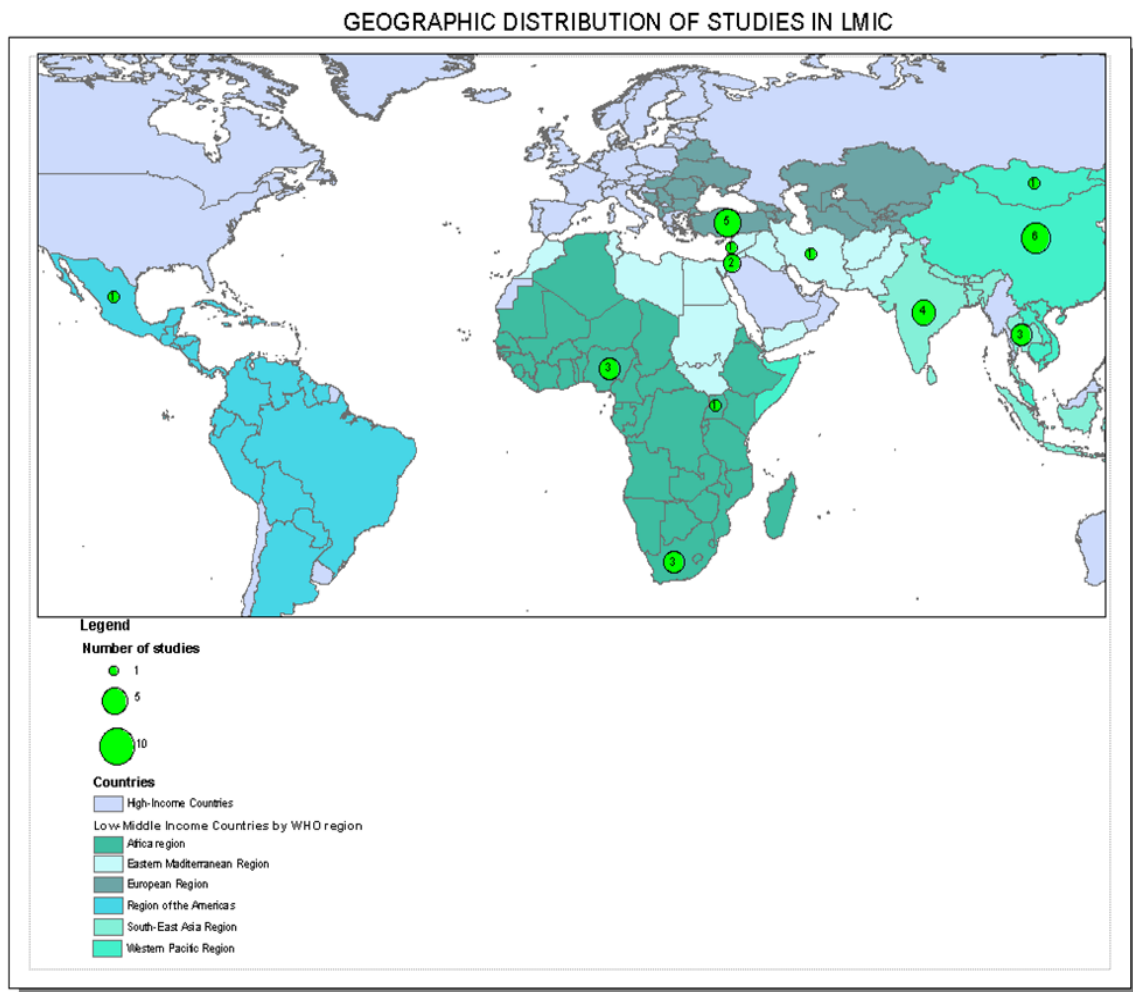
**Figure 2-1. The PRISMA flow diagram showing the search outcomes, the studies excluded and included in the review**



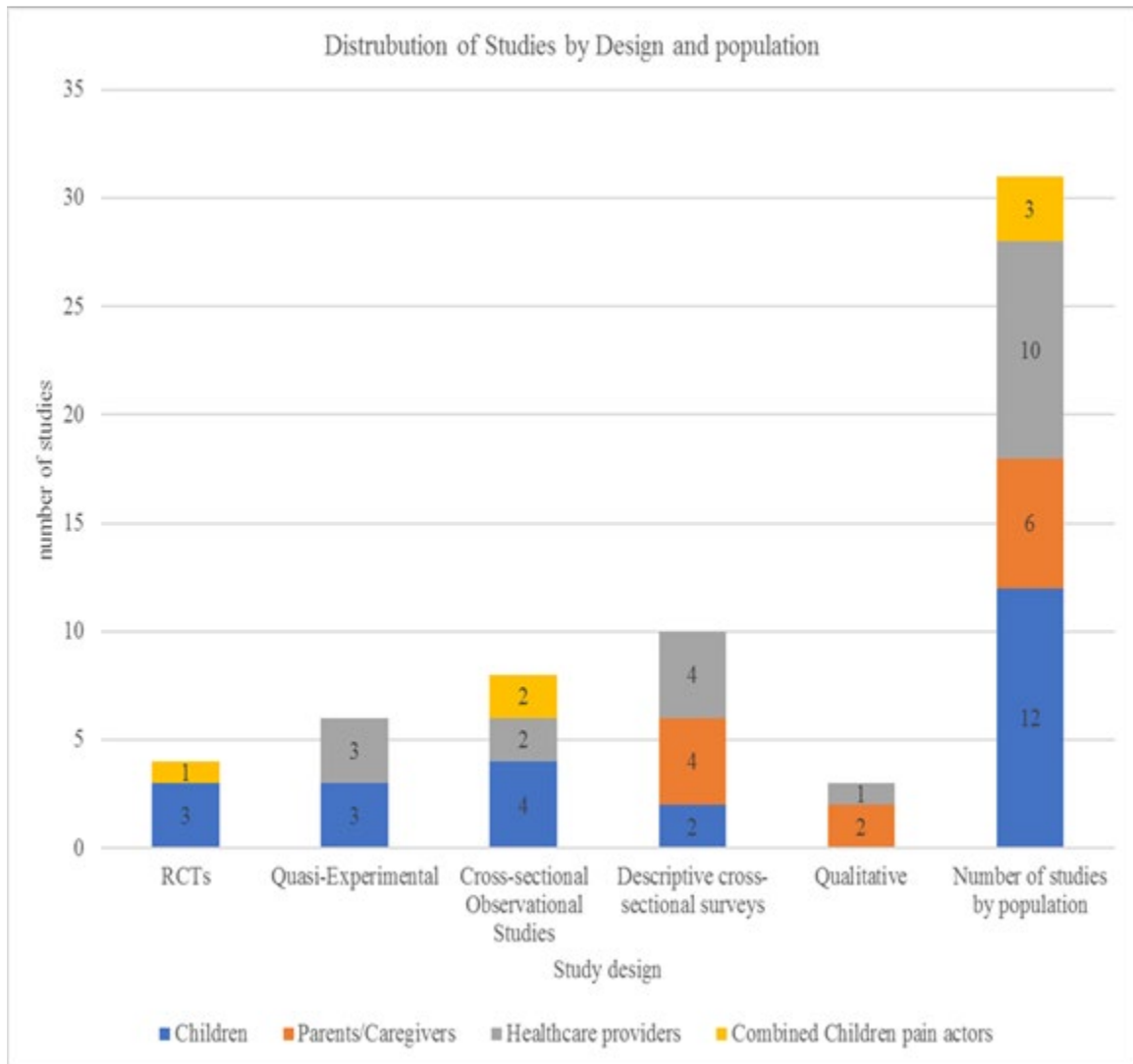
\*not related to pain, pain assessment and/or pain management.

Abbreviations: Cross-sec -Cross-sectional, RCT- Randomized control trials, Quasi-Quasi-experimental studies

**Figure 2-2. The geographic distribution of studies according to the World Health Organization classification of countries.**



**Figure 2-3. The distribution of studies by population focus and the types of studies by population.**



**Table 2-3 . Table of evidence**

<u>Author, Year of Publication</u>	<u>Study design/ Outcomes</u>	<u>Region/Set ting/ Sample size n</u>	<u>Study Objectives</u>	<u>Results</u>	<u>GRADE Criteria</u>
Dongara, A.R., Shah, S.N., Nimbalkar, S.M., Phatak, A.G., Nimbalkar, A.S. 2015.	Cross-sectional survey. Outcome: Nurse's children's pain knowledge levels and attitudes	India. Inpatient cardiac unit. Nurses n = 45	To assess nurses' knowledge and attitudes regarding postoperative pain in children and to determine the factors associated with their knowledge and attitudes.	Mean nurses experience; 2.32 years, range:1 month to 5 years Total score mean 16.74 (2.34), range 12-23/33. Mean score true/false 11.48 (2.95), range 7-19/25. MCQ† mean was 5.26 (1.50) range 3-7/8. Scenarios: Asymptomatic case -33(78.6%) underestimated pain, 36(85.7%) not treat patient's pain. Symptomatic case-25(59.5%) underestimated pain, 26(61.9%) not treat patient's pain.	Very Low
Katende, G., & Mugabi, B. 2015	Cross-sectional descriptive Exposure: Peripheral Intra Venous (IV) line insertion. Outcome: Comforting strategies	Uganda. Inpatient. Health providers n = 106.	Establish the current practices regarding the use of comforting strategies for pediatric pain management by Ugandan health care providers during peripheral IV line insertion procedure.	Comforting strategies used: Greeting the child-72% or greeting the caregiver 90%. 51 % encouraged skin-to-skin contact, breastfeeding (58%), and positioning 85%. Least used: Distraction, non-nutritive sucking, play. Perceived barriers: Time, emergency, irritability of children, not knowing the right method to use.	Low
Lunsford, L. 2015	Pretest and posttest design. Intervention: Pain education program Outcome: Nurses knowledge and attitudes	Mongolia Inpatient. Nurses n =162.	To assess current and change in knowledge and attitudes and regarding pediatric pain of Mongolian pediatric nurses working at the national center for maternal and	Pre-test mean scores: Combined score 12.74(2.67), range 6-22 Morning group 12.96 (2.5), Afternoon group 12.366(2.92) Percentage 36.38 % ( 7.63), range 17-65%. Posttest mean scores: Combined score 16.74(3.89), range 10-30.	Moderate

			child health after a pediatric pain conference	Morning-16.88(3.74), Afternoon 16.5(4.15) Percentages 47.81 % ( 11.13), range 24-84%. The difference between combined pre and post mean scores P=0.0001, Confidence Interval-4.74 to -3.23. Within groups pain scores: CLAWI- 2.5, SAPA-3.5 and EPI-3.0 Morphine requirements: Higher in SAPA and EPI SAPA-fivefold the amount of morphine on average of CLAWI. EPI group at least 50% higher the amount of CLAWI. Days to mobilize: Shorter in CLAWI group than in other two groups. Wound infection: Less incidence of wound infection in CLAWI than other groups.	High
Machoki, M.S., Millar, A.J.W., Albetyn, H., Cox, S.G., Thomas, J., Numanoglu, A. 2015	RCT Blinded. Interventions: CLAWI‡, Epidural bupivacaine Standard IV morphine (SAPA). Outcome: Pain scores	South Africa. Inpatient-post surgical. Children aged 3-12 years. n = 71.	To compare CLAWI to the standard of care in postoperative analgesia and epidural bupivacaine (EPI) among patients undergoing various abdominal operations	Themes Struggles of the health care providers: Frustration and desperation. The expatriate vs. African national perspective: African perspective-difference between belief and reality. Expatriates-limited perspective devoid of sociocultural influence Workload and parental involvement: lack of human resources, disease severity and ambiguous parental role in child-care lead tensions Mythology: Myths exist and cause frustrations Education: Lack of education on pediatric pain in all disciplines. Pharmacological aspects: Lack of essential medications and children formulations and dosages, overwhelming fear of the use of morphine.	Very low
Clancy, M.A., 2014	Qualitative; Interpretative phenomenological analysis. Outcome: Experiences of healthcare professionals.	Sub-Saharan Africa. Health Providers n = 6	To explore the experiences of sub-Saharan Africa healthcare providers working with children who suffer pain.		

Ughasoro, M.D., Udem, N.D., Chukwudi, N.K., Korie, F.C., Uzochukwu, B.S.C., Onwujekwe, E.O. 2014	Cross-sectional survey. Outcome: Caregivers willingness to pay.	Nigeria. Outpatient. Parents/Caregivers. n=188	To determine the caregiver's willingness to pay for topical anesthetic cream for minor pediatric painful procedures.	Most respondents were positive to willingness to pay. 94% of all respondents in all SES quartiles were willing to pay. No significant association between willingness to pay for topical anesthetic cream with gender, age, education, mean income, and occupation.	Very low
Ekim, A., & Ocakci, A.F. 2013	Cross-sectional survey. Outcome: Nurses knowledge and attitudes	Turkey. Inpatient. Nurses. n = 224.	To determine the level of knowledge and attitudes regarding pain management of nurses working at pediatric units in Turkey	Response rate: >50% (15%): Mean score 38.2%, range 15- 65%. Bachelors (40.8%), Masters (39.0%) vs Associates degree (36.4%), diploma holders (38.2%) scores, $f=2.99$ ; $p\text{-value}=0.03$ . Experience; 1-5 years' significantly higher scores than >10 years, $F=3.42$ , $P=0.01$ . Intensive care units higher scores higher than medical/surgical units nurses scores (43.1 vs 38.1/37.1) ( $f=13.6$ ; $p=0.001$ ). No correlation between scores and sex, pediatric nursing experience, pain education and membership in the nursing organization	Low
Sadeghi, T., Mohammadi, N., Shamshiri, M., Bagherzadeh, R., Hossinkhani, N. 2013	Quasi-experimental Intervention: Pressing a softball Outcome: Pain response behavior	Iran. Inpatient surgical floor. Children aged 4-6 year. n = 60.	To examine the effect of pressing a softball during intravenous catheter insertion on the intensity of pain in children ages 4-6 years.	Significant difference in Mean pain scores: Intervention group-3.43(1.77) vs Control-5.26(3.46) $P=0.012$ . Intervention: 43.3% reported pain as minimal (pain score 4), and none reported severe pain (pain score 10) vs. Control group: 20% reported severe pain (pain score, 10). There was a statistical difference between intervention and control group based on categorical pain scores (no pain to severe pain) ( $p=0.006$ ). 44.8% indicated that children experienced pain >2 WBFPS and 33.5% reported pain of >4 WBFPS.	Moderate
Azam, M., Campbell, L., Ross, A. 2012	Descriptive exploratory study.	South Africa.	To explore pain in young children who have HIV disease and who are taking		Very low

Bai, J., Hsu, L., Tang, Y., van Dijk, M. 2012	<p>Outcome: Pain prevalence</p> <p>Secondary outcomes: Pain predisposing factors</p> <p>Repeated measures design.</p> <p>Exposure: cardiac surgery</p> <p>Outcome: Pain measurement tools validation</p> <p>Secondary outcomes: Factors that predict pain measures scores.</p>	<p>HIV§ Clinic.</p> <p>Parents of 3-13 years children. n = 420</p> <p>China.</p> <p>Cardiac intensive care unit, Children aged 0 to 7 years. n = 170.</p>	<p>Anti-Retroviral Therapy in a regional hospital.</p> <p>To test the reliability and validity of FLACC‡‡ and COMFORT-B§§ scales for pain assessment in Chinese children after cardiac surgery</p>	<p>One-third reported pain for more than 8 hours in 24 hours and while at rest. Pain interfered with ADLs††, e.g., walking, swallowing.</p> <p>The nociceptive pain was the most common form of pain (40.2%), and Paracetamol was the most commonly used medication for pain treatment.</p> <p>COMFORT-B median scores discriminating children in pain (VAS¶¶&gt;4) was 16 significantly higher than a score of children not in pain (VAS &lt;4). P&lt;0.0001.</p> <p>FLACC median scores discriminating children in pain (VAS&gt;4) 5 vs. 1 for children not in pain (VAS &lt;4). P&lt;0.0001. Mean COMFORT-B correlated with FLACC (r=.51; P=0.0001). Correlation: VAS and COMFORT-B (r=0.31, P=0.0001 (low), VAS and FLACC (R=0.86; p=).0001 (high).</p> <p>Sensitivity and specificity: COMFORT-B, AUC††† was 0.93; p=0.0001, cutoff scores of &gt;13; 0.86 and 0.83. FLACC, AUC= .98; p=0.0001, cutoff of &gt;2 were 0.98 and .88.</p> <p>Predicting Factors: COMFORT-B-37% of variance explained by mechanical ventilation for a shorter period, children who receive muscle relaxants and analgesics after surgery and children's age.</p> <p>FLACC-11% variance predicted by children age and children receiving muscle relaxants.</p>	low
Jongudomkarn, D., Forgeron, P.A., Siripul, P., Finley, G.A. 2012	<p>Qualitative-Phenomenology.</p> <p>Outcome: Parents experiences</p>	<p>Thailand. Inpatient. Parents/car egivers n =45.</p>	<p>To elicit the experiences of parents in providing care for their hospitalized child's acute pain-needs.</p>	<p>The inner struggle in providing pain care: Parents wanted to provide care but challenged by their understanding of pain, a partiality for traditional treatments, and deference to the health care providers.</p> <p>Overarching themes: Understanding my child's pain is karma; Pain considered inevitable and can be good or bad. Pain is part of life- influences the view of pain and treatment preferences.</p>	Very low

Kassab, M., Sheehy, A., King, M., Fowler, C., Foureur, M. 2012	RCT Intervention: 25% oral glucose solution. Outcome: Pain response reduction	Jordan. Wellness child clinic. Children aged 2 months. n =120.	To determine the effectiveness of 25% oral glucose solution in reducing immunization pain in 2-month old infants	Maintaining Kreng Jai. Respect for seniors and those in authority. A significant barrier to enlisting the help of healthcare providers. Baseline pain mean scores: Treatment group, 2 (0), Control group 2(1), <i>p-value</i> =0.867. During immunization: Treatment 8(1), Control group 9 (1), <i>p-value</i> =0.005. Post immunization: Treatment 4(1), Control group 6(3) <i>p-value</i> <0.001. Mean crying time: Treatment group 7.38(3.5), Control group 13.84(4.9) <i>p-value</i> < 0.001.	High
Özdemir, F.K. & Tüfekci, F. G. 2012	Quasi-exper Intervention: Music Outcomes: pain response behavior	Turkey. Wellness child clinic aged 2 months. n =120.	To examine the effectiveness of a musical mobile as a distraction tool for pain reduction in infants during the vaccination procedure	Mean Pain scores: During the procedure: Intervention 5.13(2.11) vs. control 6.65(2.69) <i>P-value</i> <0.01. After procedure: Intervention 26(2.01) vs control 3.61(2.27) <i>P-value</i> <0.001. Crying duration: Intervention 23.53(18.38) sec vs. Control 30.88 (22.78) sec, <i>P-value</i> <0.05.	Moderate
Mathew, P.J., Mathew, J.L., Singhi, S. 2011	Prospective descriptive survey. Outcome: knowledge, attitudes, and practice of nurses.	India. Inpatient- critical care units. Nurses n =56.	To study the knowledge, attitude, and practice of nursing personnel catering to critically ill children in the developing country.	Nurses beliefs: Infant perceives painless than adults and infants forget pain faster. Painful procedures: Lumber puncture, urinary catheterization, endotracheal intubation and suction, blood sampling, removal of sticking tap and insertion/removal of an infant feeding tube Pain measurements: No pain scales used in all the areas. Pain treatment: Restraint (most common in NICU††† and SICU§§§), Distraction (PICU¶¶¶) Non-pharmacological measures: Massage, positioning, touch, and assurance, providing company, heat and cold and distraction.	Very low



Ozcetin, M., Suren, M., Karaaslan, E., Colak, E., Kaya, Z., Guner, O. 2011	RCT. Interventions: Parental presence. Nurses presence. Outcome: Pain response behavior	Turkey. Outpatient. Children aged 3-6 years. n =135.	To determine whether the presence of parents can change the tolerance of pain and distress in children	Training significantly contributed to the knowledge p=0.03, whereas experience did not affect knowledge or practice. Before the procedure mean: Group 1: Respiratory rate 23.47(5.33), Heart Rate 100.2(14.95) Group 2: Respiratory rate 26.75(6.56), Heart rate 105.09(11.63). During the procedure: Group 1: Mean respiratory rates 32.09(9.09), Heart rate 123.24(16.08) Group 2; Mean respiratory rate 38.60(8.70), Heart rate 131.82(16.96) P<0.05. WBFPS¶ higher than 3 during the procedure Group 1-77.9% and Group 2-86%, P>0.05. After the procedure: no statistical difference between the groups.	High
Celebioglu, A., Akpinar, R.B., Tezel, A. 2010	Descriptive study. Exposure: Intramuscular injection Outcome: Pain response.	Turkey. Wellness clinic. Children aged 14 to 19 months. n =185	To compare pain responses of children who receive the IntraMuscular vaccination in deltoid muscle versus vastus lateralis	NIPS†††† scores of the groups t= -0.769, p>.05. Heart rate t=1.352, p>0.5. Respiratory rate t=0.241, p>.05. Crying duration t=4.805, p<.05. No significant differences between the groups	Low
He, H. -G., Jahja, R., Lee, T. L., Ang, E. N., Sinnappan, R., Vehviläinen-Julkunen, K., & Chan, M. F. 2010	Descriptive Questionnaire. Outcome: Parent's perceptions of informational and emotional support from nurses	China. Inpatient. Parents/car egivers of 6-12-year-olds. n = 206.	To describe Chinese parents' perceptions of informational and emotional support received from nurses and their recommendations for improvement in the management of their child's postoperative pain.	Parents feelings during hospitalization: 91 % worried, 59% anxious. Parent's perceptions of informational and emotional support: Outcome of procedure-85%, Post-op recovery process-84%. Pain management: expected duration of pain-65%, non-pharmacological pain relieve-59%, and pain medications- 51%. 82% of parents consulted nurses relating to their child's pain relief. 53% had a clear idea of what to do to relieve the child's pain.	Very low

Huth, M.M., Gregg, T.L., Lin, L. 2010	Quasi- experimental Intervention: Education Outcome: Nurses knowledge and attitudes	Mexico. Inpatient. Nurses n =106	To explore the effectiveness of a pain education intervention on Mexican nurses knowledge and attitudes toward pediatric pain.	Recommendations: 67% required nurses to apply different non-pharmacological methods. 38% the need for more information and instruction. Mean posttest score 16.7(4.33) vs. pretest score 13.1(3.89) $p<.0001$ . $r=.56$ $p<.0001$ for correlation between pre and posttest scores. Hospital site and years of nursing experience related to the scores while age, education, and pain assessment practices not related to the scores.	Moderate
Eyelade, O.R., Oladokun, R.E., Fatiregun, A.A. 2009	Prospective descriptive study. Exposure: Venipuncture Outcome: Pain measurement tools validation	Nigeria. Outpatient clinic. Children aged 6 months to 12 years. n =179.	To validate the commonly used pain assessment scales among Nigerian children to improve pain management practices	OUCHER's ICC†††† baseline- 0.69, during Procedure 0.72. OUCHER before and during the procedure correlated significantly with VAS¶¶ $r=0.87$ and $r=0.63$ , $p<.0001$ and NRS§§§§ $r=0.88$ , $r=0.64$ $p<.0001$ . Observer pain scale showed poor correlation of $r=0.42$ and $r=0.33$ , $p<.0001$	Low
Forgeron, P.A., Jongudomkarn, D., Evans, J., Finley, G.A., Thienthong, S., Siripul, P.,...Boonyaw atanangkool, K. 2009	Descriptive qualitative study. Outcome: Experiences of healthcare professionals	Thailand. Inpatient. Healthcare providers. n = 65.	To capture experiences of health care professionals in the Northeastern region of Thailand	Recognizing the child's pain: Myths and misconceptions about pain in children common. Recognizing pain through assessment: Pain assessment sporadic and minimal use of pain tools. Communicating a child's pain: Undefined roles, which lead to confusion on expectations; who is supposed to assess pain, how do nurses communicate their findings with physicians and the role that parents play in child pain	Very Low

Tüfekci, F.G, Çelebioglu, A., Küçükoglu, S. 2009	RCT/quasi- experimental. Intervention: Kaleidoscopes Outcome: Pain response behavior	Turkey Inpatient. Children aged 7-11 years old. n=206.	To assess the effect of distraction (kaleidoscopes) to reduce perceived pain during venipuncture in healthy school-age children.	Intervention group lower mean pain score, 3.14(1.41) WBFS†††† and 4.64(2.40) VAS¶¶ vs. Control group scores 3.80(1.42) WBFS and 5.14(2.25) VAS WBFPS differences significant t=3.114 p<0.01. Intragroup difference between VAS and WBFPS Intervention t=7.745, p<0.001 and control group t=7.602, p<0.001.	Moderate.
Finley, G.A., Forgeron, P., Arnaou, M. 2008	Qualitative study. Outcome: program outcomes report.	Jordan. Cancer treatment facility. Healthcare providers. n = 35	To report the results of capacity building a program aimed at developing, implementing, and evaluating a pediatric pain management program at KHCC¶¶¶¶.	Misconceptions about opioids and addiction, e.g., the risk of respiratory depression, addiction, dismissal of self-reports. Discrepancies in self-report-indirect methods of assessing pain preferred over self-report. Non-pharmacological methods are best- favored over analgesia even for severe pain due to fear of side effects, addiction. Policy change better and longer impact compared to education only.	Very Low
He, H.-G., Vehviläinen- Julkunen, K., Pietilä, A.-M., Pölkki, T. 2008	Quasi- experimental. Intervention: Pain Education program Outcome: Change in nurse's use of non- pharmacological methods.	China. Inpatient. Nurses. n =187 pre and 195 post-test.	To describe and compare nurses use of non- pharmacological methods for management of postoperative pain in children.	use of non-pharmacological methods: Baseline % (change at follow-up) Cognitive behavioral: Preparatory information 75%, (65%), Distraction 60% (70%), Imaginary 35 % (65%) and positive reinforcement 10% (65%)-significant change P>0.001. Physical methods: Positioning 60% and Thermal regulation 20% (no change), Massage 155(25%), Transcutaneous electrical stimulation 0% ( 2%) P>0.001. Emotional support: Comforting 70% (65%), Touch 40% (55%) P>0.00, Presence 10% (25%) P>0.00. Helping with ADLs†† 9% (18%), Creating comfortable environment 65%. Cognitive-behavioral methods are commonly used	Moderate

Jongudomkarn, D., Angsupakorn, N., Siripul, P. 2008	Descriptive correlational study. Exposure: Surgery Outcome: Pain measurement tool development.	Thailand. Inpatient. Children 6-12 years n=150, caregivers n=150 and nurses n=17. Total n =317	To develop a tool for pain assessment specifically for parents to use with children of the Isaan culture of Northeast Thailand.	Comparison of children self-reported scores, family caregivers, and attendant nurses. NRS§§§§ vs KCU†††††: Family caregivers z=1.816, P=0.069, Attendant nurses z=-1.784, P-value =0.74, Children Z= -0.074 P=0.941. FPS-R††††† vs KCU: Family caregivers z =1.961 P = 0.676, attendant nurses Z= -1.131, P =.258, Children – z= -0.192 P-value = 0.848. Between groups comparison df 2 ss 15.76, ms 7.88 f=1.52 p=0.22. KCU a valid tool to assess pain in children of the Isaan culture.	Low
Olaogun, A., Ayandiran, O., Olalumade, O., Obiajunwa, P., Adeyemo, F. 2008	Descriptive design. Outcome: Mother's knowledge of child pain. Secondary outcome: Mother's pain management strategies. Mother's characteristic predictive of pain knowledge.	Nigeria. Outpatient. Mothers. n =130.	To assess mother's knowledge and management of pain in infants.	Child pain experience: Over 90% of mothers reported that infants experience pain, 3.8% indicating that infants less than 1 month old can experience pain. Mean age of experiencing pain 2.5 months. Pain description: 64.6% described the pain as distress, 12.3% indicated that it is subjective, and only the sufferer can describe it. Child response to pain-Behavioral responses constituted all the responses: 47% picture of an irritable child, 42% indicated crying. Causes of pain: Malaria Mothers management strategies Drug therapy (56.9%), 3.8% prescription drugs. Non-Pharmacological-16% use breastfeeding, 46.2% regarded breastfeeding as a pacifier, 9.2% indicated that it has an analgesic effect. Cuddling, application of compress and positioning, strapping the child on the back. Age and number of children did not influence pain knowledge p<0.05. Overall, the FPS-R††††† mean was higher 5.06(2.77) than color analogue scale 4.63(2.63) p<0.001.	Very low
Subhashini, I., Vatsa, M.,	Prospective, descriptive	India. Inpatient.	To compare the FPS-R and Color Analogue Scale (CAS) among children	Overall, the FPS-R††††† mean was higher 5.06(2.77) than color analogue scale 4.63(2.63) p<0.001.	Low

Lodha, R. 2008.	correlational study. Exposure: Various medical procedures Outcome: pain measurement tool validation.	Children aged 6-12 years. n = 181.	aged 6-12 years undergoing procedures. To compare to procedural pain in a child as perceived by the child, parents, and healthcare professionals.	Intra –group correlation between scales $r=0.88$ , $p<0.001$ from children, parents and health care professionals $r=0.85$ to $0.88$ , $p<0.001$ . Nurses report pain correlation to child $r=0.587$ FPS-R and $0.518$ color analogue scale. Doctors pain report vs. child: $r=0.454$ FPS-R and $0.443$ color analogue scale. Mothers pain report correlation with child, $r=0.358$ FPS-R, and $0.377$ color analogue scale. Fathers pain reports correlation with child, $r= 0.401$ FPS-R, and $r=0.290$ color analogue scale Nurses pain report closest to the child self-report. Nurses from all countries scored high in attitudes to pain management (Mean $4.21$ sd $0.37$ ), and Nurses from Sweden ( $4.44$ ) scored better compared to others $p<0.001$ , UK ( $4.14$ ) vs. SA ( $3.93$ ). Total mean knowledge scores; $3.71(0.29)$ , UK mean score $3.70(0.26)$ , SA $3.44(0.32)$ and Sweden $3.87(0.19)$ . Nurses in Sweden had higher knowledge compared to South Africa and the UK and knowledge on pain medications was lowest in South Africa mean $3.15(0.41)$ , vs. UK $3.69(0.30)$ and Sweden $3.68(0.38)$ .	
Enskär, K., Ljusegren, G., Berglund, G., Eaton, N., Harding, R., Mokoena, J.,...Moleki, M. 2007	Cross-sectional comparative survey.  Outcome: Nurses children's pain knowledge levels and attitudes	South Africa (SA), United Kingdom (UK), Sweden. Cancer units Nurses n = 106	To identify and describe the knowledge and attitudes to pain and pain management among nurses working with children with cancer in 3 countries (UK, SA, Sweden)	Children's pain-relieving methods Cognitive-behavioral methods: Relaxation -61%, distraction 61%. Physical methods: Positioning 81 %, thermal-9%. Emotional support and other methods: 80% presence of parents, 86% rest/sleep, 56% tolerated the pain, and 33% ask nurses for help. Parents and nurses' use of pain-relieving methods Cognitive-behavioral: Parents-reinforcement 75%, relaxation 61% and distraction.	Low
He, H.-G., Vehviläinen- Julkunen, K., Pölkki, T., Pietilä, A.-M. 2007	Descriptive study. Outcome: Children's perceptions of the use of non- pharmacological methods.	China. Inpatient surgical. Children aged between 8- 12 years. n = 59.	To reveal the 8-12-year- olds children's perceptions on the use of non- pharmacological methods for pediatric post-op pain alleviation by themselves, their parents and nurses		Very low

Badr Zahr, L.K., Puzantian, H., Abboud, M., Abdallah, A., Shahine, R. 2006	Descriptive observational study. Exposure: Catheter insertion Outcome: Pain measurement tools validation Secondary outcome: Scale development	Lebanon. Children Cancer Center. Children aged between 4 and 10 years. n = 45	To examine the relationship between different indicators of pain and distress in Lebanese children with cancer undergoing catheter insertion. To evaluate the validity and reliability of the DOLLS tool to assess pain.	Nurses-preparatory information 70%, relaxation 70% and distraction 66 %. Physical methods: 66% of parents use positioning and massage, 78% nurse's uses positioning. Emotional support: Parents-comforting 88%, presence 86% and touch 80%. Nurses: comforting 80%. Other methods-assisting with ADLs††-90 % parents, creating comfortable environment-nurses 71% 3-time points correlations between heart rate and FPS-R††††† r=0.82, 0.71 and 0.85, p<0.01. All significant. 3-time points correlations between heart rate and DOLLS r=0.78, 0.87, 0.76, P<0.001. All significant. 3 time points correlations between blood pressure and FPS-R r=0.59, 0.78, and 0.91(p<0.001). All significant. 3-time points correlations between blood pressure and DOLLS r=0.75, 0.81, and 0.79 (P<.001). All significant. Both tools found to be valid and reliable for pain measurements in Lebanese children.	Low
Gupta, D., Agarwal, A., Dhiraaj, S., Tandon, M., Kumar, M., Singh, R.S.,...Singh, U. 2006	RCT Interventions: Balloon inflation Distraction Outcome: Pain responses	India. Inpatient. Children aged 6-12 years n =75.	To evaluate the efficacy of balloon inflation on venipuncture pain in pediatric patients	VAS scores-Control median 4 interquartile range 2-6, distraction median 2 interquartile range 1-3, balloon median 1 interquartile range 0-3. P<0.05 between control and other study groups. P<0.05 for intergroup comparison between distraction and balloon groups. Incidence and severity of venipuncture: Number of children with no pain- Control-0, distraction-0, balloon-11. Number of children with pain- Control-25, distraction-25, balloon 14.	High

He, H.-G., Pölkki, T., Pietilä A.-M., Vehviläinen- Julkunen, K. 2006	Descriptive survey study. Outcome: non- pharmacological methods used by parents for children's pain relief.	China. Inpatient surgical. Parents/car egivers of children aged 6-12 years. n =206	To describe what non- pharmacological methods Chinese parents use to relieve their children's postoperative pain and factors related to this	<p>P&lt;0.05 intergroup comparison between control and other study groups</p> <p>P&lt;0.05 intergroup comparison between distraction and balloon groups</p> <p>Common non-pharmacological methods</p> <p>Cognitive-behavioral methods: Distraction (85%), Imagery (80%), Preparatory information (76%).</p> <p>Positive reinforcement (67%), relaxation (62%), and breathing technique (37%).</p> <p>Physical methods and other pain alleviation methods: 69% positioning and massage, emotional support-presence (93%), touch (90%), and comforting/reassurance (84%), helping with ADLs†† (87%). Create a comfortable environment (73%).</p> <p>Comparisons: Fathers used imagery, positive reinforcement, and creating a conducive environment than mothers. Older parents used pre-op information and presence more than younger parents</p>	Very low
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Abbreviations: †MCQ- Multiple choice questions, ‡CLAWI- sub-Fascial continuous local anesthetic (2 % bupivacaine) wound infusion, §HIV- Human Immune Deficiency Virus, ¶WBFPS- Wong-Baker Faces Pain scale, ††ADLs- Activities of Daily Living, ‡‡FLACC- Faces, Leg, Activity, Cry, Consolability, §§COMFORT-B- COMFORT- Behavior scale, ¶¶VAS- Visual Analogue Scale, †††AUC- Area Under the Curve, ‡‡‡NICU-Neonatal Intensive Care Unit, §§§SICU- Step down intensive care unit, ¶¶¶PICU- Pediatric Intensive unit, ††††NIPS- Neonatal Infant Pain Scale, ‡‡‡‡ICC- Inter-Class Correlation Coefficient, §§§§NRS-Numeric rating scale, ¶¶¶¶KHCC- King Hussein Cancer Center, †††††KKU-Khon Kaen University, ‡‡‡‡‡FPS-R, Faces Pain Scale-Revised.

