# UNDERGRADUATE BACCALAUREATE NURSING STUDENT KNOWLEDGE AND ATTITUDES TOWARDS NEONATAL AND PEDIATRIC PAIN MANAGEMENT PRACTICES

by

Jordan Lee Slowik

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Philosophy

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APPROVED BY:

Dr. Elizabeth Whorley, PhD, RN, CNE, Committee Chair

Dr. Roslyn Polk, PhD, Committee Member

Dr. Theresa Pape, PhD, RN, CNOR-E, CNE Committee Member

## ABSTRACT

Research has indicated that pain management practices amongst registered nurses is inadequate across all age groups; however, it is frequently noted that children receive less analgesia in comparable situations than adult clients leading to harmful and costly consequences. There is a distinct gap in nursing educational research understanding nursing student knowledge and attitudes towards neonatal and pediatric pain management practices. Using a convenience sample from a private, Christian-based university in the southeastern United States, this study used a quasi-experimental, one-group pretest/posttest design to understand the impact of elective nursing courses on undergraduate baccalaureate nursing student knowledge and attitudes towards neonatal and pediatric pain management practices using the Pediatric Healthcare Providers Knowledge and Attitude Survey Regarding Pain (PHPKAS). The research question states: To what extent do undergraduate baccalaureate nursing students neonatal and pediatric pain management knowledge and attitudes differ before and after three elective nursing courses already containing pain management education? A sample of 21 participants completed both the pretest and posttest surveys. Results from a paired samples *t*-test indicated there was not a significant difference in undergraduate nursing student knowledge and attitudes towards neonatal and pediatric pain management practices before and after elective nursing courses $t[20]=.765$; $p=.227$ (one tailed); thus, the researcher failed to reject the null hypothesis. Findings suggest that confusion exists towards the pain management practices, especially towards caring for children with cancer, the use of sedatives and narcotics, and common misconceptions regarding pain in neonates and pediatrics. The findings from this research can guide future pain management curricular content and educational research.


*Keywords:* pain management, student nurse, elective course, pediatric, neonatal

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## Dedication

This study is dedicated to my son, Pearce Andrew Slowik. At 10-days old, Pearce received the lifesaving LADDs procedure for Intentional Malrotation as the result of intestinal volvulus. Through this experience, the Lord exposed the dire need for neonatal and pediatric pain management nursing education. While it has been a privilege to advocate for all children throughout my nursing career, advocating for you and your sisters has been the greatest honor of my life. I love you and your ‘special guts’ more than you will ever know, Pearce Andrew.

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## List of Abbreviations

American Association of Colleges of Nursing (AACN)

Evidenced Based Practice (EBP)

Model for Change to Evidence-Based Practice (MCEBP)

Neonatal Intensive Care Unit (NICU)

Post Anesthesia Care Unit (PACU)

Pediatric Healthcare Providers Knowledge and Attitudes Survey Regarding Pain (PHPKAS)

Pediatric Intensive Care Unit (PICU)

Pediatric Nurses Knowledge and Attitudes Survey Regarding Pain (PNKAS)

Registered Nurse (RN)

Society of Pediatric Nurses (SPN)

World Health Organization (WHO)

# CHAPTER ONE: INTRODUCTION

## OVERVIEW

Pain is the most common reason for an individual to seek healthcare services (Good, 2020). Registered Nurses (RNs) are frequently the first healthcare professionals to encounter an individual in pain, assess the individual's level of pain, and deliver appropriate pain-relieving measures (Shahmoradi et al., 2021). However, research has consistently indicated that pain management practices of RNs across all age groups and settings is inadequate, especially in neonatal and pediatric patient populations (Smeland et al., 2018; World Health Organization, 2022). Nurses frequently underestimate a patient's level of pain, which can lead to devastating and costly consequences for the patient, the healthcare system, the community, and society (Shahmoradi et al., 2021).

### Background

The concept of pain and related concepts such as comfort began to emerge in nursing literature in the 1990s (Baker, 2017). However, formal research dedicated to pain assessment, treatment, and management was not formally established in the United States until 2000. Prior to this, the formal assessment of pain by a RN was not a standard of practice nor was it required. Patients of all patient populations were subject to painful procedures and surgical interventions with minimal to no analgesia due to the fear of opioid addiction. Patients living with chronic pain were essentially advised to live with the pain (Baker, 2017). Up until the late 1980s, neonates underwent major surgical interventions without pain medication due to the belief that neonates could not perceive pain due to underdeveloped nervous systems (Smeland et al., 2018). Pain research has flourished since 2000, debunking dated beliefs regarding the perception of pain in neonates and children (Baker, 2017; Goldman & Schafer, 2020). However, research continues to

show poor pain management knowledge and skill amongst RNs of all patient populations, particularly neonates and children (Peng et al., 2020; Smeland et al., 2018;World Health Organization [WHO], 2022; Walker, 2017).

Research shows that untreated and undertreated pain in children causes needless suffering, altered immune function, increases the risk of complications, increases the risk of morbidity, increases the development of chronic pain, and cost countless dollars for the family, community, and healthcare systems (Smeland et al., 2018; Peng et al., 2020). These findings are magnified in neonates, infants less than 28 days old, especially preterm neonates as research has shown permanent changes to the brain with untreated or undertreated pain (De Clifford Faugère et al., 2022). Uncontrolled or undertreated pain, both acute and chronic, can impact a child's mental health, growth, healing, and quality of life, creating a negative impact on the family unit, the community, healthcare system, and society. Unfortunately, misconceptions, misinformation, and poor attitudes towards pain management continue to circulate in contemporary healthcare (Smeland et al., 2018). Literature has shown that provider knowledge deficits and negative attitudes towards pain management are the most important factors impacting pain relief of children (Smeland et al., 2018; Peng et al., 2020).

Research indicates that student nurses have sufficient knowledge of pain and pain medications; however, student nurses report a knowledge deficit related to implementing pain management practices to case studies and real-life situations (Cousins et al., 2022). While neonatal and pediatric curricular content varies by institution, it has been well documented that pediatric health content taught in undergraduate nursing programs has been in a steady decline for years with the prospects of this trend to continue (Betz, 2021; Society of Pediatric Nursing [SPN], 2021). Furthermore, clinical hours dedicated towards pediatric nursing care have

dramatically waned, with some states allowing pediatric clinical hours to be solely completed in the simulation setting (Ohio Laws and Administrative Rules, 2022).

With dwindling exposure to real neonates and children in the clinical setting, student nurses are unable to practice developmentally appropriate communication techniques, pain assessment skills, and implement pain-relieving measures. New graduate nurses then enter the nursing profession with little knowledge nor hands-on opportunities working with real neonates and children in pain (SPN, 2021). Consequently, new graduates then look to more experienced nursing staff for guidance on pain management practices. This is particularly alarming as research has consistently shown poor pain management knowledge and practices amongst registered nursing staff across all patient populations (World Health Organization, 2022).

Research has shown that academic institutions are resistant to change, often hindering the integration of evidence-based practice (EBP) into existing curricula (Arslan-Yurumezoglu & Gokce, 2020). Huth and Moore's (1998) Prescriptive Theory of Acute Pain Management in Infants and Children is a middle-range prescriptive theory that gives insight into caring for infants and children in pain. The use of this theory can guide curricular reform to ensure academic institutions are using best practices. The theory has been used as a framework in several studies since the 1990s, including Kashlak (2012), Olson (2016), and Hummel (2017).

## Problem Statement

Dated pain management practices and lack of pain management education is having harmful consequences to neonates and children worldwide (WHO, 2022). Untreated and undertreated pain in children causes needless suffering, altered immune function, increases the risk of complications, increases the risk of morbidity, and increases the development of chronic pain (Smeland et al., 2018). Neonates, infants less than 28 days of age, are particularly

susceptible to undertreated pain. Undertreated pain in the postsurgical neonate can lead to prolonged pain, hypersensitivity to the surgical site, slow healing, and poor neurodevelopmental outcomes. These findings are magnified in preterm neonates as they are especially hypersensitive to pain (Peng et al., 2020; Smeland et al., 2018). This can lead to a decrease in white and gray subcortical brain matter resulting in neurological impairment (De Clifford Faugère et al., 2022). While pain management research has prospered since 2000, gaps are still evident, especially within the neonatal and pediatric populations; research shows a deficit in pain management knowledge and poor attitudes towards pain amongst neonatal and pediatric nurses (Peng et al., 2020; Smeland et al., 2018; Walker, 2017; WHO, 2021). The problem is there is a distinct gap in nursing literature on how to alleviate this breach in knowledge and attitudes prior to students entering the nursing profession.