Level of evidence determined using the GRADE Criteria, Source GRADE WORKING GROUP, (2004), Grading quality of evidence, and strength of recommendations. BMJ: British Medical Journal, 328(7454), 1490-1490.

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## Appendix A2-1

Table A2-1. Quality of studies, Subcategories and Categories

<u>Author, year</u>	<u>Significance</u>	<u>Overall Quality</u>	<u>Subcategories</u>	<u>Category</u>
Azam, M. et al., 2012	Only study directly measuring the burden of pain. Disease-specific population. Non-surgical pain	NIH-NHLBI† Observational-Good	HIV-related pain. Outpatient setting. Non-surgical pain. The burden of pain. Pain treatment options. Short-term consequences of untreated pain.	Region: Africa. The burden of pain. Resource availability.
Badr, K, L. et al., 2006	Very important study for measure validation	NIH-NHLBI† Observational-Good	Pain tool validation. Pain tool development.	Region: Eastern Mediterranean. Pain measures
Bai, J. et al. 2012	Very crucial study in critical care in LMIC‡	NIH-NHLBI† Observational-Good	Pain tool validation. Specificity and sensitivity of pain tools	Region: Western pacific. Pain measures
Celebioglu, A. et al., 2010	Only study evaluating long-standing traditions in injections	NIH-NHLBI† Observational-Good	Non-pharmacological pain strategies. Physiologic pain reduction strategy	Region: Europe. Pain management/treatment
Clancy, M. A. 2014	Very important study for insight into the work of HP in LMIC.	CASP§-Good	Healthcare Provider experiences. Work environment. Barriers and strengths of care. Resource availability	Region: Africa. Health provider's perceptions. Resource availability
Dongara, A.R. et al., 2015.	Very important study for baseline information of pain management abilities of nursing staff	NIH-NHLBI† Observational-Good	Healthcare Provider knowledge and attitudes and beliefs.	Region: South-East Asia. Health providers perceptions
Ekim, A. et al., 2013	Critical study with a large sample and multisite.	NIH-NHLBI† Observational-Good	Healthcare Provider knowledge and attitudes and beliefs.	Region: Europe. Health providers perceptions

Enskär, K., et al., 2007	Crucial study that compares nurses knowledge in LMIC with high-income countries	NIH-NHLBI† Observational-Good	Healthcare Provider knowledge and attitudes and beliefs.	Region: Africa. Health providers perceptions
Eyelade, O.R. et al., 2009	Imperative study validating pain measures	NIH-NHLBI† Observational-Good	Validation of pain measures.	Region: Africa. Pain measures
Finley, G.A. et al., 2008	Excellent study reporting translation of evidence into practice	CASP§-Good	Healthcare provider's knowledge, attitudes and beliefs experiences, and practices	Region: Eastern Mediterranean. Health providers perceptions
Forgeron, P.A et al., 2009	Excellent study involving multi-site and used focus groups	CASP§-Good	Health care provider's knowledge, attitudes, and beliefs. Experiences and practices	Region: South-East Asia. Health providers perceptions
Gupta, D. et al., 2006	very innovative study	GRADE-High	Non-pharmacological pain strategies. Distraction and bearing	Region: South-East Asia. Pain management strategies.
He, H. et al., 2006	Critical study to understand how parents approach their child's pain	NIH-NHLBI† Observational - Good	Parents use on non-pharmacological methods. Commonly applied non-pharmacological methods	Region: Western Pacific. Pain management strategies.
He, H.G. et al., 2007	Very important study from children's view	NIH-NHLBI† Observational - Good	Children use of non-pharmacological strategies. Children's perceptions of parents and health providers' use of non-pharmacological strategies	Region: Western Pacific. Pain management strategies. Parent and child perceptions
He, H. et al., 2008	Vital study to show change over time in use of non-pharmacological methods with an intervention	NIH-NHLBI† (pre-Post test design)- Good	Healthcare provider practices. Nonpharmacological strategies.	Region: Western Pacific. Pain management strategies. Health provider perceptions
He, H.G. et al., 2010	Very important study on parents perception of support	NIH-NHLBI† Observational - Good	Parent's experiences and practice. Non-pharmacological pain strategies	Region: Western Pacific. Pain management strategies. Parent and child perceptions

Huth, M. M., et al., 2010	Paramount study to show the effect of an intervention on knowledge and attitudes	NIH-NHLBI† (pre-Post test design)-Good	Health care provider's knowledge, attitudes, and beliefs.	Region: America. Health providers Perceptions.
Jongudomkarn, D. et al., 2008	Imperative study towards achieving culture-specific pain tools	NIH-NHLBI† Observational - Good	Pain tool development	Region: South-East Asia. Pain measures
Jongudomkarn, D. et al., 2012	an excellent study that provides insight into the influence of culture in pain management	CASP§-Good	Parents experiences and practices. Parents' knowledge, attitudes, and beliefs.	Region: South-East Asia. Parents and child perceptions.
Katende, G., et al., 2015	excellent study reflective on the actual clinical practice in LMIC	NIH-NHLBI† Observational-Good	Health care provider's knowledge, attitudes, and beliefs. Healthcare providers practices	Region: Africa. Health provider perceptions.
Kassab, M. et al., 2012	A great study exploring alternative and cheap pain treatment options	GRADE- High	Non-Pharmacological pain methods	Region: Eastern Mediterranean. Pain management strategies.
Lunsford, L. 2015	An excellent study to elucidate knowledge and attitudes.	NIH-NHLBI† (pre-Post test design)-Good	health care providers knowledge, attitudes, and beliefs	Region: Western Pacific. Health provider's perceptions.
Machoki, M.S. et al., 2015	A very rare study in LMIC evaluating pain relief as well as other pain outcomes.	GRADE -High	Pharmacological approaches to pain	Region: Africa. Pain management strategies.
Mathew, P.J. et al., 2011	A splendid study that compares areas of similar acuity.	NIH-NHLBI† Observational - Good	Health care provider's knowledge, attitudes, and beliefs. Non-Pharmacological pain management strategies.	Region: South-East Asia. Health provider's perceptions. Pain management strategies.
Olaogun, A. et al. (2008)	Exquisite study on parent's knowledge and experiences in managing the pain of their children.	NIH-NHLBI† Observational - Good	Parent's knowledge, attitudes, and beliefs. Parents pain management practices	Region: Africa. Parents and child Perceptions.

Ozcetin, M. et al. 2011	A very good study demonstrating the significance of parental presence in a child's ability to tolerate pain.	GRADE-High	non-pharmacological pain strategies	Region: Europe. Pain management strategies.
Ozdemir, F.K. et al., 2012	Good study applying more affordable technologies to manage pain	GRADE-Moderate	non-Pharmacological pain strategies	Region: Europe. Pain management strategies.
Sadeghi, T. et al., 2013	Good study for alternative pain management strategies	GRADE-moderate	non-pharmacological pain strategies	Region: Eastern Mediterranean. Pain management strategies.
Subhashini, L. et al., 2008.	A good study demonstrating the correlation between parents, child, and health providers pain scoring as well as validating a tool in this group.	NIH-NHLBI† Observational - Good	Scale validation.	Region: South-East Asia: Pain measures.
Tufekci, F.G., et al., 2009	A good study demonstrating alternative methods to the reduction of pain.	GRADE-Moderate	Non-pharmacological pain strategies.	Region: Europe: Pain management strategies.
Ughasoro, M.D., et al. 2014	Good study to demonstrate the willingness of parents to treat pain in their children	NIH-NHLBI† Observational - Good	Resource availability and utilization. Parents perceptions of children's pain	Region: Africa. Pain management resources. Parents and child perceptions.

†NIH-NHLBI- National Institute of Health, National Heart, Lung, and Blood Institute ‡LMIC-Low-Middle Income Countries §CASP-Critical Appraisal Skills Programme

GRADE- GRADE criteria. Level of evidence determined using the GRADE Criteria, Source GRADE WORKING GROUP, (2004), Grading quality of evidence, and strength of recommendations. *BMJ: British Medical Journal*, 328(7454), 1490-1490

NIH-NHLBI criteria, Source National Institute of Health. (2014). Study quality assessment tools. Retrieved from <https://www.nhlbi.nih.gov/health-pro/guidelines/in-develop/cardiovascular-risk-reduction/tools>

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## CHAPTER 3

### The Prevalence, Intensity, Assessment, and Management of Acute Pain in

### Hospitalized Children in Botswana

### Submission to *Journal of Nursing Scholarship*

#### Abstract

**Background:** Children in sub-Saharan Africa suffer from acute pain inconspicuously due to lack of clinical and observational data on this vulnerable population.

**Aim:** To report the prevalence, nature, and severity of acute pain and management practices, and describe associations between acute pain outcomes, children's and parents/guardian's demographics in hospitalized children aged two months to 13 years in two Botswana tertiary hospitals.

**Methods:** A descriptive-correlational prospective observational study conducted in a sample of 308 children and 290 parents between November 2018 and February 2019. Pain was measured five times in a 60-hour window using FPS-R for children  $\geq 7$  years, rFLACC for children  $< 7$  years and numeric rating scale for parents if the child is  $< 7$  years and categorized as no pain, mild, moderate, and severe pain. Data on pain documentation and management were abstracted from health records retrospectively.

**Results:** Forty-six percent of children were reported to be currently in pain, but 59% scored more than zero on pain assessments at enrollment-37% mild, 17% moderate, and 5% severe pain. On subsequent assessments, pain intensity ranged between 28-35%-mild, 10-15%-moderate, and 4-6%-severe pain. Parents indicated that 25% and 12% of children aged  $< 7$  years had moderate and severe pain, while 44% did not have pain.

Subsequent parents/guardians' reports ranged between 14-23%-mild, 14-22%-moderate, and 6-11%-severe pain. Fifty-four percent of health records had at least one pain documentation in their health records over 48 hours, and moderate pain (4-7) was the highest pain score documented. Acetaminophen was the common analgesic across all age groups.

**Conclusion:** Acute pain prevalence among hospitalized children in Botswana is high and consistently underrated when assessed and undertreated.

**Clinical relevance:** Children hospitalized in Botswana have high pain prevalence that is infrequently assessed during routine care and possibly undertreated, calling for an improvement in its management.

*Keywords:* pain, acute pain, pediatric, hospitalization, Botswana, observational

Millions of children residing in low- and middle-income countries (LMIC), such as Botswana, inconspicuously suffer from inadequately managed acute pain. The lack of reliable data on the burden of acute pain and its management practices is the primary reason children suffer from inadequate pain management (Bond, 2011; Matula, Polomano, & Irving, 2018). Available data from other sub-Saharan African countries estimate the prevalence of acute pain between 45% and 80% in various pediatric subpopulations (Azam, Campbell, & Ross, 2012; van der Heijden, de Jong, Rode, Martinez, & van Dijk, 2018). Precise estimates for the prevalence of acute pain among the general pediatric population remain largely unknown, despite recognition that the burden of pain is a significant problem in the sub-Saharan African region (Bond, 2011; Matula et al., 2018).

Inadequately managed acute pain in childhood exposes children to both acute and chronic physical, physiological, psychosocial, and developmental sequelae such as chronic pain disorders and behavioral maladaptation (Katz & Seltzer, 2009; Low & Schweinhardt, 2012; Schwaller & Fitzgerald, 2014). Furthermore, considering that sub-Saharan Africa has the world's largest population of children, inadequate acute pain management will significantly affect global population health indicators such as years lived with disability (YLDs) (Global Burden of Disease Pediatrics et al., 2016; United Nations DESA/Population Division 2017). Given the risks faced by children in LMICs and the consequences of inadequate acute pain management, data on pain prevalence and management strategies must be available to raise awareness and facilitate the development of pain management improvement strategies.

Inadequately managed acute pediatric pain in most LMIC, such as Botswana, is attributed to the interaction of multiple factors (Alotaibi, Higgins, Day, & Chan, 2018; Aziznejadroshan, Alhani, & Mohammadi, 2015; Cooper et al., 2017). Common risk factors related to inadequate acute pain management in LMIC are either non-modifiable or modifiable. Non-modifiable risk factors include those related to the etiology or nature of pain and the developmental abilities of children to communicate their pain (Aziznejadroshan et al., 2015; Czarnecki et al., 2011). Children may inadvertently experience pain and, without recognition of these painful episodes, healthcare providers may overlook the potential consequences of pain.

Modifiable risk factors emanate from the environment and socio-cultural background. Evidence suggests that the sub-Saharan African socio-cultural and environment background are significant impediments to adequate acute pediatric pain management (Alotaibi et al., 2018; Matula et al., 2018). Culture-related challenges include the different cultural norms or personal beliefs of healthcare providers, multiple languages and dialects, and cultural hierarchies that can lead to poor communication between children, parents/guardians, and healthcare providers (Alotaibi et al., 2018; Matula et al., 2018). Environmental impediments include the limited knowledge and insufficient skills of healthcare providers, high levels of illiteracy among family caregivers, and scarcity of pain management resources (e.g., analgesics and pediatric formulations of analgesics) (Alotaibi et al., 2018; Matula et al., 2018). Furthermore, some studies have reported a high prevalence of myths and misconceptions regarding pediatric pain in LMIC (Alotaibi et al., 2018; Matula et al., 2018). Given the prevalence of many modifiable LMIC risk factors in the Botswana setting, it is assumed that pediatric acute pain is being

inadequately addressed in Botswana; however, there is currently limited data to back up this assumption.

While children in sub-Saharan Africa are already vulnerable to suffering from inadequate acute pain management, hospitalization in a limited resource healthcare facility can further increase their exposure to acute pain (Aziznejadroshan et al., 2015; Matula et al., 2018). Hospitalization increases the risk of inadequate pediatric acute pain through various mechanisms, including disease processes and medical procedures (Aziznejadroshan et al., 2015). Therefore, it is essential to better understand the burden of the pediatric acute pain problem in Botswana's hospitals to inform policies, facilitate quality improvement, and close the data gap in the literature. The purpose of this descriptive prospective observational study is to report the prevalence and intensity of pediatric acute pain, describe common acute pain management practice patterns and identify risk factors for inadequate pain management among children aged two months to 13 years hospitalized in two tertiary hospitals in Botswana. The specific aims of this study are to 1) report the prevalence, nature, and severity of acute pain and acute pain management practices; and 2) describe the associations between pain outcomes and patient and family caregiver demographics.

## **Methods**

### **Study Design**

This is a descriptive correlational prospective observational study. Pain assessments were performed during the initial 48 hours following enrollment with a retrospective health record review at the end of the same period to determine acute pain management patterns. The prospective observational study design is adopted to utilize both clinical

observations, as well as a review of health records (i.e., patient charts) to reveal patterns in pediatric pain care. This approach reduces bias due to a lack of documentation that could occur with cross-sectional observation alone. Also, the five pain assessments and health record reviews for 48 hours post enrollment provide a better reflection of the child's pain experiences for the period of hospitalization compared to a one-time assessment. The results from the descriptive correlational prospective observational study could provide the basis for hypothesis generation and designing future studies, including interventions at the population level (dos Santos Silva, 1999). This study conformed to guidelines set by the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) (von Elm et al., 2014)

### **Setting**

The study was conducted in four pediatric units in two tertiary referral hospitals in Botswana. Botswana is an ethnically diverse country with a population of 2,039,000, of which 811,000 are children under the age of 18 (Unicef, 2016). Tertiary referral hospitals provide the most sophisticated care in Botswana and admit a diverse population of children, including those from rural areas (Statistics, 2012). Princess Marina Hospital (PMH) and Nyangabgwe Referral Hospital (NRH), located in Gaborone and Francistown, respectively were the settings for this study. PMH is a 525-bed hospital with 110 beds allocated for pediatric patients. Forty beds are reserved for neonates, while 40 and 30 beds are dedicated to medical and surgical pediatric patients, respectively (Steenhoff, Mazhani, Shah, & Kung). NRH is a 550-bed hospital with 98 beds allocated for pediatric patients. Twenty-eight beds are reserved for neonates, while 40 and 30 beds are dedicated to medical and surgical pediatric patients, respectively.

## **Participants Eligibility**

The target population is a hospitalized pediatric population in Botswana. Based on Botswana health guidelines, a pediatric patient is a child aged between 0 days to 13 years. Participants were recruited following a minimum of 12 hours of hospital admission to either the medical or surgical pediatric units. Children were eligible for the study if: 1) aged two months to 13 years and admitted to the inpatient pediatric units at participating hospitals; 2) aged <7 years with parents/guardians present during hospitalization; 3) aged  $\geq 7$  years either accompanied by parent or by themselves with parental consent; 4) they spoke either English or Setswana fluently; and 5) their parents/guardians were able to read, understand, and sign a consent form.

The exclusion criteria for participants were: 1) neonates (0-2 months), due to their pain care and needs being somewhat different from those of the rest of the pediatric population; 2) children admitted to units for nutritional rehabilitation without other medical indications, and other non-medical reasons for admission including transitioning to other hospitals, abandoned children (i.e. abandoned by guardians), and rape cases as they may be dealing with crisis; 3) children with cognitive and/or developmental delay as identified by the Prescreening Developmental questionnaire (PDQ-II) (Shahshahani et al., 2011); and 4) children admitted for 24 hours or less for observational purpose.

## **Variables and Measurements**

Prevalence of pain and pain intensity: either a subjective or an objective pain assessment based on the child's age using the appropriate pain scales at enrollment and four subsequent times over 48 hours at 12 to 18-hour intervals during the day. An additional question on whether the child is or is not in pain at enrollment and, if not, the

last time he/she was in pain. Pain intensity is categorized as no pain (score 0), mild (score 1-3), moderate (score 4-7), and severe (score 8-10) (Tsze, Hirschfeld, Dayan, Bulloch, & von Baeyer, 2016).

#### **Children aged $\geq 7$ years.**

Faces Pain Scale-Revised (FPS-R) is a standard self-report pain measurement tool used in pediatric pain management. FPS-R consists of six gender-neutral faces depicting a face of "no pain expression" on the left (scored as 0) and a face of "most possible pain" on the right (scored as 10) (Hicks, von Baeyer, Spafford, van Korlaar, & Goodenough, 2001). This tool is validated in children aged 4–16 of various cultures with a convergent validity of  $r = .82$  and a test-retest coefficient of  $r = .77$  (Tsze, Hirschfeld, von Baeyer, Bulloch, & Dayan, 2015). Cross-cultural validations of FPS-R have been conducted in sub-Saharan African countries with a similar culture to that of Botswana and various pediatric populations (Bosenberg, Thomas, Lopez, Kokinsky, & Larsson, 2003; Huang et al., 2012).

#### **Children aged $< 7$ years.**

The Face, Legs, Activity, Cry, Consolability (rFLACC) scale is used for the objective pain assessment in this age group (Malviya, Voepel-Lewis, Burke, Merkel, & Tait, 2006). The rFLACC is used in this population because it offers more behaviors than the original FLACC instrument due to its inclusion of children with medical conditions (Voepel-Lewis, Zanoliti, Dammeyer, & Merkel, 2010). The rFLACC scale has not been validated in Botswana, but it has been validated in various pediatric populations across the world with multicultural populations including sub-Saharan Africa (Bai, Hsu, Tang, & van



Dijk, 2012; Bussotti, Guinsburg, & Pedreira Mda, 2015). The rFLACC scale is scored from 0–10.

### **Parents/guardians.**

The numerical rating scale (NRS) is used for the parent/guardian's pain assessment of children aged <7 years in this study. The NRS has been widely used for pain measurement in adults and as proxy measures in children's pain and has shown consistency across various populations (Huang et al., 2012; Khin Hla et al., 2014).

Data on pain assessment and documentation, analgesic prescription and administration and non-pharmacologic strategies were collected retrospectively from health records at enrollment and 24 hours post-study. Data on child age, gender, and place of residence were self-reported by the patient or parent during enrollment while diagnosis, unit of admission, and whether the child had a surgical procedure were collected from health records. Parents/guardians self-reported data on age, gender, relationship to the child, educational level, and cultural background. Age at last birthday is used for both children and parents/guardians.

### **Sample size**

The sample size was estimated based on statistical methods for descriptive data analysis as described by Daniel (1999) and Snedecor and Cochran (1989) (*Equation 3-1*). According to the equation;

$$N = 4(Z_{crit})^2 p(1 - p) \div D^2 \quad (3-1)$$

where  $N$  is the sample size,  $Z = 1.96$  (95% CI),  $D = 0.22$  ( $1 - p$ ), and  $p = 0.78$ -proportions of children experiencing pain a population estimate from previous studies (van der

Heijden et al., 2018). An estimated sample size of 55 is required. Considering multisite, subgroup, and correlation analysis of various variables, the sample size is quadrupled to 220. Finally, considering an attrition rate of 20%, the sample size of 264 was required for this study. Due to the time of 48 hours that each study subject needed to spend in the study following recruitment, a shorter length of stay of some children than initially anticipated, it was observed that the attrition rate was higher than 20%, and hence the sample size was increased to 312 using an adjusted 40% attrition rate (Figure 3-1). The sample was equally stratified by age groups, hospital, and hospital units to ensure sample heterogeneity; the only exception was age because the majority of children admitted to pediatric units at these two referral hospitals are under the age of 5 years old.

### **Ethical considerations**

The study was approved by the University of Pennsylvania Institution Review Board (IRB), the University of Botswana IRB, Botswana Ministry of Health, Health Research and Development Committee (HRDC), the Princess Marina Hospital and Nyangabgwe Referral Hospital Ethics Review Committees. The research team could not provide direct patient care, therefore efforts were made to ensure that all involved parties were available to discuss and treat child's pain in participants with moderate-severe pain and no viable pain care plan or required urgent relieve of pain.

### **Procedures**

Data collection occurred between 6 am and 7 pm every day, except on holidays, and was conducted by a member of the research team using Redcap software. The analysis did not include participants with missing data; therefore, there is variability in sample size per variable and time point. Participants with missing data were dropped for each

variable rather than imputation due to the sample size being larger than the power analysis required. Place of residence is categorized based on the level of development; rural-places with a clinic or health post, sub-urban - places with primary hospitals and developed villages, urban/town - designated towns and large villages around cities and towns, and cities as cities. Children are grouped into three age groups: less than <6, 6 to <10, and 10-13 years. Parents/guardians' age was categorized as <25 years and below, 25 to <35 years, 35 to <50 years, and  $\geq 50$  years. Education was categorized as elementary (primary to middle school being 1<sup>st</sup> to 10<sup>th</sup> grade), high school (grade 11 and 12), college (certificate and diploma holders) and degree from a university degree and above. Six diagnostic groups are deduced from aggregating all related medical diagnoses: (1) Pneumonia, (2) Acute gastroenteritis, (3) Wounds -all open wounds that require dressing changes except motor vehicle, fractures and trauma-related injuries which were grouped as (4) Trauma, (5) Cancer, and all the remaining diagnoses were grouped as (6) Other. The eight most common ethnic groups were used while the rest were grouped under other for the cultural background.

### **Statistical Analysis**

Descriptive statistics, including the means, standard deviation (SD), range, and proportion, were used to analyze baseline characteristics of samples. Reliability for the instruments was tested using the area under the curve (*c-statistic*) for FPS-R and NRS, *Kappa statistic* and *Cronbach's alpha* for rFLACC, and the spearman correlation between rFLACC and NRS. Proportions and frequencies were used to analyze the categorical data. *Chi-square* was used to analyze the associations between child and parent/guardian demographics, and primary pain outcomes. The relationship of predictor variables (child

and parent/guardian characteristics) with the primary pain outcomes was evaluated, which include age, gender, admitting diagnosis, surgical procedure, unit for child demographics and age, education level, culture and primary area of residence, and parent relationship to the child for parent/guardian demographics. All analyses were conducted in Stata version 15.1 (State Corp, LP, College Station, TX, USA). The significance level for statistical tests is set at  $p \leq .05$ .

## **Results**

A sample of 308 children and 290 parents participated in the study and were included in the analysis (Figure 3-1). The mean age (SD) of children and parents/guardians was 4.3 (3.5) years and 32.8 (10.5), respectively. Sixty-eight percent of the sample were children <6 years, and 55.5% were males while the majority of parents/guardians were females (95.6%) and mothers (81.5%) to the children. More details on the demographics of the sample are reported in Table 3-1.

### **Reliability of measures.**

The inter-rater reliability for rFLACC was tested with the first 20 observations and showed  $\kappa = .87$ ,  $p = .09$ , and the internal consistency for the sample was  $\alpha = .76$ . The correlation between rFLACC and NRS was  $.51$ ,  $p = .00$ . The c-statistic for FPS-R was  $.70$ ,  $p = .06$ , and NRS was  $.80$ ,  $p = .03$ .

### **Pain prevalence and intensity.**

At enrollment, children and parents reported that 46% (142/308) of children were currently in pain. Both self-report and behavioral measurements indicated that 59% of children were in pain, with 22 % having moderate-severe pain (Figure 3-2). Of children

who did not report or were not reported to be in pain at the time of enrollment, 54% (89/165) reported experiencing pain within the past 24 hours, whereas 20% either could not remember experiencing pain or never experienced pain. A majority of children had mild pain with the highest prevalence period being 37% at enrollment and the lowest being about 28% at 48 hours. Moderate pain ranged between 10% at 24 hours post enrolment to 17% at enrollment. Severe pain was rare across the times, with a maximum of 7% at 24 hours (Figure 3-2). Thirty-six percent (85/236) of parents of children aged <7 years scored children's pain as moderate-severe pain, while 44% scored children's pain at zero at enrollment. The subsequent assessment showed the percentage increase in parents/guardians' scoring children's pain as zero from 51% at 12 hours to 56%, 63%, and 55% at 24, 36, and 48 hours, respectively. Moderate-severe pain was generally decreasing with each subsequent assessment except at 24 hours (Figure 3-3).

#### **Pain assessment and management practices.**

During the 48 hours of the study, the pain was documented at least once in 54% of the participant's health records. Minimal pain documentation (1-5 documentation against 9-15 expected documentation) constituted 95% of all pain documentation. The pain was mainly documented in nurses' notes section of health records at 32% and least in doctors' notes section of health records at 7% (Figure 3-4). Zero (no pain) was the commonly documented score at 61%. Moderate pain (4-7) was the highest pain score and constituted only 6% of the documentation. Sixty-two percent of children's health records had an analgesic prescription, and 81% of prescriptions were on clock schedule. Acetaminophen was the analgesic of choice, constituting 71% prescriptions in all health records, while

opioid analgesics constituted only 15% of prescriptions (Figure 3-5). No non-pharmacological measures were documented in health records.

**Associations: pain outcomes and children/parents/guardians demographics.**

At enrollment, children reporting to be in pain were statistically significantly associated with the admission unit ( $\chi^2 = 15.4 (3)$  - *degrees of freedom*,  $p = .002$ ), diagnosis ( $\chi^2 = 14.3(5)$ ,  $p = .014$ ) and the age of the parents ( $\chi^2 = 12.1 (3)$ ,  $p = .007$ ). Surgical units, open wounds, and older-parent age were associated with higher pain reports. The child-reported and observed pain intensity at enrollment was statistically significantly associated with child age ( $\chi^2 = 24.7(6)$ ,  $p < .001$ ), admission unit ( $\chi^2 = 18.4(9)$ ,  $p = .03$ ), and diagnosis ( $\chi^2 = 26.4(15)$ ,  $p = .034$ ). No conclusion could be drawn based on the evidence about the associations between experiencing pain at enrollment and pain intensity as reported or observed in children and parents/guardians' scores with other child and parent/guardian characteristics (Table 3-S1 & 2).

Subsequent pain intensity scores were statistically significantly associated with child age ( $\chi^2 = 19.9(6)$ ,  $p = .003$ ) and place of residence ( $\chi^2 = 27 (9)$ ,  $p = .001$ ) for child scores and parent's relationship with the child ( $\chi^2 = 21.1(9)$ ,  $p = .012$ ), parents age ( $\chi^2 = 26 (12)$ ,  $p = .002$ ) and from parent's scores at 12 hours (Table 3-S3 & 4). At 24 hours child age ( $\chi^2 = 13.9 (6)$ ,  $p = .03$ ) and surgery status ( $\chi^2 = 8.4(3)$ ,  $p = .039$ ) from child-assessed scores and diagnosis ( $\chi^2 = 24.8(15)$ ,  $p = .05$ ) and parent's age group for parent's scores were statistically significantly associated with pain intensity. Child-assessed pain intensity was statistically significantly associated with child age ( $\chi^2 = 21.5 (6)$ ,  $p = .001$ ), diagnosis ( $\chi^2 = 36.4 (15)$ ,  $p = .002$ ), parents' relationship with child ( $\chi^2 = 21.1 (9)$ ,  $p =$

.012), parent's age ( $\chi^2 = 17.2 (9), p = .046$ ) and parent's sex ( $\chi^2 = 19 (3), p < .001$ ) at 36 hours (Table 3-S5 & 6). No conclusion could be drawn based on the associations between pain intensity as scored by parents/guardians with any child or parent characteristics at 36 hours. At 48 hours child age ( $\chi^2 = 19.8(6), p = .003$ ), parent's relationship with child ( $\chi^2 = 36.5 (9), p < .001$ ), parent's sex ( $\chi^2 = 31.5(3), p < .001$ ) and cultural background ( $\chi^2 = 43.5(24), p = .009$ ) were statistically significantly associated with child assessed pain intensity while only parent's age ( $\chi^2 = 19.9(9), p = .019$ ) was statistically significantly associated with parent's scores. No conclusion could be drawn based on the associations between pain intensity at 12 hours, 24 hours, 36 hours, and 48 hours, and other child and parent/guardian characteristics.

## Discussion

This is the first prospective descriptive correlational observational investigation to look at pain prevalence, intensity, and pain management practices among children in Botswana tertiary hospitals. A high number of children are admitted who are experiencing pain, yet the health records documentation and treatment prescriptions do not reflect this. The study recruited a diverse population of pediatric patients and their caretakers, which closely resembles the population of Botswana in the areas sampled. While the percentage of male caregivers is low, it is common that most of child caretakers in Botswana and sub-Saharan Africa are women. The study used measures that are valid and reliable in this population (rFLACC, FPS-R, and NRS).

The results show that the prevalence of pain among children hospitalized in Botswana is high, ranging between 46% when asked if in pain to 59% on self-reports and behavioral assessments. Also, the number increases to 75% if including those who

reported pain less than a day before enrollment. The parent/guardian's assessment also indicated that the prevalence is high in children <7 years at 56% at enrollment. Similar studies in high-income countries (HIC) show that pain prevalence is lower than that observed in this study (Plummer, McCarthy, McKenzie, Newall, & Manias, 2017; Walther-Larsen et al., 2017), but comparable pediatric subpopulation studies in LMIC show similar results (Azam et al., 2012; van der Heijden et al., 2018).

The prevalence of medically relevant pain (moderate to severe pain) is also high among this sample with children pain scored at 22% at enrollment and ranging between 16% and 19% subsequently. Parents/guardians reported the proportion of children with medically relevant pain higher at 36% at enrollment and a range of 20% to 30% subsequently, which is also supported by associations between child age and pain intensity across time. These findings are comparable to results from other studies where the majority of children with pain report mild pain (Plummer et al., 2017; Walther-Larsen et al., 2017). While these results are encouraging, care needs to be taken because evidence suggests that underreporting of pain is very common in most LMIC populations, particularly in children (Forgeron et al., 2009).

Pain was documented at-least once in about 54% of the observations, which is less than the 87% reported by Plummer et al. (2017). Results from other LMIC pediatric studies place the range of postoperative pain assessment between 5% and 46% over the 48 hours post-surgical period (Sama et al., 2014). The majority of pain documentation was minimal (1-5 documentations over 48 hours) compared to the expected (9-15) pain documentations. Similar findings were reported by Sama et al. (2014), where pain assessment was documented at 42% at the first hour in children  $\leq 7$  years but reduced to



just 8% 48 hours later. Inconsistent pain assessment and documentation is reported as a significant issue affecting pain management in most LMIC (Matula et al., 2018).

Moderate pain was the highest pain intensity recorded in patients' health records at 6%, which is low and suggests that healthcare providers are more likely to underestimate a child's pain intensity. Also, "no pain" (0) scores were the most common documented pain intensity (61%) compared to other levels of intensity, which may point toward a systematic disregard of child's pain by healthcare providers. This represents an area for further study and education. Several children had conditions that are regarded as painful and a significant number of them were post-operative, but that was not reflected in health records documentation and treatment of pain. Forgeron et al. (2009) reported that healthcare providers often disregarded children's pain self-report and downplayed the severity of the pain. More research is needed here to elucidate factors that may be contributing to the low pain scores in this population.

About 62% of children had an analgesic prescription despite the majority of pain documented as mild, which often does not require treatment. Acetaminophen was the analgesic of choice for pain treatment, with 71% of children prescribed this drug; this is consistent with results reported by Walther-Larsen et al. (2017). Prescribing of opioid analgesics was limited in our study, and it is not clear whether this was influenced by "opioid phobia", or lack of availability of opioids, or underestimating the need for opioids as indicated in other studies in LMIC (Clancy, 2014; Forgeron et al., 2009).

Child age, diagnosis, and parent's relationship to the child and parent's age were consistently associated with pain intensity as assessed by child self-report and behavioral scale. Children aged <6 years were more likely to be reported to have mild pain, while

children aged six to <10 years were more likely to report either no pain or moderate pain. These findings were in contradiction to evidence reported by van der Heijden et al. (2018) where younger children were assigned higher pain scores than older children. Children diagnosed with both medical and surgical diseases associated with open wounds were associated with reporting higher pain intensity, which could be linked to inadequate pain control during dressing changes or admission period. The findings are similar to reports by van der Heijden et al. (2018), who found that children with burns were likely to report more pain due to dressing changes. The trend of younger parents indicating that children do not have pain and scoring pain intensity lower than older parents is intriguing as there is currently no evidence to explain this finding. Parental experience with child pain and their own pain experiences may explain these findings, however requires further investigation and is beyond the scope of the present study.

### **Limitations**

There are several limitations associated with this study. The first limitation is the sample which mainly constituted children younger than five years; this could have skewed the data, particularly concerning the relationships between pain outcomes and child age. Also, the sample consisted of mainly female family caregivers, and assessments of pain by males (fathers) may be different. While the sample is mainly children younger than five years and female caregivers, it reflects the population admitted in pediatric units and the most common family caregivers in Botswana and most sub-Saharan African countries. Also, children aged <5 years constitute 70% of the inpatient population among children aged 0-14 years in Botswana, therefore the majority of the sample was likely to be <5 years (Statistics Botswana, 2017). Future studies should

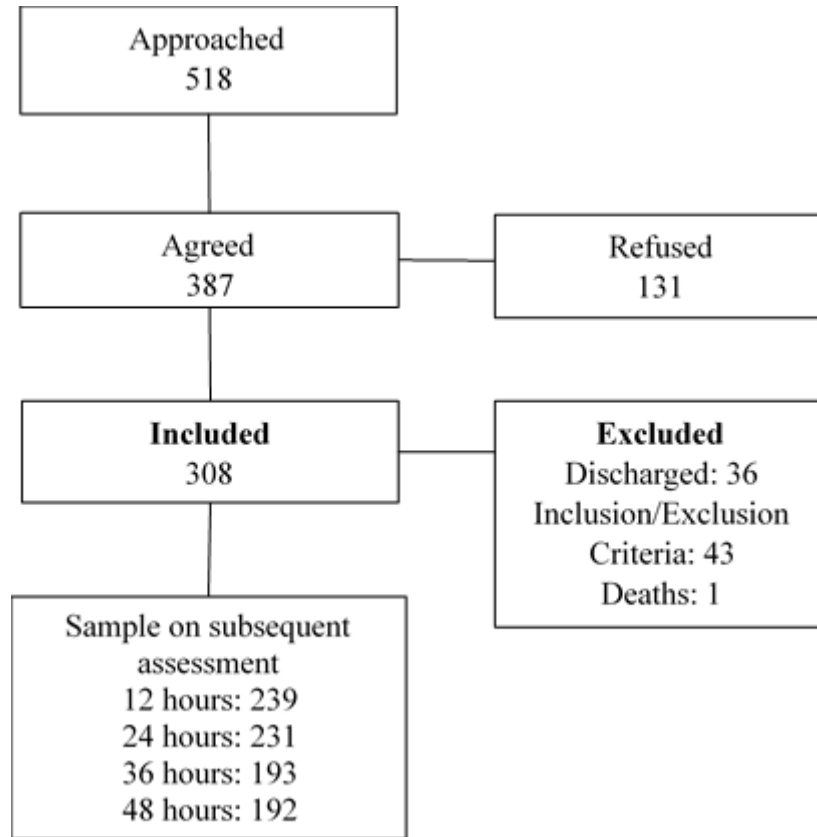
extend the data collection period to potentially increase the age range of participants to better balance the sample. Hawthorne effect, social desirability, and peer pressure biases are possible in this study. These biases could influence the results due to the over-reporting or underreporting of pain by parents/caregivers and children because the researchers ask questions related to pain and are actively assessing pain. This bias was addressed by conducting objective pain assessments for children <7 years and having the parent/guardian report their assessment of the child's pain for comparison. Evidence suggests that parents/guardians pain reports are closest to the child's self-reports (Khin Hla et al., 2014). The age cut-off for self-report (FPS-R), which is considered gold standard for reporting pain in this study is high (7 years) instead of 4 years. While this is a limitation, children aged <7 years often have a parent/guardian at the bedside who serve as proxy in reporting symptoms and questions are rarely directed to the child in clinical settings. Therefore, this study closely emulates this day-to-day clinical interaction. Furthermore, a series of pain assessments were conducted, not only one. The rareness of some of the outcome variable categories, particularly severe pain, could have skewed the results. The grouping of some diagnoses could also be considered a limitation for this study.

## **Conclusion**

The prevalence of acute pain among children aged two months to 13 years admitted to two tertiary hospitals in Botswana is high, but pain intensity is low. More research is needed to determine if the low intensity is related to the cultural perception of pain. Pain is not well documented in these Botswana hospitals, and acetaminophen is the primary

treatment of pain despite some conditions being considered painful and requiring more than just acetaminophen to manage.

**Figure 3-1. Participant selection flow diagram.**



**Table 3-1. Participant's demographics and characteristics.**

<u>Child demographics and characteristics</u>					
<u>Characteristics</u>	<u>Mean(SD)</u>	<u>Median</u>	<u>Range</u>	<u>n (count)</u>	<u>Percent</u>
Age	4.3 (3.5)	3	1-13		
Age in months if under 1 year	7.8 (3.7)	8	2-12	106	34.2
<u>Child's age group (years)</u>					
<6				211	68.1
6-<10				69	22.3
10-11				30	9.7
<u>Gender</u>					
Male				171	55.5
<u>Days in hospital at enrolment</u>	4.8(6.4)	2.5	0-45	308	
0-2 days				154	50
3-5 days				68	22.1
6-10 days				44	14.3
>10 days				42	13.6
<u>Hospital and Unit</u>					
PMH-Medical				64	20.7
PMH-Surgical				77	24.8
NRH-Medical				86	27.7
NRH-Surgical				83	26.8
<u>Post-surgery<sup>a</sup></u>					
Enrolment				74	23.9
12 hours				50	20.9
24 hours				51	22.3
36 hours				44	22.8
48 hours				50	26
<u>Residence</u>					
Rural				129	24.8
Semi-Urban				66	21.6
Urban/town				35	11.4
City				76	24.8
<u>Common diagnostic group<sup>b</sup></u>					
Acute Gastroenteritis				32	10.4
Trauma				62	20.1
Pneumonia				23	7.5
Wounds				25	8.1
Cancers				14	4.6
Other				152	49.4

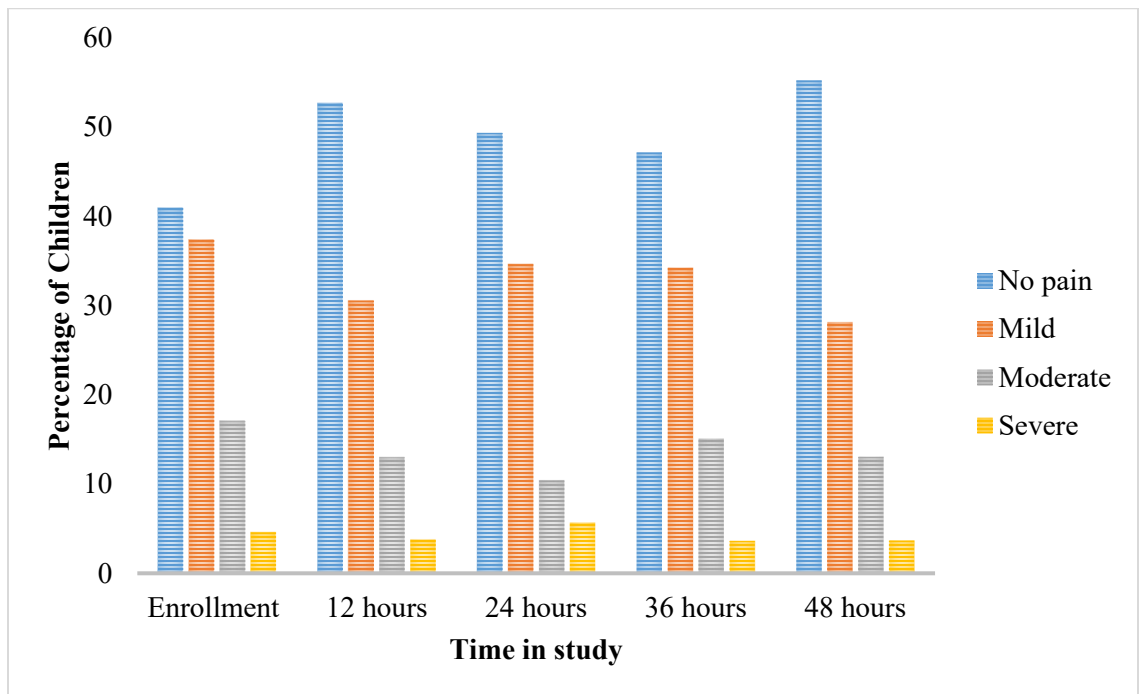
**Table 3-1 Continuation**

<u>Parent/guardian demographics and characteristics</u>					
<u>Characteristics</u>	<u>Mean(SD)</u>	<u>Median</u>	<u>Range</u>	<u>n (count)</u>	<u>Percent</u>
Age	32.8(10.5)	31	17-81	290	
<u>Parent/guardian age group (years)</u>					
≥25				64	22.2
25-<35				122	42.2
35-<50				86	29.8
≥50				17	5.9
<u>Parent/guardian gender</u>					
Female				264	95.6
<u>Parent/guardian relationship to the child</u>					
Mother				243	81.5
Father				12	4
Grandmother				23	7.7
Other				20	6.7
<u>Parent/guardian education level<sup>c</sup></u>					
Elementary				152	51.5
High School				66	22.4
College				55	18.6
Degree and above				22	7.5
<u>Parent/guardian common ethnic groups<sup>d</sup></u>					
Bakalaka				74	24
Batswapong				20	6.5
Bakgalagadi				17	5.5
Bangwato				22	7.1
Basarwa				15	4.9
Bakgatla				25	8.1
Bangwaketse				25	8.1
Bakwena				24	7.8
Other				86	27.9

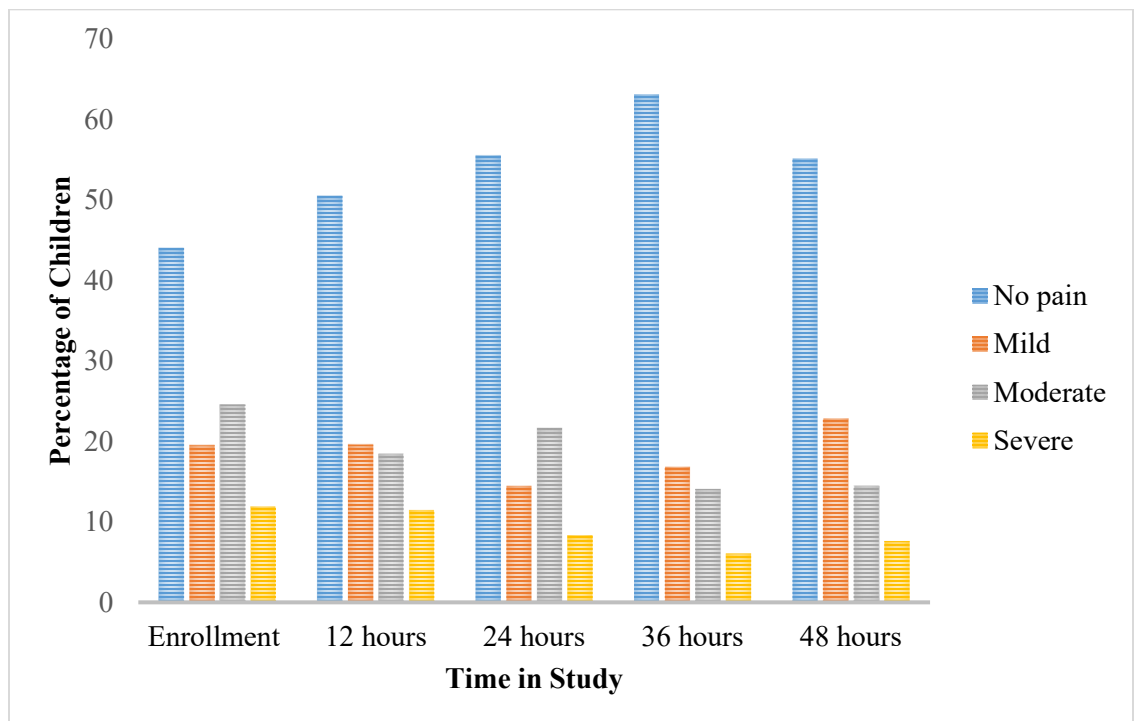
Note. <sup>a</sup>Post-surgery refers to the number of children who have undergone surgery during that period.

<sup>b</sup>Six diagnostic groups are deduced from aggregating all related medical diagnoses: (1) Pneumonia, (2) Acute gastroenteritis, (3) Wounds -all open wounds that require dressing changes except motor vehicle, fractures and trauma-related injuries which are grouped as (4) Trauma, (5) Cancer, and all the remaining diagnoses were grouped as (6) Other. <sup>c</sup>Education categories: elementary (1<sup>st</sup> to 10<sup>th</sup> grade), high school (grade 11 and 12), college (certificate and diploma holders) and degree and above for a university degree and above. <sup>d</sup>The eight most common ethnic groups were used while the rest were grouped under other for the cultural background.

**Figure 3-2. Children's self-report and observational pain intensity at different times in the study.**

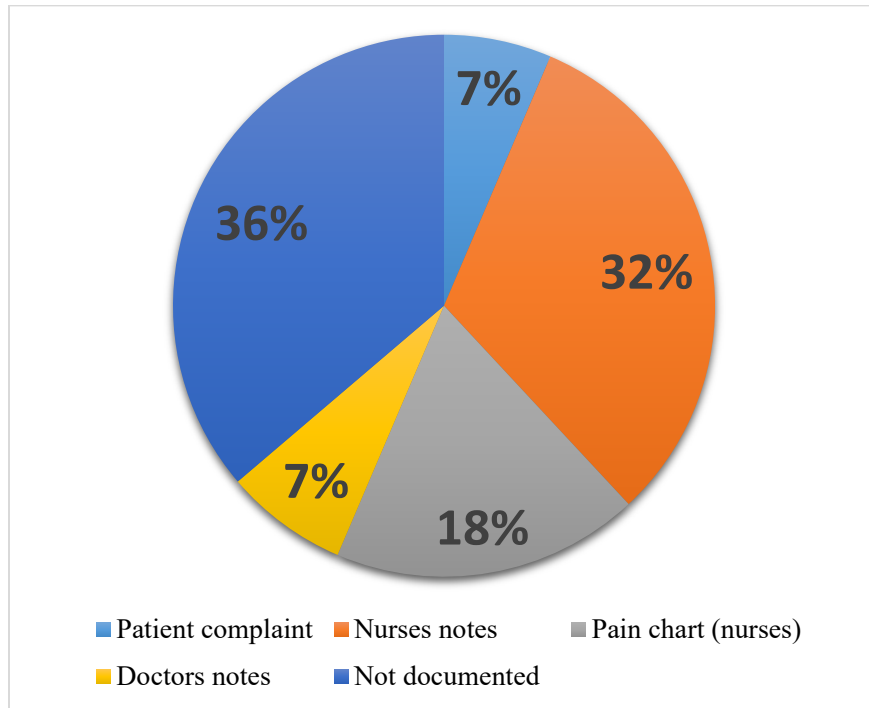


**Figure 5-3. Parent's assessment of children aged <7 years pain intensity at different times of the study.**

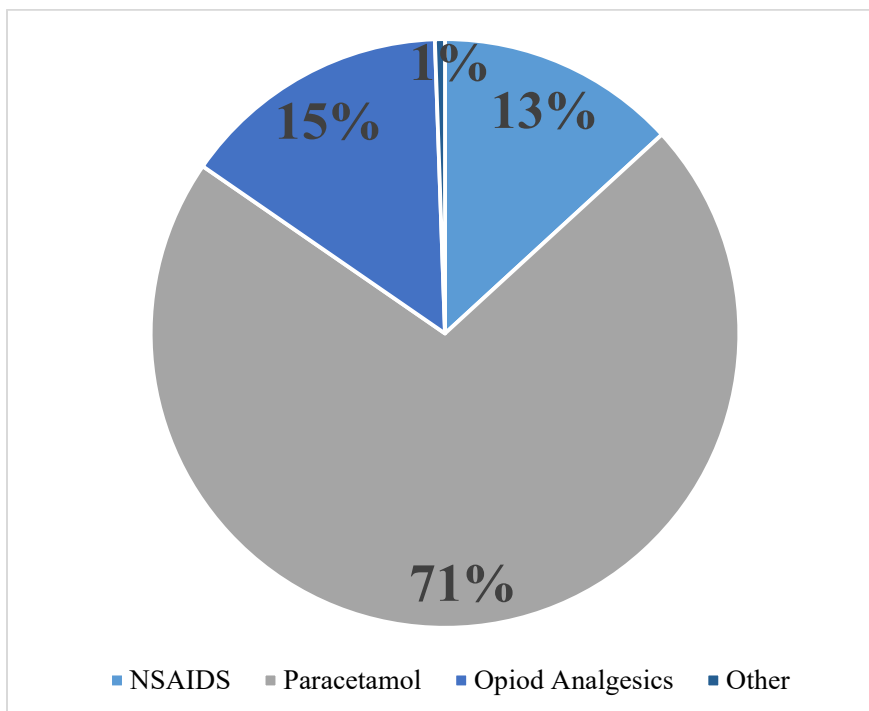




**Figure 3-4. Distribution of pain assessment documentation by location.**



**Figure 3-6. Distribution of prescribed analgesics by type.**



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### Appendix 3A: Supplementary Material

Table 3-S1.

*Associations between pain outcomes and child demographics at enrollment*

<u>Pain outcomes</u>		<u>Child's age group (years)</u>				<u>Gender</u>			<u>Residence</u>				
		<6	6-<10	10-13	$\chi^2(df)p$	Male	Female	$\chi^2(df)p$	Rural	Semi-Urban	Urban/town	City	$\chi^2(df)p$
<u>Currently in Pain</u>	Yes	44.1	52.9	48.3	1.7(2)	43.9	50	1.2(1)	41.1	53	45.7	50	3(3)
	No	55.9	47.1	51.7	.43	56.1	50	.28	58.9	47	54.3	50	.39
	n <sup>a</sup>	211	68	29		171	136		129	66	35	76	
<u>Child assessed scores</u>	No pain	41.2	43.3	34.5	24.7(6)	43.8	37.8	1.2(3)	41.3	36.4	48.6	40.8	13.7(9)
	Mild	42.6	26.9	24.1	<.01	35.5	39.3	.76	35.7	31.8	45.7	42.1	.13
	Moderate	14.8	20.9	24.1		16.6	17.8		15.9	27.3	5.7	14.5	
	Severe	1.4	9	17.2		4.1	5.2		7.1	4.6	0	2.6	
	n	209	67	29		169	135		126	66	35	76	
<u>Parent's scores</u>	No pain	44.2	53.3		0.8(3)	47.2	41.4	5(3)	53.3	29.3	44.4	43.1	10.8(9)
	Mild	19.2	13.3		.84	13.8	25.3	.17	15.6	19.5	22.2	21.5	.29
	Moderate	25	26.7			26	24.2		17.8	36.6	25.9	27.7	
	Severe	11.5	6.7			13	9.1		13.3	14.6	7.4	7.7	
	n	208	15			123	99		90	41	27	65	

Note. <sup>a</sup>n = number of subjects, <sup>b</sup>df = degree of freedom, PMHM = Princess Marina Hospital - Medical, PMHS = Princess Marina Hospital-Surgical, NRHM = Nyangabgwe referral hospital - Medical, NRHS = Nyangabgwe referral hospital - Surgical. Values in the table represent the column  $\chi^2$  percentage contribution of each category to the association between variables. *p*-value  $\leq .05$ .

**Table 3-S1 Continuation**

<u>Pain outcomes</u>		<u>Hospital and Unit of Admission</u>				<u>Surgery</u>		<u>Common diagnostic groups</u>								$\chi^2(df)p$
		PMHM	PMHS	NRHM	NRHS	$\chi^2(df)$ $p$	Yes	No	$\chi^2(df)$ $p$	Gastro enteritis	Trau ma	Pneum onia	Woun ds	Cancer	Other	
<u>Currently in pain</u>	Yes	39.1	62.3	33.7	50.6	15.4	50	59.6	2.1 (1)	37.5	46.8	34.8	80	35.7	45.4	14.3
	No	60.9	37.7	66.3	49.4	(3)	50	40.4	.15	62.5	53.2	65.2	20	64.3	54.6	(5)
	n	64	77	86	81	.00	74	235		32	62	23	25	14	152	.01
<u>Child assessed scores</u>	No pain	41.9	35.1	35.3	51.9	18.4	40.5	40.9	0.8 (3)	34.3	54.8	36.4	28	53.9	38.4	26.4
	mild	38.7	37.7	49.4	23.5	(9)	35.1	38.3	.85	53.1	24.2	63.6	44	23.1	35.8	(5)
	moderate	11.3	23.4	11.6	21	.03	20.3	16.1		6.3	14.5	0	24	15.4	21.9	.03
	severe	8.1	3.9	3.5	3.7		4.1	4.8		6.3	6.5	0	4	7.7	4	
	n	62	77	85	81		74	230		32	62	22	25	13	151	
<u>Parent's scores</u>	No pain	39.2	32.6	46.2	58.8	14.8	61.5	52.5	1.1(3)	36.7	54.6	40	35.7	75	44.1	22.7
	mild	25.5	18.6	19.2	11.8	(9) .1	7.7	18	.79	23.3	9.1	30	0	12.5	21.2	(15)
	moderate	23.5	27.9	29.5	17.7		15.4	11.5		40	24.2	25	42.9	0	21.2	.09
	severe	11.8	20.9	5.1	11.8		15.4	11.5		0	12.1	5	21.4	12.5	13.6	
	n	51	43	78	51		13	61		30	33	20	14	8	118	

Note. <sup>a</sup>n = number of subjects, <sup>b</sup>df = degree of freedom, PMHM = Princess Marina Hospital - Medical, PMHS = Princess Marina Hospital-Surgical, NRHM = Nyangabgwe referral hospital - Medical, NRHS = Nyangabgwe referral hospital- Surgical. Values in the table represent the column  $\chi^2$  percentage contribution of each category to the association between variables.  $p$ -value  $\leq .05$ .

Table 3-S2

*Associations between children <7 years pain outcomes and parent's demographics at enrollment.*

Pain outcomes		Age group (years)				$\chi^2(df)p$	Relationship to the child					$\chi^2(df)p$	Gender		$\chi^2(df)p$
		<25	25<35	35<50	≥50		Mother	Father	Grand mother	Other	Female		Male		
<u>Currently in Pain</u>	Yes	29.7	46.7	57	58.8	12.1(3)	46.1	50	56.5	35	2.1 (3)	46.1	53.9	0.3(1)	
	No	70.3	53.3	43	41.2	<.01	53.9	50	43.5	65	.56	53.9	46.2	.59	
	n <sup>a</sup>	64	122	86	17		243	12	23	20		284	13		
<u>Child assessed scores</u>	No pain	47.6	39.3	38.1	41.2	8(9)	39.8	41.7	47.8	47.4	3.9 (9)	40.9	38.5	0.4(1)	
	Mild	39.7	41	33.3	35.3	.54	39	41.7	30.4	26.3	.92	37.7	38.5	.95	
	Moderate	11.1	16.4	20.2	17.7		17	16.7	17.4	15.8		17.1	15.4		
	Severe	1.6	3.3	8.3	5.9		4.2	0	4.4	10.5		4.3	7.7		
	n	63	122	84	17		241	12	23	19		281	13		
<u>Parent's scores</u>	No pain	50.9	43.9	43.4	12.5	15.5(9)	44.8	60	33.3	62.5	13.8 (9)	44.4	50	1.5(3)	
	Mild	19.3	17.4	11.3	62.5	.08	18.6	0	46.7	0	.13	19.2	0	.68	
	Moderate	22.8	25.5	32.1	12.5		25.3	20	13.3	12.5		25.2	33.3		
	Severe	7	13.3	13.2	12.5		11.3	20	6.7	25		11.2	16.7		
	n	57	98	53	8		193	5	15	8		214	6		

Note. <sup>a</sup>n = number of subjects, <sup>b</sup>df = degree of freedom. Values in the table represent the column  $\chi^2$  percentage contribution of each category to the association between variables. *p*-value  $\leq .05$ .

**Table 3-S2 continuation**

Pain outcomes		Education level				Cultural background										$\chi^2(df)$ <i>p</i>
		Elementary	High School	College	Degree		Bakalaka	Batswaping	Bakgalagadi	Bangwato	Basarwa	Bakgatla	Bangwaketse	Bakwena	Other	
<u>Currently in Pain</u>	Yes	44.7	42.4	54.6	50	2.2	46	45	52.9	40.9	40	60	52	33.3	46.5	4.7
	No	55.3	57.6	45.5	50	(3)	54.1	55	47.1	59.1	60	40	48	66.7	53.5	(8)
	n	152	66	55	22	.54	74	20	17	22	15	25	25	24	86	.79
<u>Child assessed scores</u>	No pain	39.3	38.5	40	54.6	10.2	43.8	30	41.2	40.9	46.7	32	28	41.7	46.4	20
	Mild	35.3	47.7	38.2	31.8	(9)	35.6	50	29.4	45.5	33.3	40	44	50	29.8	(24)
	Moderate	20.7	7.7	20	9.1	.33	13.7	20	29.4	13.6	20	16	20	8.3	19.1	.7
	Severe	4.7	6.2	1.8	4.6		6.9	0	0	0	0	12	8	0	4.8	
	n	150	65	55	22		73	20	17	22	15	25	25	24	84	
<u>Parent's scores</u>	No pain	44.8	40	40.5	62.5	5.4	65.9	50	44.4	53.3	63.6	23.1	42.9	64.3	46.3	31.1
	Mild	20.7	20	16.7	6.25	(9)	12.2	35.7	33.3	6.7	9.1	46.2	28.6	21.4	12.2	(24)
	Moderate	22.4	28.9	33.3	18.8	.8	19.5	7.1	0	20	18.2	23.1	7.1	7.1	26.8	.15
	Severe	12.1	11.1	9.5	12.5		2.4	7.1	22.2	20	9.1	7.7	21.4	7.1	14.6	
	n	116	45	42	16		41	14	9	15	11	13	14	14	41	

Note. <sup>a</sup>n = number of subjects, <sup>b</sup>df = degree of freedom. Values in the table represent the column  $\chi^2$  percentage contribution of each category to the association between variables. *p* - value  $\leq .05$ .



Table 3-S3

*Associations between pain outcomes and child demographics at 12-hours post-enrollment assessments.*

Pain Outcomes		Child's age group (years)				Gender			Residence				
		<6	6-<10	10-13	$\chi^2(df)p$	Male	Female	$\chi^2(df)p$	Rural	Semi-Urban	Urban/town	City	$\chi^2(df)p$
<u>Child assessed scores</u>	No pain	53.1	54.6	45.5	19.9(6)	51.1	54.3	0.3(3)	57.6	50	55.6	45.8	27(9)
	Mild	34	18.2	36.4	<.01	31.6	29.5	.97	23.2	20.4	40.7	47.5	<.01
	Moderate	11.7	14.6	18.2		13.5	12.4		13.1	25.9	0	6.8	
	Severe	1.2	12.7	0		3.8	3.8		6.1	3.7	3.7	0	
	n <sup>a</sup>	162	55	22		133	105		99	54	27	59	
<u>Parent's scores</u>	No pain	50.6	80		4.6(3)	57.3	45.3	5.9(3)	55.2	60.6	33.3	51	10.1(9)
	Mild	19.1	20		.21	15.6	24	.12	16.4	15.2	38.1	17.7	.35
	Moderate	18.5	0			13.5	22.7		16.4	9.1	19.0	23.5	
	Severe	11.7	0			13.5	8		11.9	15.6	9.5	7.8	
	n	162	10			96	75		67	33	21	51	

Note. <sup>a</sup>n = number of subjects, <sup>b</sup>df = degree of freedom, PMHM = Princess Marina Hospital-Medical, PMHS = Princess Marina Hospital-Surgical, NRHM = Nyangabgwe referral hospital - Medical, NRHS = Nyangabgwe referral hospital - Surgical. Values in the table represent the column  $\chi^2$  percentage contribution of each category to the association between variables.  $p$  - value  $\leq .05$ .