## Purpose Statement

The purpose of this study was to evaluate neonatal and pediatric pain management knowledge and attitudes of undergraduate baccalaureate nursing students at a private, Christian-based university in the southeastern U.S. before and after three elective nursing courses containing pain management education utilizing a quantitative quasi-experimental, one-group pretest/posttest design. The independent variable in the study is the elective nursing course and the dependent variable is undergraduate baccalaureate nursing student knowledge and attitude towards neonatal and pediatric pain management practices as measured by the Pediatric Healthcare Providers Knowledge and Attitude Survey Regarding Pain Survey (PHPKAS; Manworren & Laprise, 2021). By evaluating three undergraduate baccalaureate nursing student elective courses, (a) Strategies for End-of-Life Care (b) Pain Management (c) Advanced Strategies for the Critically Ill Maternal-Child Populations Certificate Course, this study

evaluated the impact of elective courses on pain management practices with the goal of minimizing the knowledge gap of students before entering the nursing profession.

## Significance of the Study

The American Association of Colleges of Nursing (AACN) The Essentials Core Competencies for Professional Nursing Education (*Essentials*) state that all entry-level nurses need knowledge and proficiencies to practice in a variety of settings with diverse populations across the lifespan (AACN, 2021). The *Essentials* list the four Spheres of Care which include: (a) wellness/disease prevention, (b) chronic disease care, (c) regenerative/restorative care, and (d) hospice/palliative care (AACN, 2021; Appendix A). Although nursing students are provided with learning experiences across all four spheres of care, the *Essentials* suggest that nursing faculty provide additional opportunities for students to gain further education in an area of interest (AACN, 2021). Elective nursing courses supply students with additional knowledge and skills in an area of interest, enhance career readiness, provide opportunities for certification, and increase student satisfaction (Maneval et al., 2021).

As undergraduate nursing pediatric curricular content and clinical opportunities continue to decline, providing aspiring neonatal and pediatric nurses with additional knowledge and skill through elective and certificate courses is essential to meet the specific needs of this patient population (SPN, 2021; Betz, 2021). As research studies have consistently indicated that nurses worldwide lack the necessary education to provide modern pain management practices in the neonatal and pediatric populations, acknowledging this gap prior to students entering the nursing profession can positively impact student knowledge and attitudes towards neonatal and pediatric pain management practices before assuming care as a RN (Liyew et al., 2020). However, there is a severe lack of nursing research on how to alleviate this gap in knowledge. Thus, the results

from this study provide implications for evidenced-based curricular reform and future educational research.

## Research Question

**RQ1:** To what extent do undergraduate baccalaureate nursing student neonatal and pediatric pain management knowledge and attitudes differ before and after three elective nursing courses already containing pain management education?

## Hypotheses

**$H_0$1:** There is no difference in undergraduate baccalaureate nursing student neonatal and pediatric pain management knowledge and attitudes before and after three elective nursing courses already containing pain management education.

**$H_A$1:** There is a difference in undergraduate baccalaureate nursing student neonatal and pediatric pain management knowledge and attitudes before and after three elective nursing courses already containing pain management education.

## Definitions

To fully understand the phenomenon of interest, it is necessary to define the terminology used within this study. The definition of terms for this study includes the concepts and the theoretical definitions.

### Concepts and Theoretical Definitions

1. *Analgesia:* Pain relief (Good, 2020).
2. *Balance Between analgesia and side effects:* Patient satisfaction with relief of pain and relief or absence of pain (Good, 2020).
3. *Cultural Background:* The socioeconomic, ethnic, and religious factors that qualify an individual for membership in an identity group (Huth & Moore, 1998).