**Table 3-S3 –continuation**

Pain outcomes		Hospital and Unit of Admission					Surgery			Common diagnostic groups						
		PMHM	PMHS	NRHM	NRHS	$\chi^2(df)$ <i>p</i>	Yes	No	$\chi^2(df)$ <i>p</i>	Gastro enteritis	Trau ma	Pneum onia	Woun ds	Cancer	Other	$\chi^2(df)$ <i>p</i>
<u>Child assesse d scores (12 hours)</u>	No pain	53.7	55.4	56.5	44.8	10.2	50	53.4	2.8(3)	50	57.1	52.6	21.1	58.3	56.1	18.9
	Mild	25.9	27.7	33.9	34.5	(9)	36	29.1	.43	34.6	26.5	36.8	42.1	16.7	29.8	(15)
	Moderate	20.4	10.8	6.5	15.5	.33	8	14.3		15.4	12.2	10.5	21.1	25	10.5	.22
	Severe	0	6.2	3.2	5.2		6	3.2		0	4.1	0	15.8	0	3.5	
	n	54	65	62	58		50	189		26	49	19	19	12	114	
<u>Parent's scores (12 hours)</u>	No pain	54.6	47.1	55.2	50	2.3(9)	88.9	66.7	2.4(3)	52	59.3	58.8	20	66.7	51.7	16(1
	Mild	18.2	26.5	17.2	16.7	.99	0	6.7	.5	24	22.2	17.7	20	0	18.4	5)
	Moderate	15.9	14.7	17.2	22.2		11.1	13.3		20	11.1	5.9	40	0	19.5	.38
	Severe	11.4	11.8	10.3	11.1		0	13.3		4	7.4	17.7	20	33.3	10.3	
	n	44	34	58	36		9	45		25	27	17	10	6	87	

Note. <sup>a</sup>n = number of subjects, <sup>b</sup>df = degree of freedom, PMHM = Princess Marina Hospital-Medical, PMHS = Princess Marina Hospital-Surgical, NRHM = Nyangabgwe referral hospital - Medical, NRHS = Nyangabgwe referral hospital - Surgical. Values in the table represent the column  $\chi^2$  percentage contribution of each category to the association between variables. *p* - value  $\leq .05$ .

Table 3-S4

*Associations between children <7 years pain outcomes and parent's demographics at 12-hours post-enrollment assessments.*

Pain outcomes		Age group				Relationship to the child				$\chi^2(df)$ <i>p</i>	Gender		$\chi^2(df)$ <i>p</i>
		<24	25-<35	35-<50	≥50	Mother	Father	Grand mother	Other		Female	Male	
<u>Child assessed scores</u>	No pain	62	49.5	49.2	15.4	53.2	36.4	60	42.9	9.3(9)	53.1	36.4	2.9(3)
	Mild	30	29.7	33.9	0	30	36.4	30	35.7	.41	30.4	36.4	.41
	Moderate	8	17.8	13.9	15.4	13.2	27.3	0	21.4		12.5	27.3	
	Severe	0	3	3.1	69.2	3.7	0	10	0		4.02	0	
	n <sup>a</sup>	50	101	65	13	190	11	20	14		224	11	
<u>Parent's scores</u>	No pain	68.9	53.3	41	0	57.7	25	7.7	40	21.1(9)	53.3	25	3.6(3)
	Mild	11.1	20.8	12.8	66.7	15.4	25	53.9	20	.01	18.6	25	.31
	Moderate	11.1	16.9	30.8	0	16.8	50	15.4	20		16.8	50	
	Severe	8.9	9.1	15.4	33.3	10.1	0	23.1	20		11.4	0	
	n	45	77	39	6	149	4	13	5		167	4	

Note. <sup>a</sup>n = number of subjects, <sup>b</sup>df = degree of freedom. Values in the table represent the column  $\chi^2$  percentage contribution of each category to the association between variables. *p* - value ≤ .05.

**Table 3-S4 continuation**

<u>Pain outcomes</u>		<u>Education level</u>				<u>Culture</u>										$\chi^2(df)$ <i>p</i>
		Elementary	High School	College	degree	$\chi^2(df)$ <i>p</i>	Bakalaka	Batswaping	Bakgalagadi	Bangwato	Basarwa	Bakgatla	Bangwaketse	Bakwena	Other	
<u>Child assessed scores</u>	No Pain	52.1	52.8	47.7	64.7	4.4	54.2	73.3	61.5	57.9	63.6	38.1	50	63.2	43.1	23.9
	Mild	30.6	32.1	31.8	29.4	(9)	30.5	13.3	7.7	31.6	36.4	42.9	33.3	26.3	34.5	(24)
	Moderate	14.1	9.4	18.2	5.9	.88	13.6	13.3	23.1	10.5	0	9.5	16.7	0	17.2	.47
	Severe	3.3	5.7	2.3	0		1.7	0	7.7	0	0	9.5	0	10.5	5.2	
	n	121	53	44	17		59	15	13	19	11	21	24	19	58	
<u>Parent's scores</u>	No pain	52.8	54.1	39.4	75	10	65.9	50	44.4	20	63.6	23.1	42.9	64.3	46.3	31.1
	Mild	21.4	21.6	15.2	8.3	(9)	12.2	35.7	33.3	20	9.1	46.2	28.6	21.4	12.2	(24)
	Moderate	16.9	16.2	27.3	0	.35	19.5	7.1	0	6.7	18.2	23.1	7.1	7.1	26.8	.15
	Severe	9	8.1	18.2	16.7		2.4	7.1	22.2	53.3	9.1	7.7	21.4	7.1	14.6	
	n	89	37	33	12		41	14	9	15	11	13	14	14	41	

Note. <sup>a</sup>n = number of subjects, <sup>b</sup>df = degree of freedom. Values in the table represent the column  $\chi^2$  percentage contribution of each category to the association between variables. *p* - value  $\leq .05$ .

Table 3-S5

*Associations between pain outcomes and child demographics at 36 hours post-enrollment assessments.*

Pain outcomes		Child's age group (years)			$\chi^2(df) p$	Gender		$\chi^2(df) p$	Residence				$\chi^2(df) p$
		<6	6- <10	10-13		Male	Female		Rural	Semi-Urban	Urban/town	City	
<u>Child assessed scores</u>	No pain	43.6	61	42.1	21.5(6) .00	48.6	44.8	2.1(3) .54	52.8	42.2	66.7	31.7	13.3(9) .15
	Mild	41.4	14.6	26.3		30.5	39.1		28.1	35.6	27.8	48.8	
	Moderate	14.3	17.1	15.8		16.2	13.8		13.5	17.2	5.6	19.5	
	Severe	0.8	7.3	15.8		4.8	2.3		5.6	4.4	0	0	
	n <sup>a</sup>	133	41	19		105	87		89	45	18	41	
<u>Parent's scores</u>	No pain	60.6	77.8		1.3(3) .73	63.2	59.4	1.6(3) .66	65.6	60	80	48.6	10.1(9) .34
	Mild	17.4	11.1			14.5	20.3		11.5	16.7	6.7	31.4	
	Moderate	15.2	11.1			17.1	12.5		14.8	16.7	6.7	17.1	
	Severe	6.8	0			5.3	7.8		8.2	6.7	6.7	2.9	
	n	132	9			76	64		61	30	15	35	

Note. <sup>a</sup>n = number of subjects, <sup>b</sup>df = degree of freedom, PMHM = Princess Marina Hospital - Medical, PMHS = Princess Marina Hospital - Surgical, NRHM = Nyangabgwe referral hospital - Medical, NRHS = Nyangabgwe referral hospital- Surgical. Values in the table represent the column  $\chi^2$  percentage contribution of each category to the association between variables. *p* - value  $\leq .05$ .

**Table 3-S5 continuation**

Pain outcomes		Hospital and Unit				Surgery			Common diagnostic groups							
		PMHM	PMHS	NRHM	NRHS	$\chi^2(df)$ <i>p</i>	Yes	No	$\chi^2(df)$ <i>p</i>	Gastro enteritis	Trauma	Pneu monia	Wounds	Cancer	Other	$\chi^2(df)$ <i>p</i>
<u>Child assessed scores</u>	No pain	44.1	51.7	45.3	45.7	9.3(9)	40.9	49	3(3)	46.7	61.4	38.5	15.8	72.7	45.1	36.4
	Mild	44.1	28.3	39.6	28.3	.41	34.1	34.2	.39	46.7	22.7	30.8	36.8	9.1	40.7	(15)
	Moderate	8.8	16.7	15.1	17.4		22.7	12.8		6.7	15.9	30.8	36.8	0	11	.00
	Severe	2.9	3.3	0	8.7		2.3	4		0	0	0	10.5	18.2	3.3	
	n	34	60	53	46		44	149		15	44	13	19	11	91	
<u>Parent's scores</u>	No pain	46.2	54.1	69.4	72.4	8.3(9)	33.3	76	6.1(3)	71.4	68	75	30.8	100	58.3	22.5
	Mild	23.1	18.9	16.3	10.3	.5	16.7	12	.11	21.4	16	8.3	15.4	0	19.4	(15)
	Moderate	23.1	16.2	12.2	10.3		33.3	4		7.1	12	16.7	23.1	0	16.7	.1
	Severe	7.7	10.8	2.04	6.9		16.7	8		0	4	0	30.8	0	5.6	
	n	26	37	49	29		6	25		14	25	12	13	5	72	

Note. <sup>a</sup>n = number of subjects, <sup>b</sup>df = degree of freedom, PMHM = Princess Marina Hospital-Medical, PMHS = Princess Marina Hospital-Surgical, NRHM = Nyangabgwe referral hospital - Medical, NRHS = Nyangabgwe referral hospital - Surgical. Values in the table represent the column  $\chi^2$  percentage contribution of each category to the association between variables. *p* - value  $\leq .05$ .

**Table 3-S6**

***Associations between children <7 years pain outcomes and parent's demographics at 36 hour post-enrollment assessments***

Pain outcomes		Age group (years)				Relationship to the child					Gender			
		<25	25-<35	35-<50	≥50	$\chi^2(df)$ <i>p</i>	Mother	Father	Grand mother	Other	$\chi^2(df)$ <i>p</i>	Female	Male	$\chi^2(df)$ <i>p</i>
<u>Child assessed scores</u>	No pain	47.7	47.3	43.4	57.1	17.2	46	50	52.9	50	21.1	46.7	50	19(3)
	Mild	43.2	36.5	22.6	35.7	(9)	35.8	16.7	35.3	25	(9)	35	16.7	.00
	Moderate	9.1	14.9	24.5	7.1	.04	16.2	0	11.8	18.8	.01	16.1	0	
	Severe	0	1.4	9.4	0		2	33.3	0	6.3		2.2	33.3	
	n <sup>a</sup>	44	74	53	14		148	6	17	16		180	6	
<u>Parent's scores</u>	No pain	72.5	62.7	52.9	16.7	14	63	66.7	27.3	85.7	14(9)	61	66.7	4.4
	Mild	17.5	15.3	14.7	50	(9)	16.8	0	36.4	0	.12	17.7	0	(3)
	Moderate	7.5	13.6	26.5	16.7	.12	15.1	0	18.2	14.3		15.4	0	.22
	Severe	2.5	8.5	5.9	16.7		5	33.3	18.2	0		5.9	33.3	
	n	40	59	34	6		119	3	11	7		136	3	

Note. <sup>a</sup>n = number of subjects, <sup>b</sup>df = degree of freedom. Values in the table represent the column  $\chi^2$  percentage contribution of each category to the association between variables. *p* - value ≤ .05.

Table 3-S6 continuation

<u>Pain outcomes</u>		<u>Education level</u>				$\chi^2(df)$ <i>p</i>	<u>Culture</u>									$\chi^2(df)$ <i>p</i>
		Elementary	High School	College	degree		Bakalaka	Batswaping	Bakgalagadi	Bangwato	Basarwa	Bakgatla	Bangwaketse	Bakwena	Other	
<u>Child assessed scores</u>	No Pain	46.9	47.5	48.6	33.3	6.6	47.7	50	58.3	50	30.8	50	61.1	38.5	42.9	17.6
	Mild	32.7	35	37.1	33.3	(9)	36.4	35.7	33.3	20	46.2	30	22.2	46.2	34.7	(24)
	Moderate	14.3	15	14.3	33.3	.68	11.4	14.3	8.3	10	23.1	20	11.1	15.4	18.4	.82
	Severe	6.1	2.5	0	0		4.6	0	0	20	0	0	5.6	0	4.1	
<u>Parent's scores</u>	No pain	62.3	65.4	55.6	50	9.7	60	92.3	57.1	62.5	61.5	46.2	53.9	60	61.8	20.5
	Mild	18.2	15.4	22.2	0	(9)	16.7	0	28.6	25	15.4	23.1	30.8	10	14.7	(24)
	Moderate	13	11.5	14.8	50	.38	16.7	0	0	12.5	23.1	15.4	15.4	10	20.6	.67
	Severe	6.5	7.7	7.4	0		6.7	7.7	14.3	0	0	15.4	0	20	2.9	
n		77	26	27	8		30	13	7	8	13	13	13	10	34	

Note. <sup>a</sup>n = number of subjects, <sup>b</sup>df = degrees of freedom. Values in the table represent the column  $\chi^2$  percentage contribution of each category to the association between variables. *p* - value  $\leq .05$ .



## CHAPTER 4

### **Exploring Experiences and Perceptions of Children and Parents/Guardians' Regarding Pediatric Pain Management Practices in Botswana Tertiary Hospitals: A Mixed-Methods Study**

**Submission to *the International Journal of Nursing Studies***

#### **Abstract**

**Background:** Pediatric acute pain is a significant problem in sub-Saharan Africa.

Children and parents/guardians' experiences and perspectives are crucial in understanding pediatric pain management practices.

**Aim:** To investigate the experiences and perceptions of hospitalized children aged two months to 13 years and their parents/guardians regarding pediatric acute pain management practices.

**Design:** Mixed-method study

**Setting:** Botswana tertiary hospitals

**Participants:** 275 parent/guardian-child dyads completed the m-APS-POQ-R, with 42 children  $\geq 8$  years of age cm-APS-POQ-R surveys (75% response rate), and 27 (19 parents/guardians and nine children) completed the face-to-face interviews.

**Methods:** Descriptive cross-sectional surveys and descriptive qualitative face-to-face interviews. The analysis proceeded in three major stages: 1) descriptive statistics, *t-test*, and ANOVA; 2). qualitative data were organized, coded using thematic analysis techniques; and 3) merging of two datasets for mixed-methods analysis using thematic meta-inferences.

Results: Forty-seven percent of parents/guardians reported the child to be currently in moderate-severe pain while 38% of children reported current pain as moderate-severe. The mean scores for both children and parent/guardians' experiences and perceptions 113(33) ( $p < .001$ ) (cm-APS-POQ-R) and 123(26) ( $p < .001$ ) (m-APS-POQ-R) and the subscales except the parents/guardians' pain interference ( $p = .96$ ) were statistically significant ( $p < .001$ ).

Six major themes were identified from the qualitative analysis. 1) Soldiering with hope represented the overall positive outlook on pain management. 2) Facing adversity summarized how participants deal with pain on a day-to-day basis. 3) Perception of pain care reflected views and satisfaction with pain management. 4) Pain care outcomes reflected views on the outcomes of pain treatment or lack thereof. 5) Knowledge of pediatric pain management demonstrated an understanding of pediatric pain management strategies. 6) Limitations of being a child addressed parents/guardians perceived child pain risks and children's response and experiences with pain.

Seven meta-inferences emerged from merging the quantitative and qualitative datasets. 1) The pain prevalence and intensity emphasized the consensus on the inadequacy of pediatric acute pain management. 2) The overall pediatric pain outcomes indicated the general accord by participants about pain management. 3) Perception of pain care reflected views on the quality of pain care, 4) Pediatric pain knowledge and attitudes show the knowledge and attitudes of participants. 5) Child risk factors identified the vulnerability of children to pain. 6) Consequences of pediatric acute pain addressed the impact of pain. 7) The pain management strategies focused on pain alleviation approaches.

Conclusion: Pediatric acute pain is a significant problem; children and parents/guardians are aware of it and generally appear satisfied with attempts to alleviate the pain.

*Keywords:* pediatric, acute pain, pain, experiences, perceptions, child, parents/guardians

## **Contribution of the paper**

What is already known about the topic?

- Pediatric acute pain prevalence is high in hospitalized children in Botswana.
- Globally, children and parents/guardians' experiences, knowledge, attitudes, and beliefs influence a child's pain experiences and management, and this hinders adequate pain management in LMIC.
- Pediatric acute pain is not adequately assessed, documented or managed in Botswana hospitals.

What this paper adds:

- Support the high prevalence of pediatric acute pain in hospitalized children in Botswana;
- Children and parents/guardians are aware of the high prevalence and inadequacy in the management of acute pediatric pain, but there are generally content with pain care, mainly due to limited resources; and
- The environmental factors are the primary barrier to delivering adequate pediatric acute pain as opposed to cultural factors in Botswana.

## **1. Introduction**

Pediatric acute pain is a significant issue in hospitals in Botswana. Evidence shows that approximately 59% of pediatric patients report acute pain with a high prevalence of inadequate pain assessment and management (Matula, Irving, Deatrick, Steenhoff & Polomano, 2019). Even though children and parents/guardians in Botswana acknowledge pain, and some children have conditions expected to be painful, they rarely rate pain as severe (Matula et al., 2019). Evidence suggests that similar behavior is typical of children in other low and middle-income countries (LMIC), particularly sub-Saharan Africa, where children are expected to be stoic (Albertyn, Rode, Millar, & Thomas, 2009; Bosenberg, 2007). Due to the high burden of acute pain among hospitalized children, further research is necessary, particularly from the patient's perceptions, to better understand pediatric acute pain management practices in this population (Birnie et al., 2014). The patients' perceptions include pain experiences of children and parents/guardians, as well as their knowledge, attitudes, beliefs, and practices related to pain. These perceptions are critical to both inform and shape current pediatric pain management therapies and practices (Dancel, Liles, & Fiore, 2017; Kristjansdottir et al., 2018; Schellack & Matimela, 2016).

Pain is subjective, and pediatric acute pain management begins with the expression and communication of pain to healthcare providers by children or by the parents/guardians from their perception of the child's pain, thereby making children and parents/guardians critical partners in pediatric pain management (Matula, Polomano, & Irving, 2018; Schellack & Matimela, 2016). The child and parent's pain experiences and perceptions are often a reflection of the socio-cultural and environmental context in

which they occur, thereby influencing how children and parents/guardians seek and respond to pediatric pain care (Finley, Kristjánsdóttir, & Forgeron, 2009; Kristjansdottir et al., 2018). Therefore, documenting experiences and perceptions of children and parents/guardians provides critical patient-reported information to reflect the state of pediatric acute pain management practices in Botswana to improve pediatric pain care.

Pediatric pain management can be framed as a social transaction between child pain actors (child, parents/guardians and healthcare providers) and interaction of various factors related to child health, environment, and the social system (Matula et al., 2018). Pediatric acute pain is complex and requires the caregiver's knowledge regarding pain, astute and positive attitudes towards recognition of child pain and the associated the needs related to pain management (Aziznejadroshan, Alhani, & Mohammadi, 2015; Chng et al., 2015; Kristjansdottir et al., 2018; Schellack & Matimela, 2016). The individual child pain actor's idiosyncrasies embedded in socio-cultural and environmental contexts often influence how the child and parents/guardians respond to pain and request for services related to pediatric pain management (Kristjansdottir et al., 2018; Pope, Tallon, McConigley, Leslie, & Wilson, 2017). Children and parents/guardians who reside in LMIC, such as Botswana, face unique situations that inform their perceptions, decisions, and experiences related to pain care. Factors such as a high illiteracy rate, multiple languages, societal norms, resource limitations, poverty and suboptimal nutrition, famine, and intermittent religious and political conflicts may all impact pediatric pain care (Albertyn et al., 2009; Bosenberg, 2007; Size, Soyannwo, & Justins, 2007). These circumstances are often cited as significant impediments to child access to pain management in LMIC, thereby predisposing these children to suffer from inadequately

managed acute pain (Bond, 2011; Albertyn et al., 2009; Bosenberg, 2007; Size, Soyannwo, & Justins, 2007).

Factors impeding pediatric acute pain management in LMIC are either socio-cultural or environmental. Lack of knowledge about pain management strategies by parents/guardians is cited as the most common barrier towards pediatric pain relief (He, Pölkki, Pietilä, & Vehviläinen-Julkunen, 2006; He, Vehviläinen-Julkunen, Pölkki, & Pietilä, 2010; Olaogun, Ayandiran, Olalumade, Obiajunwa, & Adeyemo, 2008). Also, He and colleagues (2006) and Jongudomkarn, Forgeron, Siripul, & Finley, (2012) report that parents/guardians in LMIC often face challenges related to their overall understanding of pain, which may cause conflict between cultural beliefs and science. Balancing cultural child-rearing practices and the child's pain is intricate; children and parents/guardians often act in unison to uphold cultural values at the expense of pain management (Matula et al., 2018). Also, language and societal norms act as a significant barrier for children and parents/guardians in communicating a child's pain (He, Vehviläinen-Julkunen, Pölkki, & Pietilä, 2007; He et al., 2010; Jongudomkarn et al., 2012)

Children and parents/guardians' experiences with pain inform their understanding and, more importantly, reflects how well pain is managed in a specific setting (Kristjánsdóttir, Unruh, McAlpine, & McGrath, 2012; Pope et al., 2017; Sng et al., 2017). Currently, there is limited evidence that addresses pain experiences of children and their parents/guardians in most LMIC, particularly in sub-Saharan Africa (Bond, 2011). Evidence shows that children and parents/guardians in other LMIC regions are aware of the child's acute pain, its care, and often employ some strategies unique to each setting and cultural norms to control pain (Kristjánsdóttir et al., 2012; Pope et al., 2017; Sng et

al., 2017). Therefore, investigating pediatric acute pain management practices in Botswana closes a gap in knowledge that currently exists in sub-Saharan Africa and gives children and parents/guardians a voice to shape their pain care and ensure that they no longer suffer in silence.

The significance of children and parents/guardians' experiences and perceptions in children's pain management cannot be ignored in efforts to address inadequate pain management in Botswana. Therefore, the purpose of this mixed-method study is to investigate the experiences and perceptions of both children aged two months to 13 years hospitalized in two Botswana tertiary hospitals and their parents/guardians regarding pediatric pain management practices. The specific aims of this study are to: (1) describe the experiences and perceptions of children and parents/guardians regarding pediatric acute pain management practices through survey responses; (2) explore experiences and perceptions of children and parents/guardians regarding pediatric acute pain management practices using interviews; and (3) enhance the understanding of pediatric acute pain management practices in two Botswana tertiary hospitals by merging the survey and interview results.

## **2. Methods**

### **2.1. Theoretical Perspective**

A conceptual model driven from the tenets of the Symptom Management Theory (SMT) is used as the guiding framework for this dissertation work. SMT is a mid-range nursing theory addressing the management of various symptoms (Dodd et al., 2001; Humphreys et al., 2008). The SMT has three dynamic and bidirectional dimensions: symptom experience, symptom management strategies, and outcomes necessary for



effective symptom management (Dodd et al., 2001; Humphreys et al., 2008; Linder, 2010). The three components of SMT and their associated factors are critical in pediatric acute pain management and are used to study pediatric acute pain management practices in LMIC.

## 2.2. Research design

The study uses a convergent parallel mixed-methods design. The qualitative and quantitative research designs were developed independently, the data collected concurrently, each dataset analyzed separately, and finally, the data were merged for a mixed-methods analysis (Creswell & Plano Clark, 2018). Individuals from the same sample were used for data collection in both phases since the convergent mixed-methods design allows for the collection of data on the same group of individuals using both qualitative and quantitative methods (Creswell & Plano Clark, 2018). This mixed-methods design was adopted to provide comprehensive and corroborated results because pain is subjective and there is a dearth of evidence on children and parents' experiences and perception regarding pediatric acute pain management practices in Botswana (Creswell & Plano Clark, 2018). Also, there is a lack of validated instruments to measure pain experiences and perceptions of children and parents/guardians in Botswana and other LMIC (Creswell & Plano Clark, 2018). Mixing methods provides a comprehensive understanding of the experiences and perceptions of children and parents/guardians through the use of data from qualitative interviews to complement and expand on quantitative data derived from surveys about experiences and perceptions of children and parents/guardians (Creswell & Plano Clark, 2018). The results from the two approaches were integrated using a complementary approach to generate a comprehensive

understanding of pediatric acute pain management practices in Botswana from both the child and parent/guardian perspectives (Creswell & Plano Clark, 2018). Figure 4-1 illustrates the study design.

### 2.3. Setting and population

The study was conducted in the pediatric units of two tertiary referral hospitals, Princess Marina Hospital (PMH) and Nyangabgwe Referral Hospital (NRH), in Botswana's two largest cities, Gaborone and Francistown, respectively. Princess Marina Hospital -a 525-bed hospital, has 110 beds allocated for pediatric patients, while NRH -a 550-bed hospital, has 98 beds allocated for pediatric patients. The study was conducted over 11 weeks, and inclusion criteria were: a) parent-child dyad for children aged two months to 13 years admitted to a pediatric unit and b) fluency in spoken English or Setswana. Parents/guardians and child dyads were excluded if: a) children were admitted in the neonatal ward or were <2-months of age; b) children were admitted solely for nutritional rehabilitation, non-medical grounds, such as awaiting transfer to other hospitals, abandoned children, and forensic cases; c) child or parent with apparent developmental delay or cognitive impairments; d) parent not present with the child if child  $\geq 8$  years; and e) child was admitted for observation for less than 24 hours.

### 2.3. Ethical Considerations

The study was approved by the University of Pennsylvania (830264) and the University of Botswana (UBR/RES/IRB/BIO/105) Institutional Review Boards (IRB), the Botswana Ministry of Health and Wellness Health Research and Development Committee (HRDC) (REF: HPDME 13/18/1), and the ethics review committees of NRH (REF: NRH 1/2/170 and PMH (REF: PMH5/79 (464-12018) respectively. The research

team could not provide direct patient care to reduce bias and coercion of subjects, therefore, efforts were made to ensure that all involved parties were available to discuss and treat child's pain in participants with moderate-severe pain and no viable pain care plan or required urgent relieve of pain.

### **3. Aim 1: Quantitative design**

#### **3.1. Design**

A descriptive cross-sectional survey (Appendix 4A & B) was used because it is the most relevant design for assessing knowledge, attitudes, and patient-reported outcomes (Kesmodel, 2018).

#### **3.2. Sample size**

A total of 518 child-parent dyads were approached between November 21, 2018, and February 8, 2019; a total of 387 dyads agreed to participate (75% response rate). Two-hundred and seventy-five parents/guardians and 42 children  $\geq 8$  years of age completed the surveys aligned with the estimated sample size of 132 parent-child dyads. The sample size was estimated based on statistical methods for descriptive data analysis, as described by Daniel (1999) (*Equation 4-1*). According to the equation;

$$N = 4(Z_{crit})^2 p(1 - p) \div D^2 \quad (4-1)$$

where N is sample size,  $Z = 1.96$  (95% CI),  $D=0.22$  (1- $p$ ) and  $p = .78$  - the proportion of children experiencing pain as population estimate from previous study (van der Heijden, de Jong, Rode, Martinez, & van Dijk, 2018). The estimated sample size was doubled due to multisite and stratification of age groups to ensure heterogeneity of the sample. The attrition rate set at 20%, resulting in an estimated sample size of 132. However, the

proportion used for sample estimation (due to lack of data) was in a specific subpopulation with high prevalence of pain, which is not representative of the population under study, and data were collected concurrently with another study with shared variables using the same population, hence the final samples of 275 participants for this study.

### 3.3. Measures

#### *3.3.1. Demographic variables for children.*

Demographic variables were collected through self-report and from health records; these include age, gender, admitting diagnosis, surgical procedure, and unit of admission.

#### *3.3.2. Demographic variables for parents/guardians.*

Demographic variables were collected through self-report and variables include age, gender, relationship to the child, residential location, educational level, and parents/guardians' perception of child's illness acuity.

#### *3.3.3. Experiences and perceptions of parents/guardians.*

The American Pain Society Patient Outcome Questionnaire-Revised (APS-POQ-R), with some modification (m-APS-POQ-R) to reflect caregiver perspectives (Appendix 4A), was used as the survey tool (Gordon et al., 2010). The permission to use the APS-POQ-R with modifications has been sought from the authors (Gordon et al., 2010). The APS-POQ-R is a validated instrument designed for hospitalized adults with cross-cultural validation (Ali et al., 2016; Botti et al., 2015). This tool, the APS-POQ-R, has also been validated as a proxy measure for parents in pediatric pain and used for caregiver's perspectives in some high-income countries (HIC) (Ali et al., 2016; Chaw et al., 2019). The m-APS-POQ-R is a 28-scale tool with four domains of pain severity, perception of

care, pain interference, and knowledge (Appendix 4A) derived from a scale used by Ali et al. (Ali et al., 2016). An overall and subscale score higher than 50%, and mean pain severity subscale score of  $\leq 24$  indicate better pain outcomes. Questions related to pain severity (1-4), pain interference (5 and 6), impact on parent mood (10), and the importance of pain treatment (8) were reversed for analysis. All knowledge questions (11) except the last question were reversed for analysis.

#### *3.3.4. Child experiences and perceptions.*

Children who are eight years and above are capable of self-reporting pain and are often admitted by themselves without guardians, thus being responsible for reporting their symptoms. Their inclusion in the survey provides valuable information from a child's perspective (Pope et al., 2017). A modified version of m-APS-POQ-R, the cm-APS-POQ-R (Appendix 4B) was used as the survey tool. The advantage of using the same conceptual instrument for both children and parents/guardians is to ensure that the study results are comparable. This tool, the cm-APS-POQ-R, is scored similarly to the m-APS-POQ-R.

#### *3.3.5. Pain intensity.*

The Numerical Rating Scale (NRS) was used for the parent's assessment of children's pain. The NRS has been widely used for pain measurement in adults. As a proxy measure in children's pain, the NRS has shown consistency in various populations (Huang et al., 2012; Khin Hla et al., 2014). The c-statistic in this sample was .80 (Matula et al., 2019).

A standard self-report pain measurement tool used in pediatric pain management is the Faces Pain Scale-Revised (FPS-R), which has been validated in this population with a c-statistic of .70 (Matula et al., 2019). The FPS-R consists of six gender-neutral faces

depicting a face of "no pain expression" on the left (scored as 0) and a face of "most possible pain" on the right (scored as 10) (Hicks, von Baeyer, Spafford, van Korlaar, & Goodenough, 2001).

### 3.4. Procedures

The survey was administered by a member of the research team using Redcap software, and all analyses were conducted in Stata version 15.1 (State Corp, LP, College Station, TX, USA). The significance level for statistical tests is set at  $\leq .05$ . All participants with all data missing were dropped. However participants with some missing data, but complete data on some subscales and important dependent variables such as parental age, sex, relationship to child, child's age, sex, unit of admission were retained for analysis and missing variables treated as 0 during the analysis.

### 3.5. Statistical analysis

Descriptive statistics, including means, standard deviations (SD), ranges, proportions, and percentages, were used for sample baseline characteristics and variables of interest. Single sample t-test was used to compare the means of the outcome variables. Means for m-APS-POQ-R, cm-APS-POQ-R, and the knowledge, perception of care, pain interference subscales were set at the population mean of 50% assuming a normal distribution. The pain severity subscale mean was set at  $\leq 24$ , which represents clinically relevant pain (moderate-severe pain). ANOVA was used to analyze variance between the means of the outcome variables and some characteristics of children and parents/guardians. *p-value* was set at .05 for all analyses.

#### 4. Results

The mean age (SD) for parents/guardians was 32 years (10.2), ranging from 17 to 81 years, and for children was ten years (1.6) ranging from 8-13 years (Table 4-1). The internal consistency for m-APS-POQ-R in this sample was  $\alpha = .84$ . The original APS-POQ-R was not designed for nor validated in children, but with the modifications made, cm-APS-POQ-R had both face validity of capturing the concepts and internal consistency of  $\alpha = .80$  in this sample of children.