4. *Developmental Level:* Assessment of infant's or child's motor (fine and gross), language, and personal-social development (Huth & Moore, 1998).
5. *Effective Outcome:* Pain reduction that is satisfactory to the child and/or parent and nurse (Huth & Moore, 1998).
6. *Inadequate pain relief, behavioral distress, unacceptable physiological parameters, and side effects:* Self-report and/or parent report of pain intensity, overt physical signs of distress, and physiological parameters that have not been relieved since a pharmacologic and/or nonpharmacologic intervention was administered; or side effects that are unacceptable to the child/parent or judged unsafe by the nurse (Huth & Moore, 1998).
7. *Pain:* An unpleasant sensory and affective experience associated with tissue damage following surgery or trauma (Good, 2020).
8. *Regular assessment of pain, behavior, physiological states, and side effects:* Child self-report and/or parent report or infant behavior assessment, physiological assessments, and observation for medication side effects every hour until pain is controlled and then every 2-3 hours. Physiological measures are used only as adjuncts to self-report and behavior, since they are not sensitive or specific indicators of pain.
9. *Side Effects:* Unpleasant sensory and affective experiences associated with adverse effects of pain medication (Good, 2020).

# CHAPTER TWO: LITERATURE REVIEW

## OVERVIEW

A gap in knowledge has been identified in student nurses with the application of pain management knowledge and skill to case studies and real-life situations (Cousins et al., 2022). While neonatal and pediatric curricular content varies by institution, it has been well documented that pediatric health content taught in undergraduate nursing programs has been in a steady decline for years with the prospects of this trend to continue (Betz, 2021; SPN, 2021). Furthermore, clinical hours dedicated towards pediatric nursing care have dramatically decreased, with some states allowing pediatric clinical hours to be solely completed in the simulation setting (Ohio Laws and Administrative Rules, 2022). With declining exposure to real neonates and children in the clinical setting, student nurses are unable to practice developmentally appropriate communication techniques, pain assessment skills, and deliver pain-relieving measures. New graduate nurses then enter the nursing profession with little knowledge nor hands-on experience working with real neonates and children in pain (SPN, 2021). Thus, alleviating the gap in knowledge and skill is critical to successful future pain management practices.

## Theoretical Framework

The prescriptive theory of acute pain management in infants and children is a middle-range prescriptive theory, which includes a goal and a prescription to achieve the goal (Huth & Moore, 1998). Middle-range nursing theories are narrower in scope than grand nursing theories and provide concepts that may be applied to nursing practice and tested by researchers (Huth & Moore, 1998). The benefit of applying theory to practice is that concepts are generalizable and may be applied to various situations. Instead of lengthy clinical practice guides that can

sometimes be 100 plus pages in length, middle range theories provide assumptions and propositions that are written in testable form (Huth & Moore, 1998). The prescriptive theory of acute pain management in infants and children can guide student actions when caring for infants and children in pain and promote the incorporation of evidenced based practice (EBP) in nursing curricula.

Huth and Moore (1998) state that the theory has three propositions, or statements that summarize the theory. The first proposition states that an initial assessment consisting of past pain history, current pain assessment, assessments of developmental level, coping strategies, plus cultural background leads to the choice of appropriate therapeutic intervention. The second proposition states that therapeutic interventions should contribute to pain reduction that is satisfactory to child, parent, and nurse. This includes child/parent teaching, pharmacologic and/or nonpharmacologic adjuvants. Lastly, reassessment should consist of regular assessment of pain by the child or parent report, assessment of behavioral and physiological states, and monitoring for side effects, which can all indicate inadequate pain relief. This includes monitoring for behavioral distress, unacceptable physiological measures, and side effects. These components contribute to the choice of appropriate therapeutic interventions by the RN (Huth & Moore, 1998).