Forty-seven percent of parents/guardians reported that their children were currently experiencing moderate-severe pain, while 37% indicated their children did not have pain. Fifty-nine percent and 52% reported moderate-severe pain as the child's worst pain and average pain, respectively. Thirty-one percent and 29% reported no pain as average and worst pain the child had, respectively. Thirty-eight percent of children reported being currently in moderate-severe pain, while 45% stated that they were not in pain. The average pain was 57% for moderate-severe pain and 36% for no pain, while the worst pain was reported at 60% for moderate-severe pain and 35% for no pain. A spearman's correlation was run to assess the relationship between parents/guardians pain scores and child pain scores using a sample of 25 participants. There was a weak negative association between parent/guardian current pain scores,  $r_s = -.31, p = .13$ , average pain scores,  $r_s = -.39, p = .05$  and a moderate negative association for severe pain scores,  $r_s = -.56, p = .004$ .

The parent's and children's mean scores for m-APS-POQ-R,  $p < .001$  and cm-APS-POQ-R,  $p < .001$  were statistically significant (Table 4-2). The means of the following m-APS-POQ-R subscales were statistically significant: pain severity,  $p < .001$ , perception of

care,  $p < .001$ , and knowledge,  $p < .001$ ; however there was no significance in pain interference,  $p = .96$ . All subscales were statically significant,  $p < .001$  in the children's survey (Table 4-2). The majority of parents/guardians, 59%, stated that a combination of pharmacological and non-pharmacological measures were used to manage children's pain, while 8% and 33%, respectively, indicated that pain was managed by either pharmacological or non-pharmacological measures only. Also, a larger number of children, 72%, pointed out that combination of pharmacological and non-pharmacological measures were mainly used to manage their pain and yet only 8% and 21%, respectively, indicated that pain was managed by either pharmacological or non-pharmacological measures only.

Parents/guardians aged  $\leq 24$  years of age were more likely to score higher on m-APS-POQ-R,  $p = .04$ , knowledge,  $p = .015$ , and pain severity,  $p < .001$ , subscales than other parents/guardians (Table 4-3). Parents/guardians of children admitted in medical units likewise had higher scores on m-APS-POQ-R,  $p < .001$ , and knowledge,  $p < .001$ , pain severity  $p = .02$ , and perception of care,  $p = .003$ , subscale (Table 4-3). Parents/guardians in NRH surgical unit reported higher scores on pain interference,  $p = .008$ , (Table 4-3). Child diagnosis was similarly significant in the scoring m-APS-POQ-R,  $p = .019$ , and the pain severity subscale,  $p = .003$ . The parents/guardians' perceptions of child's illness acuity was significant in scoring m-APS-POQ-R,  $p < .001$ , pain severity,  $p < .001$ , perception of care  $p < .001$ , and pain interference,  $p < .001$  (Table 4-3). Child diagnosis was the main determining factor on overall child scores on the cm-APS-POQ-R,  $p = .04$  and perception of care score,  $p = .03$  subscale scores (Table 4-4). Child age group was significant for the knowledge,  $p = .007$  subscale with children 8-9 years of age have



lower scores. The child's place of residence was significant for pain interference,  $p = .025$ , subscale with children from less-resourced areas (rural/semi-urban) scoring higher than those from cities and towns (Table 4-4).

## **5. Discussion**

The survey results indicate a high burden of pediatric acute pain among hospitalized children in Botswana, but children and parents/guardians are content with the pain services provided. The prevalence of moderate-severe pediatric pain ranges from 38% to 60% among children compared to 47% to 59% as described by parents/guardians. Additionally, the pain severity subscale was significant with a mean below 24, which indicates moderate-severe pain for both children and parents/guardians. Similar results were suggested in an observational study on the same population with an estimate of pain prevalence ranging between 37% and 59% (Matula et al., 2019). The results are also supported by a study by Doca and colleagues who found similar trends in pediatric acute pain prevalence in Brazil (Doca, Costa Junior, Finley, & Linhares, 2017).

In the current study, both children and parents/guardians were overall content with pain care, despite the high prevalence of moderate-severe pain reported. Azam, Campbell, & Ross (2012), and van der Heijden et al. (2018), suggested similar prevalence in various pediatric subpopulations in the sub-Saharan Africa region. The results are similar to the global prevalence of pediatric acute pain for clinically relevant pediatric acute pain ranging from 24% to 56% with the participants being content with the care (Harrison et al., 2014; Walther-Larsen et al., 2017). Evidence demonstrates that children from LMIC and parents/guardians exhibit stoicism when it relates to pain; this could be the reason why both children and parents/guardians were content with their pain

service, despite the high prevalence of moderate-severe pain (Bosenberg, 2007; Jongudomkarn et al., 2012). Eshete and colleagues also found that patient satisfaction with pain care in sub-Saharan Africa was not correlated with pain intensity, which may also explain participants being content with overall care despite high pain prevalence (Eshete et al., 2019).

The knowledge subscale was statistically significant for both children and parents/guardians with a mean of 26(7),  $p < .001$  and 24(7),  $p < .001$  respectively, which suggests that they have adequate knowledge regarding pediatric pain. Similar results were reported for parents' knowledge by Chng et al. (2015) and Zhu et al. (2018). Other authors have also reported that children having adequate knowledge about their pain (Kortessluoma, Nikkonen, & Serlo, 2008; Twycross & Finley, 2013). These results were not expected because most studies cite low levels of knowledge among children and parents/guardians due to illiteracy and cultural norms (Matula et al., 2018).

The pain interference subscale was only statistically significant for children; these results were surprising in that parents/guardians did not consider pain interfering with the children's functioning despite the high levels of pain. Evidence suggests that parents/guardians believe acute pain interferes with the child's activity of daily living (Lim, Mackey, Liam, & He, 2012), which is contrary to the findings of this study. More insight is needed on reasons why parents/guardians did not consider pain interfering with a child's hospitalization and activities.

Parents scoring on the m-APS-POQ-R and the subscales was influenced by parental age, unit of admission, child diagnosis, and the perceived child illness acuity, while child diagnosis was the main factor in a child's scoring of the m-APS-POQ-R and subscales.

The results suggest a demographic shift in the understanding of pain and the association of apparent injury with pain interference. Also, the results suggest that children in the medical unit are less likely to be considered in severe pain when compared to those in the surgical unit or with apparent injuries, which is a prevalent misconception globally (O'Neal & Olds, 2016). Overall, this study adds new knowledge about the burden of pediatric pain and children and parents/guardians' view of pediatric pain management in Botswana hospitals.

The limitations of this study include selection bias due to convenience sampling. To address selection bias, two referral hospitals were included; each admits a diverse population of children with various levels of illness acuity and from rural and urban northern and southern Botswana. Also, the scales used have not been validated in this population, and comparison groups or cut-off scores do not exist for these measures. The data were normally distributed (Shapiro and Wilk test statistic range of .88 - .98); and the population means of 50% for the scale and all subscales except pain severity  $\leq 24$ , in part, addresses this limitation. The sample is mainly parents of children <6 years of age and female caregivers; reflecting the demographics of patients admitted in pediatric units and the most common accompanying family caregiver in Botswana. Also, children aged <5 years constitute 70% of the inpatient population among children aged 0-14 years in Botswana, therefore the majority of the sample was likely to be <5 years (Statistics Botswana, 2017). In future studies, it is recommended that data collection period be extended for a more balanced age range sample.

## **6. Aim 2: Qualitative design**

### **6.1. Approach**

A descriptive qualitative study was adopted for this aim; it intends to answer the research question about how people feel, perceive, and give reasons for why those feelings and perceptions about pain and pain management practices in Botswana exist (Colorafi & Evans, 2016). The qualitative design allows participants to identify factors that facilitate or hinder pediatric pain management in Botswana (Colorafi & Evans, 2016). A descriptive qualitative study was essential because of the gap in evidence on pediatric pain management practices in Botswana and sub-Saharan Africa (Colorafi & Evans, 2016; Matula et al., 2018).

### **6.2. Sample**

Twenty-seven participants who completed the survey went on to do interviews. Nineteen parents/guardians comprised of two fathers, one grandmother, and sixteen mothers to the children participated. Nine parents/guardians were from NRH, with five and four from the medical and surgical units, respectively. Nine participants were from PMH, four participants were from the medical unit, and five were from the surgical unit. Eight child interviews were conducted with two children per unit.

### **6.3. Procedures and rigor**

Interviews were face-to-face, completed by the researcher (PI) using the semi-structured interview guides for parents/guardians (Appendix 4C) and children (Appendix 4D). Interviews were recorded using two voice recorders, transcribed verbatim, and translated to English by an experienced independent transcriber. Post-transcription and translation, the PI listened to the interviews and cross-checked with the transcription to

ensure the translated scripts were consistency with the interview to ensure credibility (Sandelowski, 2010). Where there were disagreements, the PI flagged the interview and sent it back for re-translation. Two interviews were not included in the analysis due to poor sound quality.

#### 6.4. Analysis

The Atlas.ti software package version 8.4 (ATLAS.ti Scientific Software Development GmbH, Berlin, Germany) was used to organize and manage the data for analysis. Thematic analysis was used for qualitative data analysis. Thematic analysis is chosen as a method of data analysis and interpretation in qualitative descriptive studies (Colorafi & Evans, 2016; Vaismoradi, Turunen, & Bondas, 2013). The primary coder (PI) and an expert in qualitative and mixed-method research (secondary coder) developed the codes together for credibility and trustworthiness of the code (Colorafi & Evans, 2016; Vaismoradi et al., 2013). The primary coder (PI) coded the first interview and shared it with the second experienced peer who went through the coding to establish rigor and reduce bias. The primary and secondary coder differed on one code, and they agreed that the primary coder made a mistake. It was corrected to the second coder's suggestion and satisfaction. Five additional interviews were reviewed by the secondary coder post-coding and were found to be consistent. Data saturation was reached with all interviews coded.

### 7. Findings

Six major themes were identified from children and parents/guardians' interviews, some with several subthemes. The major themes identified were soldiering on with hope,

facing adversity, perception of pain care, pain care outcomes, knowledge on pain, and being a child.

#### 7.1. Soldiering on with hope.

*“...[J]ust has to endure even when he is in pain because it will get better because everyone has a problem but because there is hope for tomorrow.” PMHS-4-F*

Soldiering on with hope is a theme representing the overall general positive outlook exhibited by children and parents/guardians about their attitudes and experiences with pain and pain management. Both children and parents/guardians tended to focus on the bigger picture and regard pain as part of a whole sickness episode rather than an entity that needs to be focused on independently. By so doing, children and parents/guardians tended to focus on the diagnosis and management of the underlying causes and be willing to sacrifice being in pain for the time being as long as they knew there was hope from the promised interventions or recovery. While the children and parents/guardians agree that pain needs to be treated, pain, in general, is treated as a transient symptom with no obvious short-or long-term consequences on childcare and recovery.

*“...I believed them when I was told the surgery that was to be done would totally ensure that the pain will reduce, so even though we were waiting I knew something better was coming...there is still some pain, but it's from the surgery as they had to cut some bone, but in comparison you can see that he is getting better even the pain killers make some difference now that the can even move his toes....” PMHS-1-M*

*“...they do help him, but I have alerted them that the blood level always drops and I suspect it might be his medication or something else, but they have assured me they will get a team to monitor it....” PMHM-10-M*

*“...The doctors will attend to children depending on the treatment they are in if the child has a fever they will give them Panado syrup or they insert a cannula and infuse fluids to help with pain and fever to subside....” NRHM-12-G*

*“...they should do the treatment like the planned operation....” PMHS-3-C*

*“...I am happy because they did blood transfusion....” NRHM-6-C.*

Under this theme, pediatric acute pain is acknowledged, but its significance is less than that of the cause of the pain; its consequences are either minimized or disregarded.

## 7.2. Facing adversity.

*“...[T]o tell you the truth kids are in pain eish-[way of showing something undesirable and sympathy], kids are in pain they are suffering ai-[emphasizing how bad pain is is] they are suffering...Child pain is not a good thing....” NRHM-7-M*

The facing adversity theme highlights how children and parents/guardians responded to pain and their attitudes regarding pain treatment. Under this theme, there is a departure from minimizing the impact of pain on children with an emphasis on the need to adequately treat pain. Pain is regarded as a non-desirable thing, and children would not stop crying or complaining unless their pain is adequately addressed. Both short-and long-term impact of pain is considered, and parents/guardians recommend that children’s pain be treated with urgency. Parents/guardians also indicate that when children report pain, it

is authentic, and most of the time, when the child reports pain, it is already severe because they tend to ignore pain till it is unbearable.

*“...I mean even if the help is not sufficient, an adult can simply appreciate the little being done, but a child would want to be helped and the pain to go away immediately. I have heard them complaining before that even when given medication it is not helpful because they want the pain to be gone immediately....” NHRM-9-M*

*“...I believe my pain was better because as an adult you can withstand the pain and even come up with mechanisms to cope with it, but for children is a different story when they tell you they are in pain they literally mean it and cannot do anything about it....” PMHS-1-M*

*“...A child cannot control or manage themselves when they are in pain so he has to be attended to quickly so that their condition can be attended timely instead of ignoring them just because they are children and we should not be waiting....” NRHM-8-M*

*“...[Apart from you have you ever seen anyone in pain?...]...The child next to me...[her condition] it is not a pleasing one...she was crying, but when they gave him medication he got quite...” NHRS-4-C*

While pediatric acute pain is regarded as a bad thing that needs to be treated urgently, some parents/guardians acknowledged that not all parents/guardians view a child's pain as essential. Some parents/guardians reported that there is little they could do as parents/guardians when faced with the adversity of pediatric acute pain and suffering. Also, some parents/guardians reported that watching their children deal with the pain was



not easy, and it often produced negative emotions and sometimes rendered them feeling helpless while their child suffered.

*“....[Y]es some can see that their kids are in pain some can take the pain easy....”*

*NRHM-7-M*

*“...At first, when I got here, I had too much sympathy towards them because I could see that they were in pain and even now I can see some are in pain, but God knows everything....”PMHM-9.M*

*“...From when he was admitted, it was very painful to the point where as a parent it really affects you too, but I had to encourage him and give him hope...Yes, you become helpless because you are just there...even if your child is in excruciating pain,...But they did assure me that they have not forgotten about him....” PMHS-1-M*

*“...Having a child who is sick is painful I do not know if there is anything that could be done about the medication they are given, maybe they should give them something stronger at night to help him to sleep because he does not sleep well at night....” PMHS-2-F*

### 7.3. Perception of pain care.

*“...We end up being emotional as parents/guardians and engage nurses and doctors repeatedly seeking answers...” NRHS-11-M*

The perception of care theme depicts how children and parents/guardians view the quality of pain care they received, and their expectations with regards to pediatric acute pain care. It also presents the views on how children and parents/guardian's experiences and perceptions are shaped by the larger hospital system from the first contact with the

health care system and the hospitalization itself. The perception of care theme is divided into the quality of pain care, trusting the system and the healthcare providers, and access to services subthemes.

#### *7.3.1. Quality of pain care.*

The subtheme quality of pain care depicts what children and parents/guardians thought about their pain care. A majority of children and parents/guardians believed that the healthcare providers were attempting to treat the child's pain, citing the use of either pharmacological and non-pharmacological measures or a combination to address pediatric acute pain. The response of the healthcare providers was regarded as a significant source of satisfaction by the children and parents/guardians. Despite some parents/guardians being satisfied with the services, other parents/guardians indicated that the service was not always satisfactory, mostly citing nursing services and the lack of consistency in the information received.

*"...For other kid being hospitalized, I have noticed that they are in pain, but the doctors and nurses are really trying hard to assist them and even respond timely when called unlike in the past when you used to call the nurse and taking their time not hurrying to*

*help...." NRHM-12-G*

*"...really helped, with the condition the child was in, I did not expect that he would be playing when are being discharged as if he never had a fracture. Even now, I have to remind him that he still has a fracture because he freely plays, so I was given first-class help...." PMHS-6-M*

*“...Some nurses even when you tell them that a patient is in pain they are not keen and will be busy on their phones especially when the doctors have knocked off, so they take time to attend to patients which at times leads to arguments....” PMHM-10-M*

*“...There are some who are very keen and show compassion when helping children some are just really here to push the ticket...They only come when you call them if you do not they will not come....” PMHM-9-M*

*“...They come with different opinions on what should be done, so you are never sure of who is saying what because they have different views....”NRHM-13-M*

The quality of care subtheme also reflects the patient’s journey in the healthcare system. The positive experiences are often associated with better satisfaction with pain care, while those parents/guardians who view their interaction with health care negatively often report dissatisfaction with pain care. Some of the parents/guardians’ perceptions of the quality of care were influenced by what transpired when they first encountered the health care system and events leading to the current hospitalization. Therefore, the first contact with the health care system is used as a reference point for the quality of care received.

*“...[C]urrently we have not been given treatment, and it is has been almost a week even though he is supposed to go for surgery....They gave me feedback that my child will be going for surgery on Monday when we go to Gaborone...”NRHS-11-M*

*“...When we arrived at the emergency unit, it was around three, but we were only helped at 8 when we were already complaining, on the other hand, the child was*

*screaming...Since it was a referral the had already given him paracetamol at the clinic, but the delay here wearied off the paracetamol from his body, and the pain came back....*”PMHS-2-F

*“...When we first came here we were told that the scan is not working as he suspected that the child was affected in the brain he suggested that the spinal fluid also be drawn, but when the other doctor came he mentioned that children are normally affected by the heat and they may show these symptoms, so they treated him and he was fine....*”NRHM-5-M

### *7.3.2. Trusting the system and healthcare providers.*

The second subtheme of perception of care is trusting the system and the healthcare providers. This subtheme was derived from the children and parents/guardians' expectations of care during hospitalization. Most of the parents/guardians indicated that at-least their child was not sent back home when they came looking for help, and they had hope that since the child is in the hospital, the child will be well. Similarly, children cited hospitalization as a measure to manage their pain.

*“...[T]he thing is just that I am happy they took the situation in the right way....*”NRHM-7-M

*“...[T]hough there was a delay its better than being sent back and being told to come tomorrow without being attended to....*” PMHS-2-F

*“...They are taken to the hospital...” [Since you admitted in the hospital, what have you done so far?] Nothing....[What do you think should be done when a child is in pain?] They should be given medication [Medication?] and be admitted in the hospital...”* NRHM-6-C

Parents/guardians also indicated that they hoped that their pediatric acute pain would be addressed either through the treatment of the underlying condition or by adequately managing pain. Children and parents/guardians placed their hope on healthcare providers to do the right thing by managing their pediatric acute pain. When the expectations were not met, parents/guardians tended to become proactive and request for services they deemed appropriate to manage their children's pain.

*"...Yes, at times, I even ask some mothers to call the nurses when I see that the child is in too much pain...." PMHM-11-M*

*"...Yes, since the child cannot voice their discomfort, the doctors and nurses will find a way to help ...." NRHM-13-M*

*"....[B]ut the doctors should always listen to us parents/guardians when we indicate that there are changes in a child be it a rash or some sores because they do not normally check on the children when we tell them..." NRHM-5-M*

*"....[Did being in bed help with the relieving of the pain?]I told the nurses, and they gave me some medication, and I got better...." NRHS-3-C*

### 7.3.3. Access to services.

The access to services subtheme depicts how parents/guardians' balance views about resource availability and their children's needs for pain care. Healthcare providers and parents/guardians often concentrated on what they thought was a priority and what resources were available; most of the time, this relegated pain care to the background. Most of the parents/guardians were focused on the outcomes of the child's condition, and pain was regarded as a transient symptom that a child must endure to get access to other

services. Also, healthcare providers focused on issues they considered essential and likely to cause danger to the child's life.

*“...When he is in pain, I just lift him up as there is not much I can do; they have told me that I should not even breastfeed him after he did the biopsy. When he cried, I was forced to use a rubber glove to make it seem like a feeding bottle....”*  
PMHM-9-M.

*“...[S]he is overly tired, sleeps a lot and headaches...They have asked us not to give him any over the counter medications so when we get to Hukuntsi hospital; they know what do to with him...I really appreciate what they did they helped us a lot at times I did not believe my child would still be alive....”* PMHM-10-M.

*“... [W]hen they are in pain so he has to be attended to quickly so that their condition can be attended timely instead of ignoring them....we shouldn't be waiting for two to three days, so we have to take them to the hospital to be attended to because that's where they can get help....”* NRHS-8-M

Resource availability, particularly resource limitation and how it affected children's pain management, was also a common issue that influenced the perceptions of care. The resource limitation was cited when focusing on the parents/guardians' necessity to manage their children's underlying conditions and gain access to services on time. Most parents/guardians were cognizant of the shortage of resources in the institutions and often sympathized with healthcare workers; they mostly considered that healthcare providers were doing their best to help their child cope with pain. Some parents/guardians advocated for hospitals to work with parents/guardians where resources are limited to help expedite the process even through cost-sharing measures.

*“...I have realized that they do try, but the problem is that our country does not have resources...I feel everything would be fine because we would not have to go to different places to find help....” PMHM-9-M*

*“...So far everything went well even though we took time to finally see the doctor and being attended to but at times you observe the situation in the hospital and come to terms with it, as there may be a shortage of doctors. But in the end, we were assisted, and a surgery was performed...Yes, you become helpless because you are just there and you have to wait for your turn to be assisted even if your child is in excruciating pain....” PMHS-1-M*

*“.... I also believe for those who can afford to go to private hospitals they should do it instead of waiting for a long time at government hospital while your child is in pain, at times we have to meet the government halfway...” NRHS-11-M*

*“...As for now I really don't know, but I am not happy about the time it takes for children to be attended to, it can take up to two weeks for a child to go for a scan while at that time the child's pain is increasing, I think that's what they should improve in...” NRHS-8-M*

#### 7.4. Pain care outcomes.

*“...When I was in pain, I just wanted help so that I can get healed because no one wants to be in pain...” NRHM-5-M*

The pain care outcomes theme is a description of how children and parents/guardians visualized the outcomes of pain treatment. The pain care outcomes were presented in two-fold, first with participants describing the successfully managed pain and second

with the unwanted consequences from inadequately treated pain. Most parents/guardians were content with the progress their child made due to pain treatment.

*“...[S]he was in pain, I can’t say she was not in pain even me myself I saw that she was in pain, from the time we came here, she has improved they have treated her and even the pain I can see its reducing she can be able to do things which she has not been able for the past two weeks....” NRHM-7-M*

*“...Yes, I did notice a difference...The pain she felt when going to the theatre was severe as the wound was already infected with worm-like organisms....” NRHS-14-M*

*“...In terms of his pain, a person can only explain better what he feels, but I am happy that now he can play around compared to when he was normally asleep, he can even joke about other kids who are awaiting surgery....” PMHS-1-M*

*“...Yes, it did because the pain would instantly be relieved once given the medication....” NRHM-13-M*

*“...I believe so because at first, he was not even playful, now he can even....” NRHM-10-M*

While most of the parents/guardians reported positive outcomes regarding children’s pain treatment, other children did not have pain adequately managed, or they came a long way to achieve some positive results. Some of the children have gone through harrowing experiences that have left them with negative consequences of inadequate pain management such as complex pain syndromes which are also not being adequately managed.



*“...She was not sleeping well, she would sleep during the day and be awake at night, and she was not even playing...She was not eating at all....” NRHS-14-M*

*“...[I]t started with an infection on the knee and then progressed down the leg, it was the first time to witness a child undergoing operation without any sedation or anesthesia, they cut the leg open and washed it and left the wound uncovered, once they thought they had it under control the infection went to the other side, and they had to repeat the procedure again, but then it went to the feet...pain...with me pain...I think with regards to pain a local anesthetic has to be administered before most procedures are done like unwrapping bandages because the nurses just normally rip it off but we do understand, currently my child does not want to be injected because he is still traumatized by the fact that he was injected in the wound..., so all medications are being done through a cannula because it takes a team of 12 nurses just to give him an injection...”*

*PMHS-4-F*

#### 7.5. Knowledge of pediatric pain management.

The knowledge of pain management theme emanated from children and parents/guardians’ knowledge of pain assessment and treatment strategies that were self-employed or being used by healthcare providers to cope with pain. Overall, parents/guardians showed an understanding of the use of multimodal treatment strategies for pain and symptoms of pain. This theme is divided into measuring and assessing pain and pharmacological and non-pharmacological approaches to pain control subthemes.

### 7.5.1. *Measuring and assessing pain.*

The subtheme of measuring and assessing pain reflects how children and parents/guardians understand the presentation of pain in children, how pain is assessed/measured, and their role in identifying and reporting pain symptoms. Most children and parents/guardians show an understanding of symptoms associated with pediatric acute pain, mainly crying. Parents/guardians are also aware of a child's reluctance to admit having pain in fear of treatment and children's efforts to try to cope with pain without informing parents/guardians.

*"...How does a child show they are in pain? They cry.... Yes for a prolonged period..." NRHM-6-C*

*"...So basically they can hide their pain fearing the pain from medicines...It not many occasions where a child would say they are in pain when they are not...He normally does not play and gets in a somber mood..." NRHM-9-M*

Children and parents/guardians also know that while children cry when in pain, crying alone is not adequate to say the child is in pain. Children and parents/guardians also identify additional symptoms they associate with pain such as fever, restless, lack of sleep, and change in behavior. Some say they just know as parents/guardians that the child is in pain.

*"...I believe we do because whenever a child cries, the parents/guardians would immediately ask what could be wrong. Even grandparents often ask mothers to check what might be wrong with the child...you can just notice the difference because when he is crying due to pain, you can see the difference from when is*

*due to hunger and sometimes when they are in pain end up with fever also....”PMHM-9-M*

*“...[S]he cries you will see if she is in pain if you hold the hand if it is painful she will show that it is painful she will cry, and she will even show that resistance....”NRHM-7-M*

*“[...So apart from the fact that an adult can explain and describe where they feel the pain, what other difference is there on how we can notice that a child is in pain] ....It depends really as a parent I know my child behavior patterns so I can tell if there are some changes to him....” NRHM-13-M*

While both children and parents/guardians agree that children experience pain and often someone can tell when a child is in pain, many acknowledged the difficulty of deciphering the child’s pain as a significant barrier towards pain treatment. Furthermore, some parents/guardians indicated the limitations of the methods used to assess and measure pain in children due to the subjective nature of pain.

*“...There is a big difference because a child cannot fully explain where they feel the pain they can just say they have a tummy ache without specifically mentioning what is wrong...an adult can also force themselves to have something to eat even if they are in pain just to get strength, but children cannot do that....” NHRs-8-M.*

*“...They do say what they want, but when they are in pain they do not say anything...[So how could you tell that they were in pain or not?] The child? I could just tell....” NRHS-14-M*

*“...[B]ut a child would just cry or play until their pain is severe that is when they will notify you....” PMHM-9-M*

*“....There are no averages in pain, it is like when someone tells you that there have problems you cannot understand how big that problem is, the person is the only one who can perceive it, just like that pain is like that, you can't say it has average because you can't feel it for another person....” PMHS-4-F*

#### *7.5.2. Non-pharmacological pain control approaches.*

The non-pharmacological pain control methods subtheme summarizes the type of non-pharmacological strategies, knowledge, and expectations of children and parents/guardians for strategies applied to help cope with pain. Children and parents/guardians highlighted being there for the child and giving them love was an important strategy to help the child cope with pain.

*“...We should relieve the pain somehow for those kids who can talk we should comfort them by talking to them for those who cannot talk the parents/guardians have to cuddle them and be there for them because a mother's presence can have an impact....” NRHM-7-M*

*“...Some should be allowed to be hospitalized with their parents/guardians, and some be regularly checked....” NRHS-3-C*

*“...Children need parental support because they cannot do much for themselves and when they see our presence, they do feel better seeing that we try to bathe them and feed them...I talked to him and comforted him and told him that he will be fine and at times, prayer....” NRHS-14-M*

Children and parents/guardians also described some physical measures that were currently applied to manage pain. These measures include massaging, cuddling,

distraction, prayer, and providing encouragement and reassurance. Some of the strategies included indigenous strategies such as consulting with traditional healers.

*“...As parents/guardians especially women we know how to be tender with kids I can give him my phone to play with it, so he listens to music or plays games to distract him from the pain when there is no any pain killers, also just staying next to the child and keep on comforting them...When it is like that, as a parent you have to give the child love, I have to comfort the child and massage them and make them feel at ease and reassure them that everything will be fine and the child will be better....” PMHS-6-M*

*“...I would use a wet cloth to try to cool his body down and also lift him so that he could not tire and I continued to give him milk...” NHSM-2-M*

*“...[So how do you prevent pain from building up?] I slept [So sleeping made it better?] Yes....” NHRS-4-C*

*“...I was reading a book, played then books that’s all I do...[So what did your mother do when you were in pain] She was massaging me...[using] warm water... it was helping....” PMHS-3-C*

*“...He went to the hospital first, but they could not help him as they did not know how to extract the snake venom, so he went to the doctor who had the know-how....” PMHM-5-M*

### *7.5.3. Pharmacological pain control approaches.*

The pharmacological pain control methods subtheme encompasses children and parents/guardians’ knowledge and their experience with the use of pharmacological measures to manage pain. Children and parents/guardians show an understanding of the

use of pharmacological measures to manage pain and their expectation of being treated with analgesics.

*“...[How is a person in pain helped?] They are given medications...”NRHM-6-C*

*“...They gave me medications...[Apart from medications, what else did they do?]*

*They gave me some injections....”NRHM-15-C*

*“...[T]hey gave me pain killers and put an injection...pain injections...because I cannot swallow....”PMHS-3-C*

*“...The only pain killer they have been giving him it is Morphine...”PMHS-1-M*

While some parents/guardians acknowledged the use of analgesics, they believed the type of analgesics used were not adequate to treat the pain their children were experiencing. On the contrary, some parents/guardians were worried about the frequency in which the analgesics were given and about their impact on the child. This might suggest that while parents/guardians advocate for pediatric acute pain management, there is also a fear of side effects related to the medications.

*“...My thoughts on this are that pain gradually increases and will be treated according to the severity of its stronger medicines for greater pain....” PMHS-1-M*

*“...I really do not know what they could do because during the night because all children will be crying so I do not know if there has to be an alternative because even after being given Paracetamol they continue to cry so I think Paracetamol is no longer effective...There is an orange medication. I do not know if it is Brufen....”PMHS-2-F*

*“...They should be given pain-relieving medication though it should not repeatedly be ...hahaha [laughs] there are medications that are only to be taken three times a day, so we do not want to overdose....”NRHS-11-M*

#### 7.6 Limitations of being a child and experiencing pain.

Being a child is a theme deduced from the parents’ perceived child risk factors and the children’s experience and response to pain. Most of the parents/guardians were sympathetic with their child’s pain and wished they could trade places with them. The theme is further divided into three subthemes: two about 1) parents/guardians’ view of child risk factors being overall child health status; 2) perceived child developmental capabilities; and one related to 3) children’s response and experience dealing with the pain.

##### 7.6.1. Overall child health status.

The general child health outlook influenced how parents/guardians viewed the child’s pain. Parents/guardians of healthy children who experienced an acute illness regarded their child’s pain as severe and the illness condition as a cause of concern. Also, children with high acuity illnesses were considered to be in severe pain, mainly due to perceived suffering; children whose illness was considered improved were thought to be in less pain.

*“...When we came he could not breathe, he had an irregular heartbeat, low blood and was malnourished but he is better now....” NRHM-10-M*

*“...It was painful, and it even emotional affected me to the point where I had elevated blood pressure as he was hit by a car, and his left thigh was broken....”PMHS-6-M*

*“...[He was not able to move his leg] at all...yesterday he took a wheelchair to the loo, but when he got there and could limp a few steps...last week he could not have done it...”PMHS-1-M*

Some parents/guardians believed that because children are aware of their condition, they exaggerate their pain experience by exhibiting behaviors that show that they are in severe pain when, in reality, they have less pain.

*“....Because he is a child even when you touch his finger, he cries if it was an adult he could explain, but now as a child, he does not want to be touched...,moreover, because he is a child, he also fantasizes just because of the injury and thinks he is in pain....” PMHS-2-F*

*“...It is painful really, but kids are brave they continue to play, so we are constantly shouting at them to take it easy despite that they look in pain....”  
PMHS-6-M*

#### *7.6.2. Perceived child developmental capabilities.*

*“...Children cannot withstand the pain compared to adults...”NRHM-9-M*

The perceived child developmental capabilities subtheme encompasses parents/guardians' view of the child's age, developmental milestones, and the ability to communicate their needs as an essential aspect of pediatric acute pain care.

Parents/guardians indicated that children, due to their age and developmental milestones have not mastered dealing with pain and as such, require urgent care and adequate pain management. Pain was also associated with severe consequences on the child's daily function and physical, psychological, and social development by parents/guardians.



*“... [T]he child can’t really handle that pain on herself at least as adults we can manage to handle the pain...at-least when you tell them about the child they look more concerned, about us they will come, yes they will come, but they will give treatment there and then but they can’t give the same treatment they are giving to a child....” NRHM-7-M*

*“... I believe my pain was better because as an adult you can withstand the pain and even come up with mechanisms to cope with it, but for children is a different story when they tell you there are in pain they literally mean it and cannot do anything about it....” PMHS-I-M*

#### *7.6.3. Child’s response and experiences with pain.*

The child’s response and experience with pain subtheme document children’s responses to pain and their experiences being in pain. In general, children indicated that they know when they are in pain and often try to notify someone to help them. Children indicated that they try to control pain by themselves through various coping mechanisms. Children believed that pain was affecting their activities of daily living and sleep. Also, most children do not overemphasize their pain because they believe that being hospitalized is one way to deal with pain.

*“...[H]e was crying, and he would move his feet when I tried to touch them as that is where the pain was....” NRHM-13-M*

*“...They cry [Apart from crying, what do they do?] They do not play...I could not walk... I could not play...I could not eat properly....” NRHM-15-C*

*“...I have been in pain...Yesterday...I was crying [So you were crying and not playing?] ...Yes...I was not eating [Because it was painful?] Yes...”NRHM-6-C*

*“....[What about the time you had a fracture?] It was ten...I could not eat... I could not sleep [Because of the pain?] Yes...I could not play I spent most of my time in bed...”NRHS-3-C*

Overall, children and parents/guardians showed an understanding of pediatric acute pain, how it affects them, their healing, and how it is managed or supposed to be managed. Also, they were generally happy with the care they received related to pain management.

## **8. Discussion**

The interview results demonstrate that pediatric acute pain is a significant challenge among children hospitalized in Botswana. Children and parents/guardians believe that healthcare providers are doing their best to manage the child's pain and are content with the outcomes of pain management. Six themes were deduced from the interviews, and some of them had several subthemes. The themes were soldiering on with hope, facing adversity, perception of pain care, pain care outcomes, knowledge of pediatric pain management, and being a child.

### **8.1. Soldiering on with hope.**

Both children and parents/guardians expressed they focus on the bigger picture of the illness and the hope of pain improving with time. The positive outlook affects how they interpret pain by reducing the significance of pain and focusing on the ultimate goal of treating or recovering from the illness. Such thoughts prove to be beneficial in acute conditions when there are planned interventions or condition ultimately resolving. However, these same thoughts may be detrimental to children with extended sick days or chronic conditions and repeated procedures. Similar findings were reported by

Jongudomkarn et al. who found that children and parents/guardians in Thailand denied having pain due to the cultural beliefs that pain can be seen as acceptable (Jongudomkarn et al., 2012). Also, Angelini and colleagues in Sweden reported similar results in her study of adults with orthopedic conditions (Angelini, Wijk, Brisby, & Baranto, 2018). In addition, the findings of this study provide valuable information; however, further research is needed to prove or disprove the evidence which suggests that children and parents/guardians in this population rarely rate their pain as severe, implying pain is underrated (Matula et al., 2019). Therefore, healthcare providers dealing with children and families need to educate children and parents/guardians on the importance of identifying, quantifying, and acknowledging acute pain so they can advocate for appropriate pain treatment as a standard of care.

#### 8.6. Facing adversity.

The theme of facing adversity provides insight into how children and parents/guardians deal with acute pain during the child's hospitalization. While still holding to the bigger picture view, children and parents/guardians argue that acute pain should be adequately treated as it is not desirable and has adverse effects on child behavior, healing, and wellbeing. Similar findings were reported by Twycross and Finley, where both children and parents/guardians demanded that their pain be treated adequately (Twycross & Finley, 2013). The results also suggest that parents/guardians believe their children when they say they are in pain, a departure from findings reported by Forgeron et al., where healthcare providers often dismiss the child's subjective report of pain (Forgeron et al., 2009). Furthermore, they are contradicting the assertions that children in sub-Saharan Africa are stoical and often do not require pain treatment because they can

cope better with pain than their counterparts in different settings (Bosenberg, 2007). Similar studies report that parents/guardians often feel frustrated and hopeless when dealing with their child's pain, and in the present study under the theme of facing adversity, there were similar sentiments shared by parents/guardians (Lim et al., 2012; Valizadeh, Ahmadi, & Zarea, 2016).

#### 8.7. Perception of pain care.

The perception of care theme addresses the quality of pain care and whether the expectations of children and parents/guardians are met, as well as access to the resources for pain treatment and general care provided. Overall, children and parents/guardians were happy with the care they received, despite reporting that their children are in pain. They believed healthcare providers were doing everything in their power to address their children's pain or their needs. Similar findings were reported by Twycross & Finley, where children reporting severe pain also acknowledged that the care was optimal (Twycross & Finley, 2013). Resource availability and access to services were considered significant issues in pediatric acute pain care, but healthcare providers were considered experts, trustworthy, and were perceived as trying their level best despite limited resources (Idvall, Bergqvist, Silverhjelm, & Unosson, 2008). While the limited resources and access to pain care are similar to findings from Clancy, the current study findings contradict those from Clancy (2014) that patients are often not willing to let their child's pain be treated due to socio-cultural norms.

#### 8.8. Pain care outcomes.

The pain care outcomes theme encompassed both positive results for adequately managed acute pain and negative results associated with poorly managed acute pain.

Children and parents/guardians associate pain with both the positive and negative outcomes, with a departure from the perspective that treatment of the underlying condition is the priority. Findings by Twycross and Finely (2013) and Lim et al. (2012) were similar and children and parents/guardians associated the negative and positive outcomes to acute pain. These results from the present study were also surprising because parents/guardians believed that a child should be patient with pain since hope exists, yet they understood the ramifications of being in pain. The results of the current study were also a departure from the prevailing narrative in the literature that due to low levels of literacy, parents/guardians in LMIC have a minimum understanding of the consequences of pain, thereby tolerating pediatric pain because of cultural influences (Bosenberg, 2007; Clancy, 2014; Valizadeh et al., 2016).

#### 8.9. Knowledge of pediatric pain management.

Both children and parents/guardians showed an understating of pediatric pain assessment and treatment approaches. Children and parents/guardians understood the pain symptoms and pain assessment strategies that can be used to identify pediatric acute pain. Parents/guardians also demonstrated a wealth of experience with pain management strategies, often citing the multimodal pain approaches and being in control of their child's pain management. The results were similar to the findings reported in other studies that looked into parent and child understanding of pain management strategies (Lim et al., 2012; Sng et al., 2013; Twycross & Finley, 2013). These results are a departure from the expected low level of knowledge on pain assessment and management strategies expected in this population (Clancy, 2014; Matula et al., 2018).

#### 8.10. Limitations of being a child and experiencing pain.

The limitation of being a child theme, as it relates to pain, was shared across the parents/guardians' interviews and also could be deduced from children's interviews. Most parents/guardians were sympathetic to their child's pain experience, particularly those children whose health care was in a critical state; parents/guardians wanted to trade places with their children. Also, children were not considered to be able to cope with pain, and parents/guardians demanded immediate relief. Lim et al. (2012) reported similar findings in their study where parents/guardians wanted to trade places with their children. On the contrary, Jongudomkarn and colleagues (2012) reported that parents/guardians sometimes believed that pain brings life experience, and children have to go through it in order to learn. Children were cognizant of their pain and often communicated it to health care providers or their caregivers, as reported by Twycross and Finley (2013).

The limitations of this study include the small sample size per hospital unit. The results may be transferable to a similar population on overall experiences and perceptions of pediatric acute, but they should not be interpreted at the hospital unit level due to possible lack of representativeness of the sample. Furthermore, the results may have been influenced by the patient's views on other aspects of childcare during hospitalization and not necessarily or solely on pain care. Therefore, caution is needed when interpreting the results particularly transferability to other countries with different healthcare delivery systems than found in Botswana. Overall, the results suggest that children and parents/guardians understand pediatric pain and pain management, are happy with the

care they receive despite pediatric pain being a problem, and expect that children's pain is treated adequately and urgently.

## **9. Aim 3: Data Integration**

### **9.1. Procedures for data integration**

Data analysis in convergent mixed-methods designs are aimed at developing results that are comprehensive and aid in expanding understanding of the concept investigated; in this study, it is pediatric acute pain management practices from the patient's perspective. Primary data integration procedures were employed, as described by Creswell and Plano Clark (Creswell & Plano Clark, 2018). The results from qualitative and quantitative methods are merged to compare the shared and disparate concepts on a matrix (table of mixed-method analysis). The data (descriptors from quantitative and themes and sub-themes from qualitative) are presented in joint tables or matrices to determine in what ways the results confirm, repudiate, or expand this concept under investigation (Creswell & Plano Clark, 2018).

## **10. Findings**

There were seven mixed-methods meta-inferences generated from merging the two datasets. The meta-inferences are pain prevalence and intensity, the overall pediatric pain care outcomes, perception of pain care, pediatric pain knowledge, child risk factors, consequences of pain and pain management strategies as presented in the combined display table (Table 4-5). Each of these meta-inference matrices is further explained.

### **10.1. Pain prevalence and intensity.**

The prevalence of pain meta-inference highlighted the magnitude of pain in hospitalized children in Botswana with both qualitative and quantitative datasets

identifying pain as a significant issue among children hospitalized in Botswana. The severity of pain meta-inference provided an additional dimension on the pain intensity these children experience. A significant proportion of children were reported to be currently experiencing pain and scored their worst and average pain as moderate-severe through the surveys. Equally, the qualitative database showed that parents/guardians considered children's pain to be severe and often not adequately addressed. The qualitative database also expanded on why children and parents/guardians mainly scored current pain lower than average pain by divulging that at certain times, particularly at night, and during specific procedures, the children's pain intensity increases, which drive the average pain intensity higher.

#### 10.2. Overall pediatric pain care outcomes.

Overall pediatric pain care outcomes meta-inference provides an overview of how children and parents/guardians view pediatric care services meeting the needs of their pain (child's self-described) and their child's pain (parent/guardian perception) in the broad context of care. Both datasets indicate that children and parents/guardians consider the pain services to be above average at meeting the child's pain needs, but they identify areas that require improvements such as optimal pain management and efficiency in delivering of services related to pain when needed.

#### 10.3. Perception of pain care.

The perception of pain care meta-inference focuses on the narrower scope of how children and parents/guardians rated the quality of the pain care they received. Both datasets suggest that participants were generally happy with the pain services offered. Also, the qualitative database provided pertinent data on why participants were content



with the pain service provided despite the high prevalence of medical relevant pain, which expanded the understanding of the perceptions of pain care. The reasons include; children and parents/guardians acknowledging the limited resources available, the belief that healthcare providers are doing everything in their power to manage the pain for the child despite the unfavorable working conditions, and the fact that the child is under the care of experts through hospitalization.

#### 10.4. Pediatric pain knowledge and attitudes.

Pediatric pain knowledge meta-inference focuses on the general understanding of pain and attitudes regarding children's pain assessment and management by children and parents/guardians. Both datasets suggest that children and parents/guardians have a general knowledge about how pain presents in children, its assessment, and management strategies. Also, the results expanded on some reasons why children and parents/guardians have considerable knowledge of pediatric pain, yet children are still suffering from pain including children hiding their pain; consistency or inconsistency and effectiveness of methods applied to manage pain; and parents/guardians fear of overuse of analgesics. Furthermore, participants also described the limitations of pain assessment methods and highlighted the limitation of their role in pediatric acute pain treatment, including being involved in decision making on pain treatment modalities. Also, some misconceptions about children not having pain coping mechanisms were identified through the qualitative dataset.

#### 10.5. Child risk factors.

The child risk factors meta-inference refer to children's characteristics that children and parents/guardians believe make them vulnerable to pain and their pain experience

unique. Both datasets confirmed that there are characteristics in children that are considered to affect the child's pain experience and response. A majority of parents/guardians use themselves or other adults as reference points for their child's pain. While pain is believed to be the same, children are considered somewhat vulnerable. The vulnerability is deduced from the belief that children lack coping mechanisms for pain, thereby requiring urgent relief of pain. Also, the perceived child's health status, diagnosis, and unit of admission, which are all associated with the child's condition, were in the current study consistently statistically significant across subscales. The qualitative dataset also expanded the results by confirming that the child's perceived health status and inability to engage with his or her environment, including sleeping, eating, and playing, were often associated with more pain.

#### 10.6. Consequences of pediatric acute pain.

The consequences of pain meta-inference were derived from the pain interference subscale and the parents/guardians' view on how acute pain was affecting the child and the child's experiences during hospitalization. The results from both datasets confirmed, expanded, and were discordant with each other for this meta-inference. Children in both datasets indicated that being in pain was affecting their mood, activities, and relationship with other people. Based on the pain interference scores parents/guardians did not believe that pain was affecting the child's activities, despite reporting that pediatric pain was a bad thing, children could not withstand pain, and that pain affects the child's wellbeing in the qualitative dataset. The qualitative data provided a rationale for these discordant results. The rationale includes parents/guardians' preferences for their hospitalized child to engage in expected sick role behaviors, which entails the child being confined to bed.

Nevertheless, children reported that being in pain prevented them from getting out of the bed, exploring the unit, and playing with their peers. Being confined to bed is considered a good behavior by the parent/guardians because it reduces safety risks for the child, which parents/guardians indicated as a significant concern as children will continue playing and only report pain when it is severe.

#### 10.7. Pain management strategies.

The pain management strategies meta-inference focuses on pain management approaches employed by both children and parents/guardians. Both datasets identified a multi-modal pain approach as the mainstay for pain treatment among hospitalized children in Botswana, but some used either pharmacological or non-pharmacological measures alone for pain management. The qualitative database expanded that treatment of pain should be focused on the cause of pain instead of targeting pain itself. These findings help explain why participants were content with pain management, despite children still experiencing severe-moderate pain. Also, hospitalization was considered to be a form of pain management strategy because being admitted to the hospital was considered a pain - relieving measure.

### 11. Discussion

The merged mixed-methods results provide a comprehensive understanding of pediatric pain among children hospitalized in Botswana from the child and parent/guardian's perspective. The results suggest that pediatric acute pain is a significant issue among children in Botswana. However, in general, children and parents/guardians are content with the pain care and demonstrate adequate knowledge on pediatric pain, child risk factors, and pain management approaches. The merged datasets generated

seven meta-inferences from confirmation and expansion as well as one instance of discordance in the results from the datasets. Therefore, the datasets were in agreement and complemented each other. The identified meta-inferences are the pain prevalence and intensity, the overall pediatric pain care outcomes, perception of pain care, pediatric pain knowledge, child risk factors, consequences of pain, and pain management strategies.

#### 11.1. The pain prevalence and intensity.

The results of this study provide a broad appreciation of the magnitude of pediatric pain among hospitalized children in Botswana. The study provides the much-needed evidence for the frequent assertions that pediatric pain is a significant problem among children in sub-Saharan Africa, which often does not have data to substantiate these claims (Albertyn et al., 2009; Bond, 2011; Matula et al., 2018). Also, the findings provide pertinent evidence and suggest a direction for future research relating to why children and parents/guardians often report a high magnitude of pain but rarely score pain as severe (Matula et al., 2019). The burden of clinically relevant pain reported in the study is in line with other studies in the region and other LMIC (Azam et al., 2012; Doca et al., 2017).

#### 11.2. The overall pediatric pain outcomes and perception of pain care.

Overall children and parents/guardians were found to be content with their pain care and outcomes, despite some identified undesirable outcomes. These findings provide a broader understanding of the perception of care and care outcomes among children and parents/guardians in sub-Saharan Africa. Most notably about these results is that both children and parents/guardians are aware of the intensity of pain and have adequate knowledge of pain and pain management strategies when they indicate that they are happy with the pain care. Also, the results suggest that parents/guardians show an

understanding of the limitations of resources in the identified health care institutions in Botswana and possibly sub-Saharan Africa (Clancy, 2014; Size et al., 2007). The evidence from this study dispels the myth that culture is the main factor that leads to inadequate pediatric acute pain management in sub-Saharan Africa. Instead, the results of the current study indicate that socio-culture has a minimal effect on the trends reported on children and parents/guardians' expectations of pain care, rather, environmental factors are more at play (Clancy, 2014; Kristjansdottir et al., 2018; Matula et al., 2018). Similar findings were reported in Twycross and Finley (2013), where children and parents/guardians understood that they were in pain, but the healthcare providers were doing the best they could to control the pain.

#### 11.3. Pediatric pain knowledge, attitudes and management strategies.

Both datasets were in confirmation that children and parents/guardians have adequate knowledge of pediatric pain and positive attitudes towards pediatric pain treatment. Similar results were reported by Zhu et al.(2018), Lim et al.(2012) and Chng et al. (2015). The results are a departure from the evidence in the literature that suggests that children and parents/guardians in LMIC have low literacy and knowledge, as well as negative attitudes towards the treatment of pediatric pain informed mainly by culture (Albertyn et al., 2009; Bosenberg, 2007; Matula et al., 2018). Also, the children and parents/guardians showed an understanding of the limitations of pain assessment in children and the use of multimodal pain management strategies for pain relief. Parental presence was identified as an essential non-pharmacological measure in this study, but evidence suggests that parental presence for reduction of procedural pain was not found to be significantly different from parental absence (Saglik & Caglar, 2019). Therefore,

parental presence may be necessary during hospitalization for long-term consequences of pain but not when measuring the corollaries of a one-time procedure. Evidence also suggests that parental presence was an essential factor in pediatric pain management (Jongudomkarn et al., 2012; Lim et al., 2012; Stamoulara, Papadopoulou, Meleti, & Matziou, 2013). The non-pharmacological methods used by children and parents/guardians are limited. Therefore healthcare providers need to invest in educating children and parents/guardians about additional methods that they can use to control pain.

### 11.3. Child risk factors.

The findings of this study suggest that pediatric pain is a unique experience for the child and the parent/guardian based on several factors associated with child growth and development and a child's resilience against pain and disease. The results suggest that children are considered vulnerable to pain and possess fewer coping mechanisms when compared to adults, which is similar to findings reported by Jongudomkarn et al., 2012; Kortessluoma et al., 2008; Lim et al., 2012; and Stamoulara et al., 2013. The results contradict the claim that children are considered not to feel the pain or are more adaptive to pain than adults (Matula et al., 2018). This finding is essential for healthcare providers to understand that parents/guardians understand the vulnerability of their child and that parents/guardians need to be listened to when they express concern about child's pain. Also, children demonstrated an understanding of pain and its symptoms and often reported that they inform a caregiver (who can either be a health care worker or parent/guardian) when in pain (He et al., 2007; Twycross & Finley, 2013). Therefore, children's pain reports need to be taken seriously, as parents/guardians have indicated

that children would hide being in pain until pain is unbearable, therefore, when child complain about pain it more likely to be already moderate-severe (Valizadeh et al., 2016).

#### 11.4. Consequences of pediatric acute pain.

The findings showed that children and parents/guardians were aware of how pain affected their recovery, activities of daily living, general wellbeing, and hospital stay. In general, while children and parents/guardians agreed on most of the consequences of pain and parents/guardians recognized that pain disturbed children hospital stay, parents/guardians did not consider how pain interferes with a child's hospital stay. The findings provide an essential understanding of why parents/guardians would not consider pain interfering with the child as they expect the child to be confined to bed and not interacting with their environment or playing since they are sick and admitted to a hospital. These findings are in line with children being considered vulnerable and parents/guardians wanting to take their pain as reported in other studies (Harper, Penner, Peterson, Albrecht, & Taub, 2012; Lim et al., 2012; Matziou et al., 2016; Valizadeh et al., 2016). It also highlights the cultural undertones where children are expected to behave in a specific manner in public places such as hospitals.

The limitations of this study include different sample sizes for datasets; and this may influence the results. This limitation was taken into account during the design, as evidence suggests that if the aim of combining the datasets is to compare results by topic or synthesize them into a complementary picture to fully understand the phenomenon, the sample sizes can differ (Creswell & Plano Clark, 2018). Also, the data were collected using a convenience sample over a short period of time, which may not be representative of the population. These results are from diverse family members and children found at

the two referral hospitals; however, they are likely typical of children and their parents/guardians in Botswana and sub-Saharan Africa. Also the sample was mainly parents of children <6 years and female caregivers. This is aligned with trends in pediatric inpatient service use in Botswana where 70% of the in-patient population are children < 5 years of age (Statistics Botswana, 2017). Other extraneous variables relating to general care rather than pain care specifically may influence the results because children and parents/guardians did not treat pain or pain care as an independent entity from the underlying diseases and care processes. Lastly, children and parents/guardians with developmental disabilities were not included in this study; therefore, pain experiences and perceptions may be different in this group.

## **12. Conclusion**

This study provides comprehensive evidence on pediatric pain management practices in Botswana from the patients and their caregivers' points of view. Overall, children and parents/guardians agree that pediatric pain is a problem; they demonstrate an understanding of pediatric pain, how is it managed, and their role in managing the pain. They are also generally happy with the management of pain they received while hospitalized.



**Figure 4-1. Visual presentation of study design**

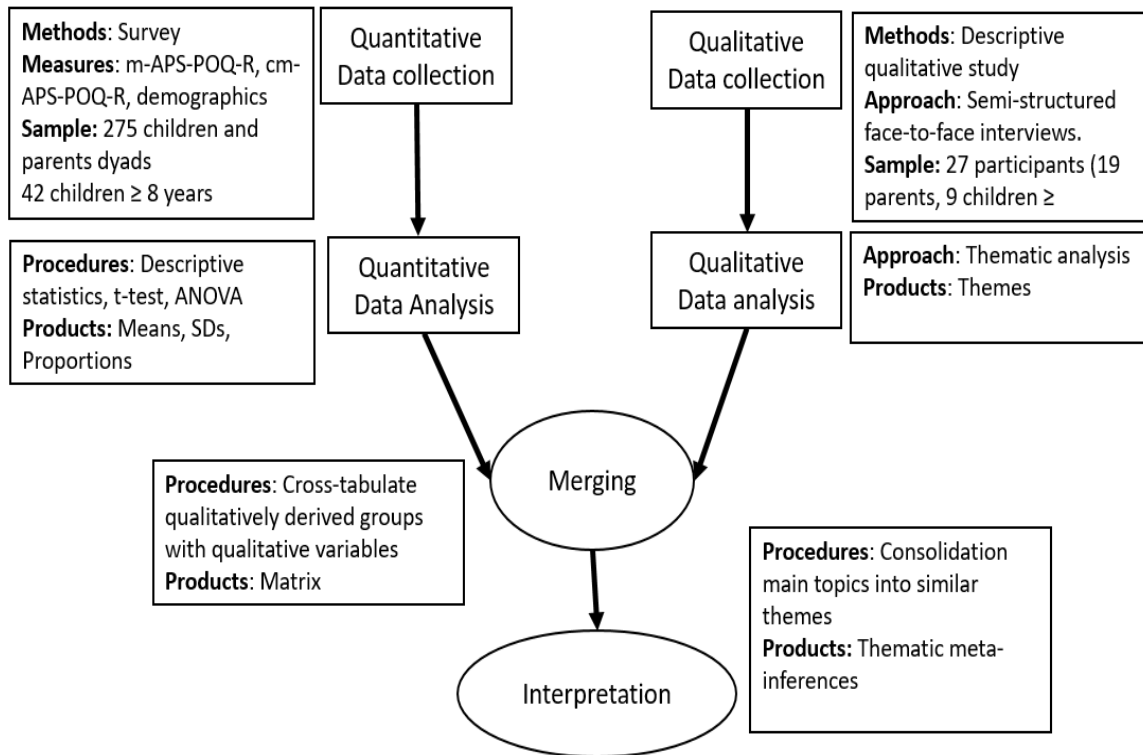


Figure 4-1 shows flow diagram for study design. Quan refers to a quantitative study, while Qual refers to a qualitative study.

**Table 4-1.*****Participant's demographics and characteristics.***

<u>Characteristics</u>	<u>Mean(SD)</u>	<u>Range</u>	<u>Count(n)</u>	<u>Percent</u>
<u>Parents/guardians demographics</u>				
<u>Parents age (years)</u>	32(10)	17-81	275	
<u>Parents age groups (years)</u>				
17-<25			63	22.9
25-<35			119	43.3
35-<50			79	28.7
≥50			14	5.1
<u>Children's age</u>	4(3.3)	1-13	275	
<u>Children's age group (years)</u>				
<6 years			200	72.7
6-<9 years			52	18.9
10-13 years			23	8.4
<u>Parents gender</u>				
Female			262	95.3
<u>Children's gender</u>				
Female			106	39.2
Male			166	60.8
<u>Parent relationship to the child</u>				
Mother			229	83.3
Grandmother			15	5.8
Father			13	4.7
Other			18	6.6
<u>Parent's education level<sup>a</sup></u>				
Elementary			135	49.1
High School			61	22.2
College			54	19.6
Degree and above			25	9.1
<u>Hospital and Unit of Admission</u>				
PMH -Medical			58	21.1
PMH-Surgical			75	27.3
NRH-Medical			82	29.8
NRH-Surgical			60	21.8
<u>Common diagnosis group<sup>b</sup></u>				
Acute Gastroenteritis			30	10.9
Trauma			55	20
Pneumonia			22	8
Wounds			20	7.3

**Table 4-1. continuation**

Characteristics	Mean(SD)	Range	Count(n)	Percent
Cancers			13	4.7
Other			134	49.1
<u>Residence</u>				
Rural			118	42.9
Semi-Urban			58	21.1
Urban/town			33	12
City			66	24
<u>Length of child's Admission</u>				
0- 2 days			138	50.6
3-5 days			62	22.7
6-10 days			38	13.9
11-14 days			20	7.3
≥ 14 days			15	5.5
<u>Children &lt;8 years demographics</u>				
<u>Age (years)</u>		10(2)	8-13	42
<u>Age groups</u>				
8-<10			21	50
10-13			21	50
<u>Gender</u>				
Male			27	64.3
<u>Common diagnosis group<sup>c</sup></u>				
Cancer			6	14.7
Trauma			16	39
Other			19	46.3
<u>Residence</u>				
Rural			5	12.5
Sub-urban			6	15
Urban/town			10	25
Cities			19	47.5
<u>Unit Type</u>				
Medical			7	16.7
Surgical			35	83.3
<u>Hospital of admission</u>				
PMH			25	59.5
NRH			17	40.5

**Table 4-1. continuation**

<u>Characteristics</u>	<u>Mean(SD)</u>	<u>Range</u>	<u>Count(n)</u>	<u>Percent</u>
<u>Length of Child's Admission</u>				
0-2 days			16	40
3-5 days			10	25
6-10 days			7	17.5
>10 days			7	17.5
<p>Note. <sup>a</sup>Education categories: elementary (1<sup>st</sup> to 10<sup>th</sup> grade), high school (grade 11 and 12), college (certificate and diploma holders) and degree and above for a university degree and above. <sup>b</sup>Six diagnostic groups are deduced from aggregating all related medical diagnoses: (1) Pneumonia, (2) Acute gastroenteritis, (3) Wounds -all open wounds that require dressing changes except motor vehicle, fractures and trauma-related injuries which are grouped as (4) Trauma, (5) Cancer, and all the remaining diagnoses were grouped as (6) Other. <sup>c</sup>Diagnostic groups are further consolidated for children survey by combining wounds and trauma to make 1) Trauma, 2) cancer and 3) Other which include pneumonia and acute gastroenteritis. Abbreviations- SD-<i>standard deviation</i>, PMH -Princess Marina Hospital, NRH- Nyangabgwe Referral Hospital.</p>				

**Table 4-2.**

<b>Outcome scale and subscales means and internal consistency</b>				
	<u>Scales and subscales</u>	<u>Mean (SD)</u>	<u>Range</u>	<u><math>\alpha</math></u>
<u>Parent/guardian</u>	m-APS-POQ-R	113.48 (33.22)***	22-174	.84
	Knowledge	25.78 (7.34)***	0-40	.59
	Perception of care	35.62 (11.03)***	0-51	.75
	Pain interference	31.88 (18.04)	0-54	.87
	Pain severity	20.16 (8.5)***	3-34	.86
<u>Child</u>	cm-APS-POQ-R	122.79 (25.77)***	58-171	.80
	Knowledge	24.24 (7.07)***	0-37	.55
	Perception of care	37.76 (8.24)***	6-51	.77
	Pain interference	40.57 (16.03)***	9-59	.85
	Pain severity	20.21 (9.52)***	0-31	.89

Note. \*\*\*Statistically significant at  $p\text{-value} < .05$  The maximum scores of m-APS-POQ-R = 187, Knowledge = 40, Perception of care = 52, Pain interference = 60, Pain severity = 35, and cm-APS-POQ-R = 187. Abbreviations: SD - *standard deviation*

**Table 4-3.**

**Relationship between parent demographics and outcomes survey and subscale scores**

Characteristics	m-APS-POQ-R		Knowledge		Perception of care		Pain interference		Pain Severity	
	<u>Mean (SD)</u>	<u>Range</u>	<u>Mean (SD)</u>	<u>Range</u>	<u>Mean (SD)</u>	<u>Range</u>	<u>Mean (SD)</u>	<u>Range</u>	<u>Mean (SD)</u>	<u>Range</u>
<u>Parents age group (years)</u>	***		***						***	
17-<25	122.6 (32)	49-173	27.3(7.1)	0-40	35.9(11)	0-51	34.3(18.5)	0-54	25.1(9.4)	0-34
25-<35	113.7(33.1)	32-174	25.9(7.3)	0-40	35.7(11.4)	0-51	32.7(18.1)	0-54	19.6(10.2)	0-34
35 -<50	107(32.9)	22-173	25.4(6.9)	0-38	35.6(10.4)	0-50	28.4(17.5)	0-54	17.7(10.3)	0-34
≥50	106.8(35)	30-157	20.4(9.2)	0-32	34( 12.6)	0-50	34(17.7)	0-54	18.4(13.3)	0-34
<u>Child age group (years)</u>			***						***	
<6	115.5(34)	30-173	26.4(7.47)	0-40	35.5(11)	0-51	32.4(18.5)	0-54	21.2(10.4)	0-34
6-<10	110.3(29.7)	23-173	24(6.7)	7-40	35.6(11.4)	0-50	32.4(16.3)	0-54	18.4(9.9)	0-34
10-13	102.8(32.6)	22-174	24.1(6.8)	11-38	37.1(11)	0-50	26.2(17.4)	0-54	15.4(11.5)	0-34
<u>Parent Gender</u>			***				***			
Female	113.1(33.4)	22-174	26(7.4)	0-40	35.6(11.2)	0-51	31.4(18.1)	0-54	20.1(10.5)	0-34
Male	120.6(30.6)	74-163	21.4(5)	16-32	35.5(6.3)	29-46	40.7(14.6)	16-54	23(11.6)	4-34
<u>Child gender</u>										
Female	113.6(31.2)	41-174	25.1(6.9)	0-38	36.0(10.4)	1-51	31.8(18.4)	0-54	20.6(10.4)	0-34
Male	113.5(34.3)	22-173	26.3(7.6)	0-40	35.4(11.5)	0-51	32(17.8)	0-54	19.9(10.6)	0-34
<u>Relationship to child</u>			***							
Mother	113.2(33)	22-173	26.44(7)	0-40	35.5(11)	8-36	31.3(18.2)	0-54	20(10.2)	0-34
Grandmother	104.5(39.2)	30-157	19.47(10.5)	0-34	32.4(15.2)	20-36	32.7(16)	0-54	19.9(12.4)	0-34
Father	118.7(32.4)	74-163	21.6(4.9)	16-32	36.3(6.5)	19-30	39.5( 16)	15-54	21.2(13.2)	0-34
Other	120.6(32.1)	71-174	25.7(7.1)	15-38	39.1(10.4)	20-36	33.1(16.7)	4-54	22.83(11.7)	0-34