## Related Literature

Pain is the most common reason for an individual to seek healthcare services (Good, 2020). There are many kinds of pain, including acute and chronic pain processes. Acute pain is usually triggered by a specific injury or disease process which serves a useful biologic purpose and is self-limiting. By promoting behaviors that minimize the chance for reinjury, acute pain can aid in the healing process, whereas chronic pain serves no biological purpose and usually has

no foreseeable endpoint (Goldman & Schafer, 2020). Chronic pain may originate from an acute process, but over time, chronic pain becomes a disease state of its own, with potential permanent changes in central nervous system physiology. There is no clear threshold in which acute pain transitions to chronic pain. However, it is largely accepted that pain that continues past expected healing time is pathological, usually between three to six months (Goldman & Schafer, 2020).

Unrelieved acute and chronic pain has consequences in all patient populations which can lead to negative healthcare outcomes ( Peng et al., 2020; Smeland et al., 2018). Potential physical consequences include altered breathing patterns, slowing of the urinary and gastrointestinal systems, musculoskeletal system tension, spasm, and fatigue; and an increase in metabolic rate in response to stress hormones, such as adrenaline, catecholamines, and cortisol, which can alter immune function and wound healing (Smeland et al., 2018; Peng et al., 2020). Neonates, especially preterm neonates, are suspectable to poor neurodevelopmental outcomes in response to unrelieved or undertreated pain leading to a decrease in white and gray subcortical brain matter resulting in neurological impairment (De Clifford Faugère et al., 2022). The psychological impact of poorly controlled acute and chronic pain is well documented, including the development of chronic pain, hypersensitivity to pain, and the protentional alteration of how the brain and nervous system perceive pain (Peng et al., 2020; Smeland et al., 2018).

**Origins of Pain**

Pain can originate from somatic or visceral structures with somatic pain being well localized, resulting from injury or disease of the skin and/or musculoskeletal system. Various types of stimulation can induce a somatic pain response by binding to nociceptors, which can be polymodal or nociceptive specific (Cohen & Raja, 2020). Polymodal receptors respond to painful and nonpainful stimuli, whereas nociceptive specific receptors respond to mechanical, chemical,

or temperature stimuli. Visceral pain arises from internal structures and organ dysfunction which is often a consequence of inflammation, occlusion of flow, ischemia, or functional pathology (Cohen & Raja, 2020). Visceral pain is diffuse and poorly localized, often associated by somatic regions; for example, pain from a myocardial infarction that radiates to the arm or pain over the area known as McBurney's point which indicates an inflamed or ruptured appendix. This occurs due to afferent somatic and visceral nerve fibers sharing spinal cord segments which often results in intensified emotions and exaggerated autonomic reflexes (Cohen & Raja, 2020).

Pain can be etiologically categorized as neuropathic, nociceptive, nociplastic, or mixed, with more than one pain mechanism often being involved in chronic pain (Cohen & Raja, 2020). Understanding the etiology of pain can guide pharmacological and nonpharmacological interventions. Neuropathic pain arises from a disease process or lesion affecting the somatosensory system and is characterized by positive and negative symptoms (Cohen & Raja, 2020). Loss of sensation, a negative symptom, is usually the result of axon or neuron loss which is often described by the patient as numbness or tingling. Positive symptoms are the result of abnormal excitability of the nervous system and are often described by patients as shooting or electrical (Cohen & Raja, 2020). Causes of neuropathic pain in children include postsurgical pain (such as scoliosis correction), cancer related pain, neurotoxic medications, genetic metabolic diseases, and more rarely, cerebrovascular lesions, infarcts, or hemorrhages (Walker, 2020).

Nociceptive pain results from a disease or injury affecting somatic or visceral structures. Common sources of nociceptive pain in children include abrasions, bruises, burns, fractured or broken bones, muscle/tendon overuse or damage and gastrointestinal gas pain or constipation (Cohen & Raja, 2020). Nociplastic pain, the perception or sensation of pain, arises from altered nociception with no evidence actual or potential tissue damage, such as in irritable bowel

syndrome (IBS). Patients usually describe nociceptive pain as throbbing or aching (Cohen & Raja, 2020). Mixed pain contains components of both neuropathic and nociceptive pain. Examples of mixed pain in children include pain associated with advanced malignancies and migraines (Cohen & Raja, 2020).