**Table 4-3. continuation**

<u>Characteristics</u>	<u>m-APS-POQ-R</u>		<u>Knowledge</u>		<u>Perception of care</u>		<u>Pain interference</u>		<u>Pain Severity</u>	
	<u>Mean (SD)</u>	<u>Range</u>	<u>Mean (SD)</u>	<u>Range</u>	<u>Mean (SD)</u>	<u>Range</u>	<u>Mean (SD)</u>	<u>Range</u>	<u>Mean (SD)</u>	<u>Range</u>
<u>Education level<sup>a</sup></u>										
Elementary	114.4(31.2)	30-170	25.5(7.8)	0-40	36.4(10.6)	0-51	33.2(17.4)	0-54	19.4(11.1)	0-34
High School	113(37.4)	22-174	26.6(6.6)	7-40	34.9(12)	0-51	30.2(19.5)	0-54	21.2(10.3)	0-34
College	107.7(34.3)	32-171	24.5(7.8)	0-40	33.8(12.4)	0-50	29.4(18.1)	2-54	19.9(9.4)	0-34
Degree and above	122(30.2)	60-170	28(4.6)	16-35	37.2(6.5)	23-50	34(17.7)	5-54	22.8(10)	3-34
<u>Hospital and Unit</u>	***		***		***		***		***	
PMH -Medical	115.7(37.5)	41-174	26.2(6.8)	13-40	35.7(11.5)	0-50	33.9(19.1)	0-54	19.9(10.8)	0-34
PMH-Surgical	98.5(32.3)	22-160	22.6(8.1)	7-40	32.6(13.4)	0-50	25.9(17.7)	0-54	17.4(9.4)	0-34
NRH-Medical	123.1(30)	50-173	28.3(6)	15-40	39(7.2)	15-51	33.4(18)	0-54	22.5(10.9)	0-34
NRH-Surgical	117(28.1)	56-163	26(7.1)	10-40	34.7(10.7)	5-50	35.4(16.1)	0-54	20.9(10.5)	0-34
<u>Diagnosis<sup>b</sup></u>	***								***	
Acute Gastroenteritis	121.3(29.8)	41-170	28(5.3)	0-40	38.6(9.2)	1-50	33.5(17.7)	0-54	21.1(9.3)	6-34
Trauma	110.4(32.5)	23-161	24.2(7.00)	0-40	34.8(12.4)	0-51	30(17.8)	0-54	21.4(9.7)	3-34
Pneumonia	124.3(32.2)	56-168	27.6(5.9)	15-40	39(6.8)	23-51	35.2(18.5)	3-54	22.5(9.5)	7-34
Wounds	91.8(26.5)	49-156	24.6(7.8)	11-38	33(10.3)	13-50	23.3(16.6)	0-52	11(7.6)	0-34
Cancers	110.2(50.1)	22-173	24.5(10.5)	0-35	29.8(17.5)	0-50	33.9(22.5)	0-54	21.9(11.9)	2-34
Other	114.8(29.8)	30-174	26(7.6)	0-40	35.7(10.5)	0-51	32.8(17.8)	0-54	20.3(11)	0-34
<u>Residence</u>							***			
Rural	114.4(36.2)	32-170	26( 5.8)	10-40	36.2(12.2)	0-50	31(19)	0-54	21.1(9.9)	0-34
Semi-Urban	120.9(30.5)	68-168	25.5(8.6)	0-40	34.6(10)	5-46	39.5(16.2)	5-54	21.4(10.4)	0-34
Urban/town	104.4(28.6)	49-171	24.6(7.8)	0-40	36(9.9)	0-51	26.1(17.4)	0-54	17.7(10.1)	0-34
City	115.3(33.8)	22-174	26.3(7.5)	0-40	35.4(11.3)	0-51	33.1(17.5)	0-54	20.6(11.1)	0-34

**Table 4-3. continuation**

<u>Characteristics</u>	<u>m-APS-POQ-R</u>		<u>Knowledge</u>		<u>Perception of care</u>		<u>Pain interference</u>		<u>Pain Severity</u>	
	<u>Mean (SD)</u>	<u>Range</u>	<u>Mean (SD)</u>	<u>Range</u>	<u>Mean (SD)</u>	<u>Range</u>	<u>Mean (SD)</u>	<u>Range</u>	<u>Mean (SD)</u>	<u>Range</u>
<u>Child condition by parent</u>	***				***		***		***	
Very worrisome	97.9(29.2)	49-164	25.5(5.7)	12-35	32.8(8.6)	0-45	25(16.7)	0-54	14.6(11.6)	0-34
Worrisome	107.7(31.2)	41-161	25.6(8.8)	0-40	34.9(10.8)	1-51	29.8(16.6)	0-54	17.5(10.4)	0-34
Unsure	98.7 (32)	40-163	26.6(8.2)	10-40	29.9(12.5)	0-50	24.1(16.7)	0-54	18.2(10.6)	0-34
Less worrisome	121.4(25.4)	60-174	25.8(6.4)	10-40	38.5(8.1)	11-50	36.2(17.3)	0-54	20.9(9.2)	1-34
Not worried at all	129.1(35.3)	22-173	26.5(6.8)	7-40	38.5(12.2)	0-51	37.9(18)	0-54	26.3(8.3)	3-34
<u>LOS</u>			***							
0-2 days	113(33.1)	22-173	26.5(7.1)	0-40	35.4 (11)	0-50	32.2(17.6)	0-54	18.9(10.3)	0-34
3-5 days	115.7(29.8)	40-174	26.9(6.5)	14-40	36(10.9)	0-51	31.1(17.5)	0-54	21.6(10.1)	0-34
6-10 days	117.8(39.3)	30-163	24.3(8.5)	0-35	36.3(11.3)	0-46	34.4(20.5)	0-54	22.8(11.7)	0-34
about 2 weeks	107.6(37)	47-164	24.3(7.6)	10-35	33(13.6)	0-51	30.3(18.5)	0-54	20(10.6)	2-34
≥2 weeks	109.5(28.4)	60-155	20.4(7.2)	10-30	37.6(9)	20-51	30.4(19.2)	0-53	21.1(10.8)	0-34

Note. \*\*\* Statistically significant at  $p\text{-value} \leq .05$ , <sup>a</sup>Education categories: elementary (1<sup>st</sup> to 10<sup>th</sup> grade), high school (grade 11 and 12), college (certificate and diploma holders) and degree and above for a university degree and above. <sup>b</sup>Six diagnostic groups are deduced from aggregating all related medical diagnoses: (1) Pneumonia, (2) Acute gastroenteritis, (3) Wounds - all open wounds that require dressing changes except motor vehicle, fractures and trauma - related injuries which are grouped as (4) Trauma, (5) Cancer, and all the remaining diagnoses were grouped as (6) Other. Abbreviations: *SD* - *standard deviation*, PMH - Princess Marina Hospital, NRH - Nyangabgwe Referral Hospital, LOS - length of child's hospitalization at survey.



**Table 4-4.****Relationship between children demographic and outcome survey and subscale scores**

<u>Characteristics</u>	<u>cm-APS-POQ-R</u>		<u>Knowledge</u>		<u>Perception of care</u>		<u>Pain interference</u>		<u>Pain Severity</u>	
	<u>Mean (SD)</u>	<u>Range</u>	<u>Mean(SD)</u>	<u>Range</u>	<u>Mean (SD)</u>	<u>Range</u>	<u>Mean(SD)</u>	<u>Range</u>	<u>Mean(SD)</u>	<u>Range</u>
<u>Age (years)</u>			***							
8-<10	122.4(24.8)	82-171	21.4(7.3)	0-31	39.1(7.7)	22-51	42.3(16.1)	9-59	19.6(10.1)	0-31
10-13	123.2(27.3)	58-162	27.1(5.7)	14-37	36.4(8.8)	6-47	38.9(16.2)	11-59	20.8(9.1)	5-31
<u>Gender</u>										
Male	121.4(28.1)	58-162	23.6(7.7)	0-37	37.8(8.2)	6-45	39.9(17.1)	9-59	20.1(9.1)	4-31
Female	125.2(21.7)	96-171	25.3(5.9)	15-32	37.7(8.7)	22-51	41.7(14.5)	17-59	20.5(10.5)	0-31
<u>Diagnosis<sup>a</sup></u>					***		***			
Trauma	125.5(16.5)	93-154	22.7(7.7)	0-32	40.1(5.3)	32-49	42.9(11.8)	17-58	19.8(9)	4-31
Cancer	98.2(30.9)	58-146	22.2(6.6)	14-32	29.8(12.9)	6-42	25.8(15.8)	11-51	20.3(11.8)	5-19
Others	127(27.6)	82-171	25.9(6.7)	15-37	38.5(7.6)	22-51	42.3(17.4)	9-59	20.3(10)	0-31
<u>Residence</u>							***			
Rural	121(25.6)	93-154	18.6(11.8)	0-29	42.2(4.2)	37-47	43.2(18.2)	17-59	22(12.4)	4-31
Semi-Urban	142(12.2)	126-155	23.5(5.2)	15-30	39.2(4.4)	34-45	56.2(3.7)	49-59	23.2(6.4)	14-31
Urban/town	117.9(29.5)	82-171	26.1(5.4)	20-35	38.6(5.7)	33-51	32.3(18.4)	9-59	20.9(8.7)	5-31
City	115.8(25.1)	58-162	24.5(6.9)	14-37	35.5(10.7)	6-49	38(13.8)	11-59	17.7(10.3)	0-31
<u>Unit Type</u>										
Medical	133(40.5)	58-171	25.29(7)	15-35	40.1(8.6)	25-51	14(21.8)	0-45	23.3(10)	5-31
Surgical	120.7(22)	73-155	24(7.2)	0-37	37.3(8.2)	6-49	16.7(14.4)	0-47	19.6(9.5)	0-31
<u>Hospital</u>										
PMH	119.2(24.1)	58-162	23.1(7.1)	0-37	36.3(9.1)	6-49	39.7(15.6)	11-59	20.2(8.9)	4-31
NRH	128.1(28)	82-171	25.9(6.9)	15-35	39.9(6.5)	24-51	41.9(17)	9-59	20.3(10.7)	0-31

**Table 4-4. continuation**

<u>Characteristics</u>	<u>cm-APS-POQ-R</u>		<u>Knowledge</u>		<u>Perception of care</u>		<u>Pain interference</u>		<u>Pain Severity</u>	
	<u>Mean (SD)</u>	<u>Range</u>	<u>Mean (SD)</u>	<u>Range</u>	<u>Mean (SD)</u>	<u>Range</u>	<u>Mean (SD)</u>	<u>Range</u>	<u>Mean (SD)</u>	<u>Range</u>
<u>LOS (days)</u>										
0-<3	116.4(25.8)	73-162	22.7(8.5)	0-35	36.1(9.7)	6-45	40.3(16.5)	9-59	17.4(9.8)	0-31
3- <6	126.2(20.5)	99-159	26.8(4.9)	21-35	40(4.9)	34-47	38.3(15.9)	14-58	21.1(9)	5--31
6-≤10	130.9(24.3)	102-171	26.7(6.2)	18-37	38(6.8)	31-51	44.7(14.5)	23-59	21.4(9.2)	11-31
>10 days	124.1(35.4)	58-154	20.4(6.1)	15-29	38.9(11.3)	22-49	41(18.1)	11-59	23.9(11.3)	5-31

Note: \*\*\* statistically significant at  $p\text{-value} \leq .05$ . <sup>a</sup>Diagnostic groups are further consolidated for children survey by combining wounds and trauma to make 1) Trauma, 2) cancer and 3) Others which include pneumonia and acute gastroenteritis. Abbreviations: *SD* - *standard deviation*, PMH - Princess Marina Hospital, NRH - Nyangabgwe Referral Hospital, LOS - length of child's hospitalization at survey.

**Table 4-5.**

**Joint display of qualitative and quantitative data**

Major topic	QUAN results	QUAL results	Mixed-methods Comparison
	<u>Proportions</u>	<u>Major themes/subthemes with examples</u>	<u>Meta-inferences</u>
Prevalence of pain	<u>Currently in pain:</u> <u>Child</u> moderate-severe 38% Mild 17 % no pain 45% <u>Parents</u> Moderate-severe 47 % Mild 16 % no pain 37 %	Facing adversity <i>"...[Apart from you have you ever seen anyone in pain?]?...The child next to me....[her condition] it's not a pleasing one...she was crying but when they gave him medication he got quite..." NHRS-4-C</i> <i>"...to tell you the truth kids are in pain eish, kids are in pain they are suffering ai they are suffering.....Child pain is not a good thing....." NRHM-7-M</i> Pain care outcomes <i>"....She was not sleeping well, she would sleep during the day and be awake at night and she was not even playing.... She was not eating at all..." NRHS-14-M.</i>	<b>Confirmation:</b> Acute pain is a significant issue in pediatric population hospitalized in Botswana; hence, about 55-63% of children were reported to have some form of acute pain.
Pain intensity	<u>Child</u> Current pain Severe 10%, Moderate 29% , Mild 17%, No pain 45% Average pain: Severe 19%, Moderate 38%, Mild pain 7%, No pain 36% Worst pain: Severe 31%, Moderate 29%, Mild pain 7% No pain 33% Pain severity subscale 20.21(9.52) 0-31*** <u>Parents</u>	Facing adversity <i>".... I have heard them complaining before that even when given medication it's not helpful because they want the pain to be gone immediately..." NHRM-9-M.</i> Pain care outcomes <i>"...He is in a lot of difficulty especially at night ...he cries... It's gets more painful and he cries a lot...They would have already given him paracetamol...he cries a lot at night....during the night because all children will be crying...even after being given paracetamol they continue to cry so I think paracetamol is no longer effective ... " PMHS-2-F.</i> Soldiering on with hope <i>".....I believed them when I was told the surgery that was to be done would totally ensure that the pain will reduce, so even though we were waiting I knew something better was coming...there is still some pain, but it's from the surgery as they had to cut some bone but in comparison you can see that he is getting better</i>	<b>Confirmation:</b> Children experience medical relevant pain (moderate-severe pain) that require treatment during hospitalization and pain treatment is not optimal hence higher prevalence of medical relevant pain. <b>Expansion:</b> Pain intensity is not consistent over time and with certain times being related to high pain intensity such as at night and during procedures which explain the higher prevalence of moderate-severe pain for

	<p>Current pain Severe 16%, Moderate 31%, Mild 17%, No pain 45%</p> <p>Average pain: Severe 16%, Moderate 36%, Mild pain 17%, No pain 31 %</p> <p><b>Worst pain:</b> Severe 34%, Moderate 25%, Mild pain 12%, No pain 29%</p> <p>Pain severity subscale 20.16(8.5)3-34***</p>	<p><i>even the pain killers make some difference now that the can even move his toes....” PMHS-1-M</i></p> <p>Perception of care/Quality of pain care “.... really helped, with the condition the child was in, I did not expect that he would be playing when are being discharged as if he never had a fracture. Even now I have to remind him that he still has a fracture because he freely plays, so I was given first class help....” PMHS-6-M</p>	<p>average and worst pain reported by both children and parents.</p>
Perception of pain care	<p>Perception of care subscale mean scores.</p> <p><b>Child</b> 37.76(8.24) 6-51***</p> <p><b>Parents</b> 35.62(11.03)0-51***</p>	<p>Perception of care/ Quality of pain care “...For other kid being hospitalized, I have noticed that they are in pain but the doctors and nurses are really trying hard to assist them and even respond timely when called unlike in the past when you used to call the nurse and taking their time not hurrying to help...” NRHM-12-G</p> <p>“...There are some who are very keen and show compassion when helping children some are just really here to push the ticket....They only come when you call them if you don't they won't come....” PMHM-9-M</p> <p>Perception of care/trusting the system and the healthcare providers “...though there was a delay its better than being sent back and being told to come tomorrow without being attended to....” PMHS-2-F</p> <p>“...They are taken to the hospital....” [Since you admitted in the hospital what have you done so far?] Nothing...” NRHM-6-C</p> <p>Soldiering on with hope</p>	<p><b>Confirmation:</b> participants general happy with pain care, as shown by significant statistical scores.</p> <p><b>Expansion:</b> The qualitative results expand on the range of the perception of pain care scores by giving some of the reasons participants were not happy with the service. There is also an expansion on the background of the scores by participants being aware of resource limitation, which limits the translation of results to service being optimal.</p>

Pediatric pain knowledge	Pain knowledge subscale mean scores. <b>Child</b> 24.24(7.07)0-37*** <b>Parents</b> 25.78(7.34) 0-40***	<p><i>“... they do help him but I have alerted them that the blood level always drops and I suspect it might be his medication or something else, but they have assured me they will get a team to monitor it....” PMHM-10-M</i></p> <p><i>Perception of care/ access to services“... when they are in pain so he has to be attended to quickly so that their condition can be attended timely instead of ignoring them ....we should not be waiting for two to three days, so we have to take them to the hospital to be attended to because that is where they can get help....” NRHS-8-M</i></p> <p><i>“...So far everything went well even though we took time to finally see the doctor and being attended to but at times you observe the situation in the hospital and come to terms with it, as there may be shortage of doctors. But at the end we were assisted, and a surgery was performed...Yes you become helpless because you are just there and you have to wait for your turn to be assisted even if your child is in excruciating pain...” PMHS-1-M</i></p> <p><i>Knowledge of pain/measuring and assessing pain“...How does a child show they are in pain? They cry....Yes for a prolonged period...” NRHM-6-C</i></p> <p><i>“...So basically they can hide their pain fearing the pain from medicines. But do they ever say they are in pain when not in pain. It not many occasions where a child would say they are in pain when they are not...He normally does not play and gets in a sombre mood...” NRHM-9-M</i></p> <p><i>“....There are no averages in pain, it is like when someone tells you that there have problems you cannot understand how big that problem is, the person is the only one who can perceive it, just like that pain is like that, you can’t say it has average because you can’t feel it for another person...” PMHS-4-F</i></p> <p><i>Knowledge of pain/non-pharmacological pain control approaches</i></p> <p><i>“... We should relieve the pain somehow for those kids who can talk we should comfort them by talking to them for those who cannot talk the</i></p>	<p><b>Confirmation:</b> Overall participants showed an understanding of pediatric pain and its management as shown by statistically significant results. The results also explain the range 0-40 in the pain knowledge subscale.</p> <p><b>Expansion:</b> The results expand on behaviors considered peculiar in this population and challenges the norm of pain assessment.</p>
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		<p>parents have to cuddle them and be there for them because a mother's presence can have an impact...." NRHM-7-M</p> <p>"...I was reading a book, played then books that's all I do...[So what did your mother do when you were in pain] She was massaging me...[using] warm water... it was helping..." PMHS-3-C</p> <p>Knowledge of pain/pharmacological pain control approaches</p> <p>"...they gave me pain killers and put an injection...pain injections...because I cannot swallow..." PMHS-3-C</p> <p>"...My thoughts on this is that pain gradually increases and will be treated according to the severity of it stronger medicines for greater pain..." PMHS-1-M</p> <p>Being a child/perceived child developmental capabilities, "... the child can't really handle that pain on herself at least as adults we can manage to handle the pain...atleast when you tell them about the child they look more concerned, about us they will come, yes they will come but they will give treatment there and then but they can't give the same treatment they are giving to a child..." NRHM-7-M</p> <p>Pain care outcomes "...it was the first time to witness a child undergoing operation without any sedation or anesthesia, ....pain.....with me pain.....I think with regards to pain a local anesthetic has to be administered before most procedures are done like unwrapping bandages because the nurses just normally rip it off but we do understand, currently my child does not want to be injected because he is still traumatized by the fact that he was injected in the wound and the wound attended to, so all medications are being done through a cannula because it takes a team of 12 nurses just to give him an injection..." PMHS-4-F</p>	
Consequences of pediatric acute pain	Pain interference subscale mean scores. <b>Child</b> 40.57 (16.03)9-59*** <b>Parents</b> 31.88(18.04)0-54	Pain care outcomes "...She was not sleeping well, she would sleep during the day and be awake at night and she was not even playing.... She was not eating at all..." NRHS-14-M Perception of care/ Trusting the system and the healthcare providers "...from when he was admitted it was very painful to the point where as	<b>Confirmation:</b> The results confirm the scores seen in children which are statistically significant and explain the range in the

Pain management strategies

**Child**

Pharmacological-7.7%  
Non- Pharmacological-20.5%  
Combined-71.8%

**Parents**

Pharmacological-8.3%  
Non- Pharmacological-32.6%  
Combined-51.1%

*a parent it really affects you too but I had to encourage him and give him hope... ” PMHS-I-M.*

*Facing adversity “...I believe my pain was better because as an adult you can withstand the pain and even come up with mechanisms to cope with it, but for children is a different story when they tell you they are in pain they literally mean it and can’t do anything about it...” PMHS-I-M*

*Being a child/child’s response and experiences with pain. “...They cry [Apart from crying what do they do?] They don't play...I could not walk... I could not play....I could not eat properly...” NRHM-15-C*  
*“...It's painful really but kids are brave they continue to play so we are constantly shouting at them to take it easy despite that they look in pain...” PMHS-6-M*

Knowledge of pain/non-pharmacological pain control approaches

*“...As parents especially women we know how to be tender with kids I can give him my phone to play with it, so he listens to music or plays games to distract him from the pain when there isn't any pain killers, also just staying next to the child and keep on comforting them....When it's like that, as a parent you have to give the child love, I have to comfort the child and massage them and make them feel at ease and reassure them that everything will be fine and the child will be better...” PMHS-6-M*

*“...[So how do you prevent pain from building up?] I slept [So sleeping made it better?] Yes...” NHRS-4-C*

*“...We should relieve the pain somehow for those kids who can talk we should comfort them by talking to them for those who cannot talk the parents have to cuddle them and be there for them because a mother’s presence can have an impact....” NRHM-7-M*

results by both the parents and children.

**Discordant:** The results show discordance because overall parents believe children cannot withstand pain, and it disturb them, but the scores show that parents did not think pain interferes with child activities.

**Expansion:** The results give some reasons as to why some parents may consider pain as non-interfering as pain keeps the child in bed and limits parent’s having to deal with child’s undesirable behavior in hospital such playing.

**Confirmation:** Participants use multi-modal pain management strategies and have knowledge and experience with both.

**Expansion:** Treating or diagnosing the primary/underlying condition as pain management, hospitalization as a mitigating factor on pain experience (acting as a moderator of pain intensity).

		<p>Knowledge of pain/pharmacological pain control approaches</p> <p><i>"...They gave me medications....[Apart from medications what else did they do?] They gave me some injections..." NRHM-15-C</i></p> <p><i>"...They should be given pain-relieving medication though it should not be repeatedly...hahaha[laughs] there are medications that are only to be taken three times a day, so we don't want to overdose..." NRHS-11-M</i></p> <p><i>Soldiering on with hope ".....I believed them when I was told the surgery that was to be done would totally ensure that the pain will reduce, so even though we were waiting I knew something better was coming..... there is still some pain, but it's from the surgery..." PMHS-1-M</i></p>	
Child risks factors	<p><b>Child</b></p> <p>Diagnosis (total score, perception of care, pain interference)</p> <p>Age (Knowledge)</p> <p><b>Parents</b></p> <p>Condition of child, child age, diagnosis, unit of admission</p>	<p>Being a child/overall child health status <i>"...When we came he could not breathe, he had an irregular heartbeat, low blood and was malnourished but he is better now..." NRHM-10-M</i></p> <p>Perceived child developmental capabilities <i>"...Children cannot withstand the pain compared to adults..." NRHM-9-M</i></p> <p>Child's response and experiences with pain. <i>"...I have been in pain...Yesterday...I was crying [So you were crying and not playing?] ...Yes...I was not eating [Because it was painful?] Yes..." NRHM-6-C</i></p>	<p><b>Confirmation:</b> Children viewed as more critical, with apparent wounds or trauma were considered to likely suffer more pain while in medical units were likely to score better on the perception of care.</p> <p><b>Expansion:</b> adults used as a reference point, not the diagnosis or other children.</p>
Overall pediatric pain care outcomes	<p>Overall modified APS-POQ-R scores</p> <p><b>Child</b></p> <p>122.79(25.77)58-171***</p> <p><b>Parents</b></p> <p>113.48(33.22)22-174***</p>	<p><i>Soldiering on with hope "...just has to endure even when he is in pain because it will get better because everyone has a problem but because there is hope for tomorrow." PMHS-4-F</i></p> <p><i>Pain care outcomes "....she was in pain, I can't say she was not in pain even me myself I saw that she was in pain, from the time we came here, she has improved they have treated her and even the pain I can see its reducing she can be able to do things which she has not been able for the past two weeks..." NRHM-7-M</i></p>	<p><b>Confirmation:</b> Overall participants were satisfied with their childcare, showed significant knowledge of child pain. Also, satisfaction with pain treatment was considered based on resources limitation and overall picture of child health care, which explains that</p>



Facing adversity “...At first when I got here I had too much sympathy towards them because I could see that they were in pain and even now I can see some are in pain but God knows everything...” PMHM-9.M

Perception of care/quality of pain service “....For other kid being hospitalized, I have noticed that they are in pain but the doctors and nurses are really trying hard to assist them and even respond timely when called unlike in the past when you used to call the nurse and taking their time not hurrying to help...” NRHM-12-G

Perception of care/ Trusting the system and the healthcare providers “...the thing is just that I am happy they took the situation in the right way...” NRHM-7-M

despite the high prevalence of pain, parents and children were content with the care they received.

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## Appendix 4A

### m-APS-POQ-R

Thank you for completing this survey. The survey is a data collection tool for a study that has been approved by the research ethics board. Pain management is an essential aspect of childcare, and we would like to know your perceptions and experiences with your child's pain management during this admission. Understanding your experiences is important in informing us on how we are doing in treating children's pain during their hospital stay. This survey is for research purposes only, and the results may not immediately be beneficial to your child, but we believe the results will help us build better programs to help care for children during admission to hospitals. Your participation in this survey will not affect your childcare in anyhow, and if you choose not to complete this survey, you won't be penalized. You may skip questions you don't feel comfortable answering and can stop anytime you feel uncomfortable about the questions.

**The first set of questions asks about your child health condition.**

1. How old is your admitted child? \_\_\_\_\_ Years

2. My child is a: ☐ Boy ☐ Girl

3. I am this child's;

☐ Mother ☐ Father ☐ Grandmother ☐ Grandfather

☐ Legal Guardian (specify) Uncle/ Aunt/ Sibling/ Caretaker

☐ Other.....

4. My age is;

☐ 18-24

☐ 25-34

☐ 35-44

☐ 45-55

☐ 56-64

☐ Above 65

5. I am a: ☐ Male ☐ Female

In the past 24 hours;

6. How can you rate the child's condition?

a. Very worrisome

b. Worrisome

c. Unsure

d. Less worrisome

e. Not worried at all

7. Please describe the location of the child's pain

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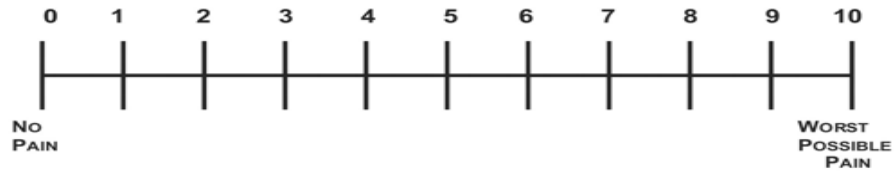
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8. Please describe the source of the child's pain

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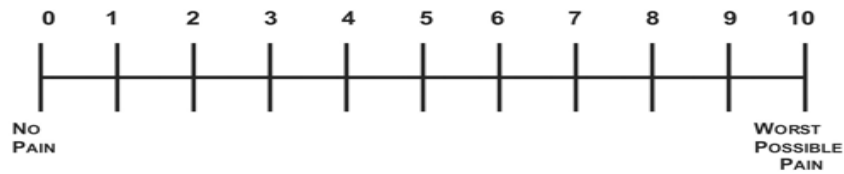
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1. On this scale, please indicate how much pain is your child having right now?

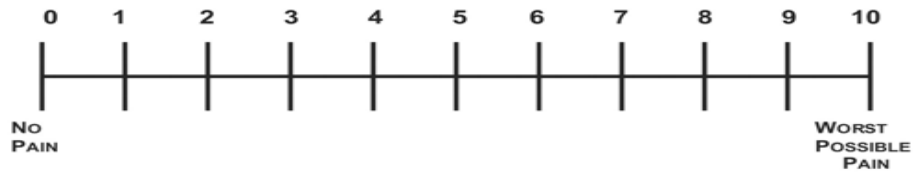


**The next set of question are about your child pain experience in the last 24 hours**

2. On this scale, please indicate the **worst** pain your child experienced in the past 24 hours:



3. On this scale, please indicate the **average** pain your child experienced in the past 24 hours:



4. How often was your child in **severe** pain in the last 24 hours? Please circle your best estimate of the percentage of time your child was in severe pain.

Never      A little      Sometimes      Most of the time      Always

☐☐☐☐☐



5.

On the scale of 0-10, how much did pain interfere or prevented your child from (Circle the one number below)

	Does not interfere					Completely interferes				
<b>Doing activities in bed such as turning, sitting up, repositioning.</b>	0	1	2	3	4	5	6	7	8	9 10
<b>Doing activities out of bed such as walking, playing &amp; feeding</b>	0	1	2	3	4	5	6	7	8	9 10
<b>Mood</b>	0	1	2	3	4	5	6	7	8	9 10
<b>Relating with other people</b>	0	1	2	3	4	5	6	7	8	9 10
<b>Sleep</b>	0	1	2	3	4	5	6	7	8	9 10

**In the last 24 hours:**

6. How often did you think your child was being bothered by pain? Please circle the one percentage that best describes the number of times your child was bothered by pain

Never      A little      Sometimes      Most of the time      Always

☐                      ☐                      ☐                      ☐                      ☐

7. How much relief did your child receive from pain after pain treatments (both medicine and non-medicine treatments)?

No relief      A little      Some relief      Good relief      Complete relief

☐                      ☐                      ☐                      ☐                      ☐

8. Did a Doctor/Nurse make it clear to you that we consider child pain treatment important?

☐ Yes                                      ☐ No

**The next set of questions will be about your child's pain management experience during this admission.**

9. On the next set of questions select a phrase on how satisfied or dissatisfied you are with the following statements

	Very dissatisfied	Dissatisfied	Slightly dissatisfied	Slightly Satisfied	Satisfied	Very Satisfied
Your child overall pain treatment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your child's nurses response to your child's pain reports	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your child's doctor response to your child's pain reports	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your child's nurse efforts to help your child deal with the pain	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your child's doctor efforts to help your child deal with the pain	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**On a scale of 0-5;**

10. How will rate how your child pain experience made you feel in the last 24 hours? Circle the number that comes closest to how you felt about your child pain

	Not at all					All the time
Anxious	0	1	2	3	4	5
Helpless	0	1	2	3	4	5
Angry	0	1	2	3	4	5

11. Please respond to the next eight items by circling the number 0 to 5 (0 being do not agree at all, and 5 being agree very much) that comes closest to how much you agree with the item. There are no right or wrong answers.

	Strongly disagree			Strongly Agree		
Children's pain does not require treatment	0	1	2	3	4	5
Pain medication cannot really control pain	0	1	2	3	4	5
People get addicted to pain medicine easily	0	1	2	3	4	5
Good patients avoid talking about pain.	0	1	2	3	4	5
It is easier to put up with pain than side effects that come with pain medicine	0	1	2	3	4	5
Complaints of pain could distract a physician from treating my child's underlying illness	0	1	2	3	4	5
Pain medicine should be saved in case pain gets worse	0	1	2	3	4	5
The experience of pain is a sign that illness is getting worse	0	1	2	3	4	5

12. Which of the following pain control methods (if any) has your child used over the last 24 hours?

- ☐ Pain pills
- ☐ Pain Injections
- ☐ Pain medication into cannula
- ☐ Topical creams
- ☐ Relaxation
- ☐ Touch
- ☐ Prayer
- ☐ Heat application
- ☐ Cold application
- ☐ Distraction
- ☐ Guided imagery
- ☐ Backrub
- ☐ Massage
- ☐ Music therapy
- ☐ Breastfeeding
- ☐ Non-nutritive sucking
- ☐ Other (specify).....

Thank you for taking your time to complete this survey. We believe your answers will help us provide better care to your child and other children in the future.

## Appendix 4B

### cm-APS-POQ-R

Thank you for completing this survey. This survey is a data collection tool for a study that has been approved by the research ethics board. Pain management is an essential aspect of childcare, and we would like to know about your pain experiences during this admission. Understanding your experiences is important in helping us on how we are doing in treating pain during a hospital stay. This survey is for research purposes only, and the results may not immediately be beneficial to you, but we believe the results will help us build better programs to help care for children during admission to hospitals in future. Your participation in this survey will not affect your care in anyhow, and if you choose not to complete this survey, you won't be penalized. You may skip questions you do not feel comfortable answering and can stop anytime you feel uncomfortable about the questions.

**The first set of questions asks about you and your health.**

1. How old are you \_\_\_\_\_ Years
2. I am a: ☐ Boy ☐ Girl
3. What hurts the most?

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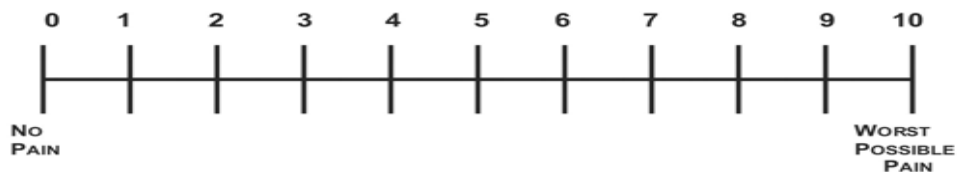
4. What causes your hurts

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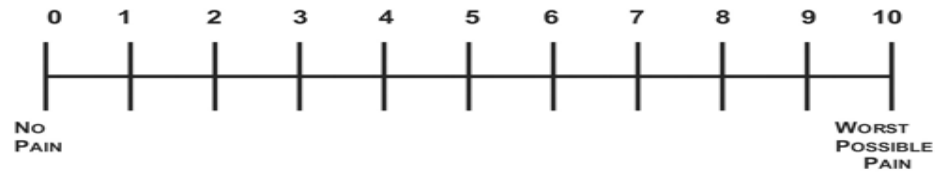
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1. On this scale, please indicate how much it hurt right now?

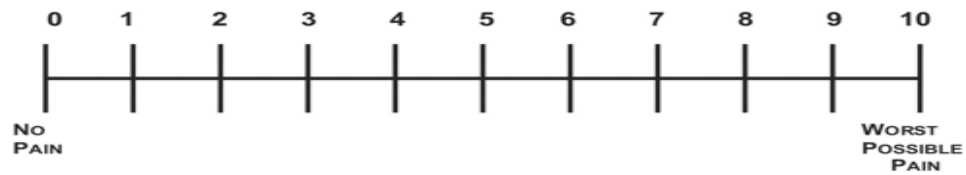


**The next set of question are about your pain experience in the last 24 hours**

2. On this scale, please indicate the **worst** hurting you had in the past 24 hours:



3. On this scale, please indicate how much hurt you can say you experienced in the past 24 hours:



4. How often would you say your hurts were more painful in the last 24 hours? Please circle your best estimate of the percentage of time your child was in severe pain.

Never      A little      Sometimes      Most of the time      Always

☐                      ☐                      ☐                      ☐                      ☐

5.

On the scale of 0-10, how much did pain interfere or prevented you from (Circle the one number below)

Does not interfere                      Completely interferes

Doing activities in bed such as turning, sitting up, repositioning.      0   1   2   3   4   5   6   7   8   9   10

Doing activities out of bed such as walking, playing & feeding      0   1   2   3   4   5   6   7   8   9   10

Mood      0   1   2   3   4   5   6   7   8   9   10

Relating with other people      0   1   2   3   4   5   6   7   8   9   10

Sleep      0   1   2   3   4   5   6   7   8   9   10

**In the last 24 hours:**

6. How often did you think you were bothered by pain? Please choose the option that best describes the number of times you were bothered by pain.

Never	A little	Sometimes	Most of the time	Always
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. How much relief from pain did you receive after pain treatments (both medicine and non-medicine treatments)?

No relief	A little	Some relief	Good relief	Complete relief
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. Did a Doctor/Nurse make it clear to you that we consider your pain treatment important?

☐ Yes ☐ No

**The next set of questions will be about your pain treatment experience during this admission.**

9. On the next set of questions select a phrase on how satisfied or dissatisfied you are with the following statements

	Very dissatisfied	Dissatisfied	Slightly dissatisfied	Slightly Satisfied	Satisfied	Very Satisfied
Your overall pain treatment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your nurse's response to your pain reports	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your doctor response to your pain reports	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your nurse's efforts to help you deal with the pain	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your doctor's efforts to help you deal with the pain	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**On a scale of 0-5;**

10. How did you feel about your pain in the last 24 hours? Circle the number that comes closest to your feelings when you experienced pain

	Not at all					All the time
Scary	0	1	2	3	4	5
Helpless	0	1	2	3	4	5
Angry	0	1	2	3	4	5

11. Please respond to the next eight items by circling the number 0 to 5 (0 being do not agree at all, and 5 being agree very much) that comes closest to how much you agree with the item. There are no right or wrong answers.

	Strongly disagree					Strongly Agree
Children do not require pain treatment	0	1	2	3	4	5
Pain medication cannot really control pain	0	1	2	3	4	5
People get addicted to pain medicine easily	0	1	2	3	4	5
Good patients avoid talking about pain.	0	1	2	3	4	5
It is easier to put up with pain than side effects that come with pain medicine	0	1	2	3	4	5
Complaints of pain could distract a physician from treating my disease	0	1	2	3	4	5
Pain medicine should be saved in case pain gets worse	0	1	2	3	4	5
The experience of pain is a sign that illness is getting worse	0	1	2	3	4	5

12. Which of the following pain control methods (if any) have you used over the last 24 hours?

<input type="checkbox"/>	Pain pills
<input type="checkbox"/>	Pain Injections
<input type="checkbox"/>	Pain medication into cannula
<input type="checkbox"/>	Topical creams
<input type="checkbox"/>	Relaxation
<input type="checkbox"/>	Touch
<input type="checkbox"/>	Prayer
<input type="checkbox"/>	Heat application
<input type="checkbox"/>	Cold application
<input type="checkbox"/>	Distraction
<input type="checkbox"/>	Guided imagery
<input type="checkbox"/>	Backrub
<input type="checkbox"/>	Massage
<input type="checkbox"/>	Music therapy
<input type="checkbox"/>	Breastfeeding
<input type="checkbox"/>	Non-nutritive sucking
<input type="checkbox"/>	Other (specify).....

Thank you for taking your time to complete this survey. We believe your answers will help us provide better care to you and other children in the future.



## Appendix 4C

### Interview Guide Parents

Thank you for participating in our study that looks at how children's pain is treated in our hospitals. We are not checking on anybody; in fact, our discussion is strictly for research purposes and is not reported to your child's healthcare providers. Therefore, what you say will not affect your child's care. If you feel uncomfortable with our discussion, you can opt not to answer some of the questions, and you can always ask us to stop anytime. There will be no penalties against you or your child. This interview may last from 1-2 hours. Now let's begin.

**Yourself:** Tell me a little about yourself and your family

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---

Have you ever taken care of someone with or experienced pain yourself?

Probe: How would you describe the situation? Was the pain treated? If so, how? If not, tell me about it. What did you think about the treatment or non-treatment of the pain?

---

---

**Your Child:** Tell me a little about your child.

Probe: Is there anything you noticed about his/her current condition that impacts how he/she acts or behaves normally?

---

---

Tell me about your child's (s) current hospital stay.

Probes: What has gone well and what is frustrating about it? How is your child doing?

---

---

Tell me a little bit more about your child's pain experience?

Probes: What causes it? How much pain is child experiencing? Is it something you were expecting? How is it the pain affecting your child?

---

---

Do you have any concerns regarding your child pain experience and how it is being treated? What do you think should be done about it?

Probe gently for what they actually did and the response to the same.

---

---

**Hospital/Staff:** How would you describe the staff's response to your child's pain? Who was more helpful? What did they do that you liked/ did not like? What did they do that was helpful/not helpful?

---

---

Are you satisfied about the pain care you child received during this hospital stay? What are the reasons for satisfaction or non-satisfaction?

---

---

**Wrap up:** What are your thoughts regarding child pain? What should be done when a child is in pain?

Probe: Describe differences or similarities between your previous pain experiences and your child's recent pain experience.

---

---

Thank you for your time and helping us understand how children's pain is treated in hospitals. We believe your answers will go a long way in helping us understand what happens to children who are in pain during their stay in the hospital. Our interviews will end here. Once again thank you.

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## Appendix 4D

### Interview guide Child

Thank you for helping us with our research project about children who are in the hospital and how any pain they feel is treated. We are not checking on anybody; in fact, our discussion is strictly for research purposes and is not reported to your healthcare providers. Therefore, what you say will not affect your care. If you feel uncomfortable with our discussion, you can opt not to answer some questions, and you may ask us to stop anytime. There will be no penalties against you. Now let's begin.

**About Yourself:** Tell me a little about yourself and your family.

Probes: Where do you live? Which school do you go to? Who are your friends?

---

Have you ever seen someone in pain?

Probes: How will describe that? Were they taking any medicine or was anything being done to help the pain go away?

---

**Pain experience:** Tell me about your stay in hospital.

Probes: What did you do today? What was hard/easy to do today? When was that? What make it hard/easy?

---

I see you scored XX on your pain scores, tell me a little about it.

Probes: Was it something you were expecting? Have you had more or less pain in the past? (Tell me about that). What did it stop you from doing today? Was it any better/worse than yesterday? What do you think make it worse/better?

---

**Your family:** Was your family there when you were in the hospital?

**Probes:** If they were present, what did they do? What did they do when something hurt? Was it helpful/not helpful? What did you like/not like about what they did?

---

**Hospital/Staff:** Who on the hospital staff was helpful when you had something that hurt?

Probes: What did the nurse/doctor do that was helpful/not helpful? What did you like/not like about what they did?

---

Where you happy/not happy about what they did?

Probe: what made you happy/unhappy

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**Wrap up:** What do you think should be done when children are hurting?

Probe: What was the difference between your pain and the person/persons you have seen in pain in terms of how they felt and what was done/not done to help them?

---

Thank you for your time and helping us understand how children's pain is treated in hospitals. We believe your answers will go long way in helping us understand what happens to children who are in pain during their stay in hospital. Our interview ends here. Thank you once more

## CHAPTER 5

### Discussion

Children in LMIC traverse an environment marred by challenges on a daily basis. All children have the right to be protected against unnecessary pain and suffering (1, 2). Equally important is their right to also report their pain using age appropriate and valid measures and expect that healthcare providers will respond accordingly to relieve their pain. This dissertation provides a comprehensive understanding of pediatric acute pain management in Botswana, an LMIC in sub-Saharan Africa. The results of the work presented here indicate that while pediatric acute pain is a significant issue in LMIC, it is not well addressed in the literature (2, 3). This gap in evidence has significant repercussions for children, their families, and the health care systems in LMIC due to a lack of awareness of the extent of pain and suffering experienced by hospitalized children. The results further show that indeed, an unacceptably high proportion of children in Botswana experience acute pain during hospitalization, and their pain is neither adequately assessed, documented or managed (4). Studies presented in this dissertation demonstrate that both children and parents are aware of the state of children's pain experiences. While the majority of participants believe healthcare providers are doing their best, they fault environmental factors for children's suffering (5). Given the short- and long-term impact on the lives of children and their families (6-9), more efforts are needed to minimize Botswana's children from suffering unnecessary pain during hospitalization.

The purpose of this dissertation was to examine pediatric acute pain management practices in Botswana guided by a conceptual model driven from tenets of Symptom

Management Theory (10, 11). The model framed the; 1) identification of keywords, narrowing the literature search outcome, and framing the results into themes for Chapter 2. 2) research question, aims, and the identification of variables and their measures in Chapter 3; and 3) formulation of the research question and aims, identification of variables and their measures, guide for interview questions, and the results for Chapter 4. The reporting of results of this dissertation work also align with the SMT by the conceptual model with the expansion and removal of factors (Figure 5-1 & 5-2).

Using a three -article format, this dissertation in Chapter 2 presents a synthesis of existing literature to describe the state of the science of pain management practices in LMIC. Chapter 3 reports on pain prevalence, its nature, and pain management practices in Botswana using observational data and a retrospective review of the hospital health records. In chapter 4, children's and parents/guardians' experiences and perceptions of pediatric pain management practices in Botswana are explored through a convergent mixed-method design, integrating data from a descriptive cross-sectional survey and descriptive qualitative study. Together, this work demonstrates pediatric acute pain is a significant problem in LMIC, such as Botswana, it is not adequately assessed, documented or managed, yet children and parents/guardians are generally content with the pain care.

There are gaps in the existing knowledge on pediatric acute pain management globally; this dissertation adds to the existing knowledge (2, 3). The work presented here also provides a comprehensive understanding of pain and vital information on acute pain management from patients and family caregivers' perspective (2). The data presented also advances the testing of SMT with a population of children in an LMIC setting;

henceforth, establishing its usefulness as a framework for children with symptoms related to various illnesses (10, 12). Above all, the dissertation highlights the plight of children hospitalized in Botswana with a focus on their experiences with acute pain.

## **Major Findings of Chapter 2**

For chapter 2, findings show that there is a critical gap in the literature addressing pediatric acute pain management practices in LMIC. An integrative review demonstrates that the available evidence is of low quality using GRADE criterion (13). Most of the evidence is from European and South-East Asia regions. There were few studies that addressed child and parents/guardians' experiences and perceptions. The findings of this review identified three primary themes each with two subthemes: 1) the magnitude of pediatric pain in LMIC; 2) child pain actor's perceptions, experiences and practices; and 3) pain management practices.

The theme of the magnitude of pediatric pain in LMIC addressed the prevalence of pediatric acute pain in LMIC and challenges related to pain management resources. The pediatric pain burden in LMIC subtheme presented a synthesis of evidence reporting on acute pain prevalence among children in LMIC. There is limited evidence in this area. However, some studies addressed factors known to predispose children to pain; the results supported a high prevalence of acute pain among children. The second subtheme- pain management resources - presented evidence on access, availability, and financial implications of pediatric acute pain management in LMIC.

The second theme of the integrative review, child pain actor's perceptions, experiences, and practices - explored healthcare providers, parents/guardians and children's perceptions, experiences, and practices related to pain. The first subtheme -

parent and child perceptions, experiences, and practices - describes patient-reported outcomes of pediatric pain. The findings emphasized that patient and family caregiver voices are primarily absent in literature relating to child pain, despite the role each has in child pain care. The second subtheme addressed healthcare provider's perceptions, experiences, and practices. Overall, the evidence suggests that healthcare providers have limited knowledge about pediatric pain management, and there are misconceptions and myths prevalent among these providers. These findings imply that cultural and environmental factors play an essential role in pediatric acute pain management, therefore should be studied and used to generate solutions to improve pediatric acute pain management.

The third theme from the integrative review, pain management practices - examined pain assessment and treatment strategies used for children in LMIC. The first subtheme addressed assessment tools used to measure the intensity of pain in children in LMIC and found that most tools used and validated globally are also used in LMIC. Efforts to develop culturally specific tools in a few of the studies LMIC are visible. Pain management approaches were summarized in the second subtheme, including novel strategies to treat pain that used both pharmacological and non-pharmacological measures. While the tools are developed and validated in LMIC and studies on novel strategies are underway, their application in clinical settings is conspicuously absent in the literature. Overall, findings for Chapter 2, the review of the literature, indicate that there are significant limitations in the available evidence; additional research is needed to gain a comprehensive understanding of pediatric pain management practices in LMIC.

### **Major Findings of Chapter 3**

The findings of this descriptive correlational prospective observational study demonstrate a high prevalence of pediatric acute pain in two Botswana largest hospitals. Study results report the prevalence of pediatric acute pain was between 46 % and 59 %, respectively when participants are asked a general question about whether a child was currently experiencing pain and using pain intensity tools. Twenty-two percent of children had moderate-severe pain, which is of major concern given that acetaminophen, a weak analgesic, was the drug of choice for this sample. An interesting finding was the report of severe pain, a rare event at 7%; but the maximum pain intensity documented in the health records is moderate pain at 6%. When initially asked by the study team, parents indicated that at least 36% of children aged >7 years of age experienced moderate to severe pain, while 44% implied children were not in pain. In parents/guardians' subsequent pain evaluations scores post-enrolment, the proportion of children with "no pain" increased from 44% to a range of 51% to 63%.

Pain assessment is not well documented in the health records. Only 54% of patient health records had at least one pain assessment documented during the 48-hour study window. However, 95% of that documentation was minimal. The nurses' notes section of the health record seemed to be the most common site for pain documentation. Sixty-two percent of health records had a scheduled analgesic prescription; however, on review of documentation no non-pharmacologic measures were documented in the patients' health record. Some child and parent/guardian demographics were associated with the present pain experience report and the child's pain intensity. These child and parent/guardian demographics include; child's age, parental age, hospital, and unit of

admission, diagnosis, child's residence, parental relationship to the child, parent sex, and cultural background. Only the child age was consistently associated with pain intensity across time points, with children from the younger categories (2-months-5 years and 6-9 years of age) reporting higher pain intensity. Factors such as parent relationship to the child, parental age, sex, and level of education were all associated with the parents/guardians report of the child's pain intensity. Interestingly, none of the parent/guardians pain intensity reports were associated with any of the child's demographics. These findings suggest that pediatric acute pain is a significant problem among hospitalized children in Botswana, but it also suggests underreporting and poor documentation of pain.

#### **Major Findings of Chapter 4**

The findings of this mixed-methods study indicate a current pain prevalence in children in Botswana more often reported by parents/guardians than self-report by children (57% reported by parents/guardians and 37% by children). Children and parents/guardians are similar in their reporting of moderate-severe as the worst pain at 59% and 60%, respectively. Similarly, the two groups report the average pain at 52% and 57%, respectively. The mean scores for m-APS-POQ-R and cm-APS-POQ-R, tools used to evaluate parents/guardians and children's experiences and perceptions and the related subscales, were significant for pain interference, pain severity, knowledge and perception of care except for the m-APS-POQ-R pain interference subscale, which did not show significance. These findings illustrate the usefulness of tools such as m-APS-POQ-R and cm-APS-POQ-R to evaluate parents/guardians and children pain experiences and perceptions. A multi-modal pain treatment approach was a common strategy used to treat



pain. Parents/guardians aged 24 years or younger, with children, admitted to medical units, child diagnosis of open wounds and perceptions of the child being seriously ill scored the m-APS-POQ-R and its subscales higher than others. Children with open wounds and trauma -related diagnoses were associated with high cm-APS-POQ-R scores, while children 6-9 years of age scored lower on the knowledge subscale.

Qualitative study findings were summarized into six main themes: soldiering on with hope, facing adversity, perception of pain care, pain care outcomes, knowledge of pediatric pain management, and limitations of being a child. While each theme has importance in understanding the experiences and perceptions of pain management practices in children, collectively, these results indicate that for both children and parents/guardians regarding pediatric pain management as a problem that needs to be addressed with urgency. Despite claims, children and parents generally had a positive outlook about pain and reported that pain was not usually seen as an independent entity from a child's underlying disease. Pain reportedly interfered with a child's hospital stay, healing, and wellbeing by affecting his or her sleep, eating, and interaction with the environment. Children and parents demonstrated knowledge of pain, its measurement, and both pharmacological and non-pharmacological pain treatment strategies.

The integrated qualitative and quantitative data produced seven meta-inferences.

1) Pediatric pain is a significant problem in Botswana's two largest hospitals; data document pain prevalence, intensity, and factors influencing both prevalence and intensity. 2) The overall pediatric pain outcomes and results, in general, indicate that children and parents are content with their pain care. 3) The perception of pain care, which specifically addresses the quality of pain care delivered, and the results generally

show that children and parents/guardians are satisfied with the care as delivered despite reporting high rates of moderate to severe pain. Data suggests the reason for this discrepancy maybe due to the acceptance of the healthcare resources limitations in Botswana by children and parents/guardians. 4) Pediatric pain knowledge and attitudes indicate that children and parents/guardians understood pain and its management strategies. 5) Child risk factors associated with high pain intensity, with child's age as the most important factor. 6) Children and parents/guardians belief that pain impacts a child's well-being, healing, and hospital stay. Children pointed out that pain affects their mood and activities because its limits their interaction with others, they cannot play, sleep and even be themselves. Parents/guardians' qualitative and quantitative results, however, were discordant. While they reported on the survey that pain did not interfere with the hospital stay, in qualitative interviews they disclosed that pain was not a "good thing" and affected children negatively. 7) The last meta-inference addressed pain management strategies, and both parents and children understood how to treat pain if a child was in pain.

Overall, the results of this work clearly shows that pediatric acute pain is a problem among hospitalized children in two of Botswana's largest hospitals. Moreover, children and parents/guardians expect acute pain treatment to be adequate and to bring the child comfort. Children and parents/guardians also demonstrated significant understanding of pediatric acute pain, child risk factors, consequences, and management strategies.

## **Limitations**

There are limitations to this dissertation work. First, the evidence used in the integrative review was limited to English language. Therefore studies published in other languages used in LMIC, which could provide pertinent information about other LMIC regions and countries were not represented. Second, the data used in subsequent articles were collected from a convenience sample, which imposes risks of sampling bias that can both over and underrepresent specific members of the population. The work presented in chapter 2 and 3 has a sample with majority of children being under the age of five years and female caregivers (14). Despite its weakness, a convenience sample was the best sampling method for this dissertation due to acute pain experiences being a believed common occurrence in this cohort of hospitalized children. These studies do, however, align with other studies that also had a majority of children requiring health services being under the age of 5 years old, and in sub-Saharan Africa, females are the primary caregivers (14). However, to counter this, it must be noted that this dissertation was conducted in Botswana's two major referral hospitals, which serve a diverse population across the country. The use of these two facilities decreases bias in the sample due to the national representativeness within the sample. Therefore, these results can be generalized to similar populations. Measures used in chapter 3 and 4 of this dissertation were not validated in this population, but their performance in the sample was excellent, thereby reducing the probability of measurement related error. The children aged  $\geq 8$  years for the child survey in chapter 4 sample size was small; therefore, the results from the children's survey should be interpreted with caution.

## **Implications**

Implications of this dissertation include adding evidence to address critical gaps in the literature for pediatric acute pain in sub-Saharan Africa and Botswana, as well as adding to the existing knowledge of pediatric acute pain. The findings of this dissertation elucidate a critical aspect of pediatric pain management in Botswana and can be used to challenge various conventional narratives about pediatric pain management in LMIC, particularly in sub-Saharan Africa. These results can also be used to inform future research in pediatric pain management in sub-Saharan Africa and Botswana.

These dissertation results also come at a critical time for Botswana's Ministry of Health and Wellness because it is currently moving towards prioritizing pain management in hospitals nationwide through the "Treat the Pain Initiative." This initiative is being co-sponsored by the Ministry of Health and the African Palliative Care Association, with funding support from the American Cancer Society's Treat Pain program (15). The results of this dissertation can contribute to many aspects of this initiative. These findings can serve as baseline data on the prevalence of pediatric acute pain, and identify current pediatric pain management practices, as well as inform strategies to design programs directed towards improving pain management for hospitalized children. Additionally, these results provide an evidence base to formulate national policies and standards for pediatric acute pain management in hospitalized children in Botswana, including items such as frequency of pain assessment and pain documentation. Also, the findings provide valuable information for use in validation of tools for pain assessment and patient-reported outcomes that can be used in the daily care of children and to track quality improvements initiatives in pain care.

Finally, these results may be useful as the basis for advocacy to end unnecessary pain and suffering for children. Organizations such as the International Association of the Study of Pain (IASP) can use these data to address their goal of decreasing pain, particularly in children who live in LMIC (16).

### **Future directions**

There are critical gaps in knowledge on pediatric acute pain management in LMIC, particularly sub-Saharan Africa that urgently need to be addressed. First, there is a need for observational cohort studies to investigate healthcare provider practices, knowledge, and perceptions regarding pediatric acute pain. Also, there is a need for further studies that address policy around the management of pediatric acute pain in most LMIC, including in Botswana. Furthermore, clinical studies, such as quasi-experimental studies and comparative effectiveness studies, are needed to test the use of various interventions and pain measurement tools in clinical settings to ensure feasibility and fidelity in any setting. Also, implementation research needs to be adopted for pain management strategies and pain measuring tools to improve pediatric acute pain outcomes. Finally, the data for this dissertation can further be used to validate the measures used in the study and confirm the conceptual model for future studies.

### **Conclusion**

In conclusion, this dissertation contributes to the understanding of pediatric acute pain management practices in Botswana and gives insight into the state of pain management practices for children in sub-Saharan Africa. There is limited evidence on pediatric acute pain management practices in LMIC, particularly in sub-Saharan Africa. The apparent gaps in the knowledge and care are particularly critical for: the burden of

pediatric acute pain; availability of resources to address pain therapies; patients and their caregiver's role in recognizing and treating pain; child and parent/guardian's perspective on the intensity of pain; their experiences and practices related to pain management; and clinical application of pain measuring tools and interventions. The prevalence of pediatric acute pain in Botswana is high, and acute pain is not adequately assessed and documented. Risk factors of high pain intensity include open wound diagnosis and child age. Parent's age and their relationship to the child are also linked to how parents/guardians report their child's pain. While data supports that children and parents/guardians effectively assessed the child's pain, their reports should be taken into consideration in pain management, they should be encouraged to report pain at all levels of intensity. Both children and parents/guardians considered pediatric acute pain as a problem that requires appropriate management; they also acknowledge healthcare resource limitations that force them to reduce their expectations of pain treatment. Healthcare providers and researchers, are obligated to improve that expectation.

**Figure 5-1. Conceptual model of factors under investigation redefined**

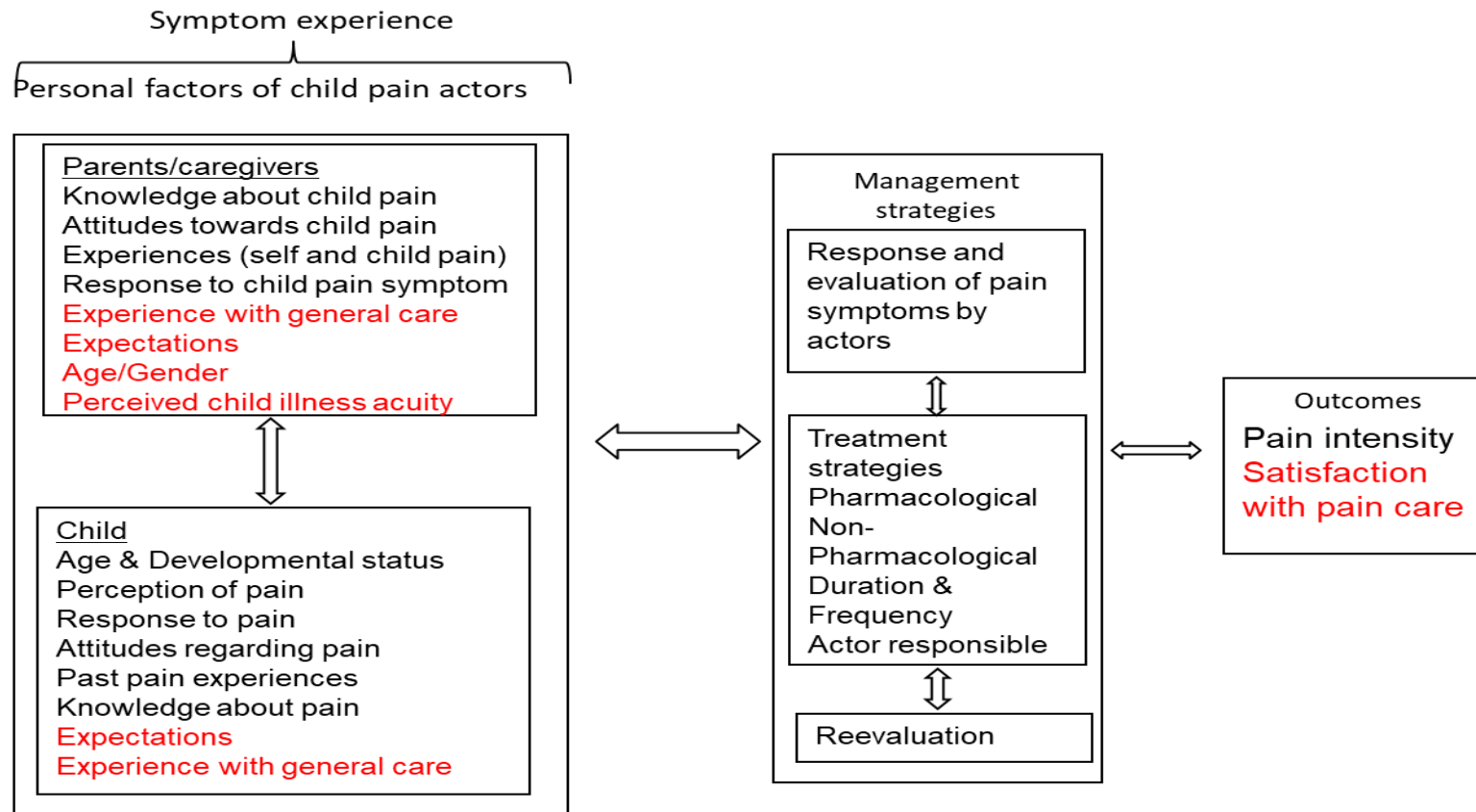


Figure 5-1 shows an expansion of factors based on the results of this dissertation. Black represent the factors in the original model of dissertation focus while red color represents the new factors identified from the results.

**Figure 5-2. Conceptual Model: Pediatric acute pain symptom management redefined**

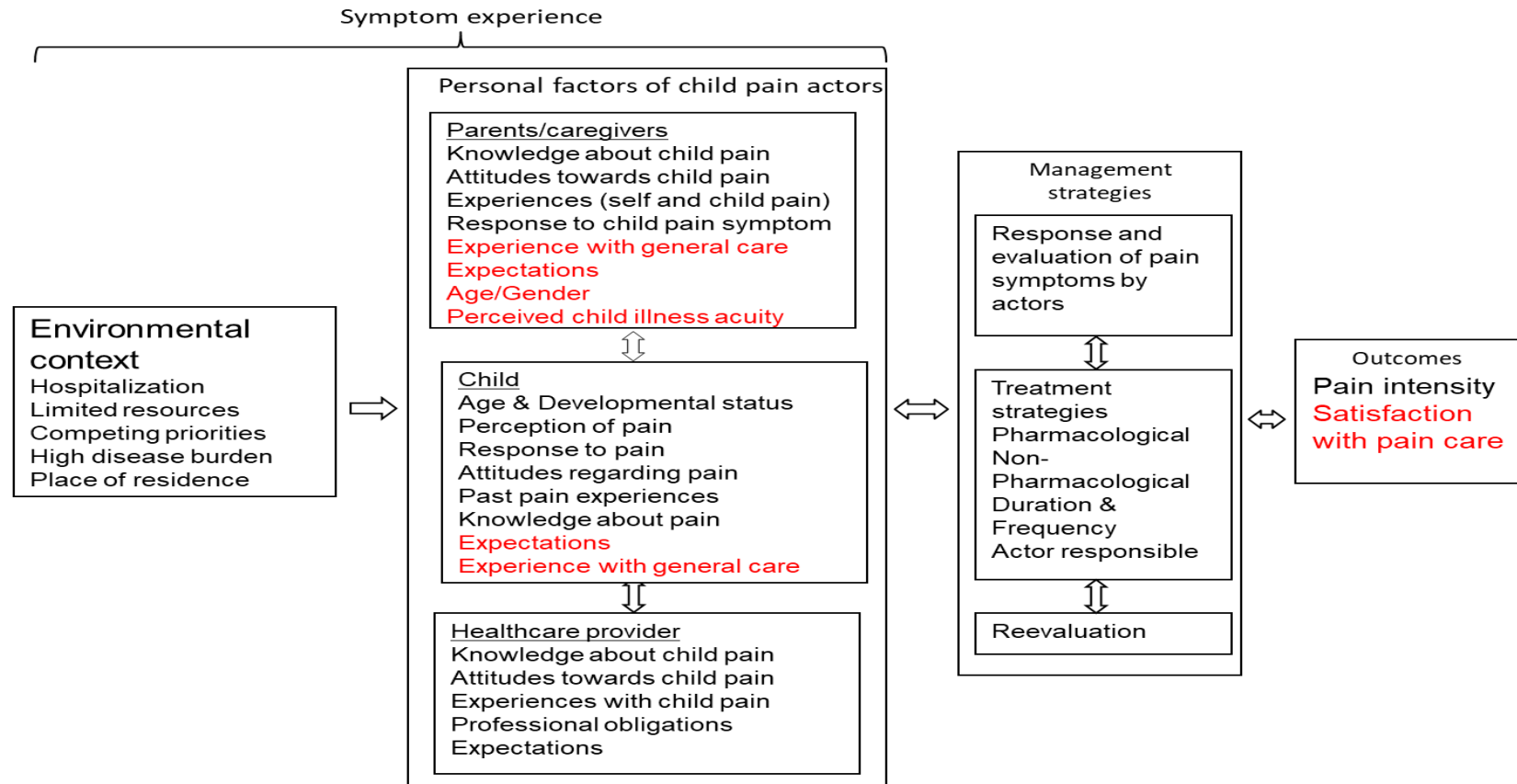


Figure 5-2 shows the extended conceptual model with the new factors red and removal of the cultural context from the original model as the environmental context has a more significant influence on pain symptom experience.



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