An individual's perception and expression of pain is multifaceted, incorporating cultural, religious, ethnical, social, cognitive, genetic, and developmental components. Patients who are in pain endure considerable suffering and are at risk for adverse effects related to untreated or undertreated pain (Peng et al., 2020). Only the person experiencing pain can describe what his or her pain is like, describing the pain in intensity, duration, quality, and trajectory over time (Good, 2020). Thus, a patient's report of pain is a valid measurement for healthcare professionals (Good, 2020). Furthermore, validated and reliable pain assessment tools should be an accepted measurement for health care professionals in all patient populations (Huth & Moore, 1998). To recognize the importance of RNs in pain management, it is critical to understand the historical progression of pain management practices and theoretical background of pain.

**Historical Background of Pain**

Scientist have proposed various theories regarding the transmission of pain beginning in the 17th century (Good, 2020). As an anesthesiologist and pain therapist in Italy during World War II, Henry Beecher noted there was no correlation between the severity of a soldier's injury and the intensity of the pain experience (Benedetti, 2022). Upon his arrival in the US, he found that civilian patients required more pain medication for similar or less severe injuries than soldiers on the battlefield, indicating that pain contains a psychological component that could change the transmission of pain impulses (Benedetti, 2022). According to Benedetti, Beecher understood that the experience of pain is closely linked to psychological factors surrounding the

injury. This led to a peaked interest in studying the placebo effect as Beecher often administered placebos to soldiers on the battlefield when analgesics were sparce (Benedetti, 2022).

Melzack and Wall's (1965) gate control theory caused a major shift in pain theory, unifying several sensory pain theories. This theory incorporated motivational, affective, and central control elements that could modify an individual's pain response (Good, 2020). The theory proposed that various gates in the dorsal horn control the level of noxious input (Melzack & Wall, 1965). According to Good (2020) the discovery of endogenous opiates, serotonin, catecholamines, and neuropeptides produced new theories, some of which supported gate control theory while others refuted it.

Nurses have created a variety of descriptive and predictive middle-range theories focusing on the mechanisms of pain. Notable middle-range theories include the concept of pain (Mahon, 1994), the concept of acute and chronic pain (Simon et al.,1995), paradox of comfort (Morse et al., 1995) and unpleasant symptoms (Lenz et al., 1997). This led to a theoretical shift that focused on pain relief rather than on the mechanisms of pain, utilizing different medications for different scenarios, such as, utilizing nonsteroidal anti-inflammatory drugs (NSAIDs) for situations involving tissue injury to decrease the release of inflammatory markers that sensitize nerve fibers to respond to painful stimuli. These theories, while useful, did not guide nursing care and specify interventions (Good, 2020).

### *Theoretical Shift in Theories of Pain*

A third theoretical shift occurred in the 1990s, focusing on the alleviation of pain by nurses through an integrated prescriptive approach (Good, 2020). The idea of a prescriptive theory was introduced by Dickoff, James, and Wiedenback in 1968 to bridge theory, practice, and research (Huth & Moore, 1998). Integrated prescriptive theories emphasized the actions

nurses must take to deliver both medical and nursing interventions, incorporating pharmacological and nonphonological therapeutic interventions (Good, 2020). Good and Moore's (1996) theory of a balance between analgesia and side effects is an integrative middle-range theory created for the delivery of pain relief in adult clients. This was a hallmark theory, instituting prescribed actions nurses must take to achieve proper pain management in adult clients (Good, 2020). However, this theory was not applicable to the nursing care of pediatric patients. Thus, A Prescriptive Theory of Acute Pain Management in Infants and Children was developed shortly afterward, which guided nursing care for infants and children (Huth & Moore, 1998).

### *Historical Background of Pain Assessment Tools*

Before the 2000s, formally assessing pain was not a standard occurrence in any healthcare setting (Baker, 2017). Many physicians were fearful to prescribe opioids in fear of causing addiction, including short-term opioid use. In the 1990s, research surfaced indicating that pain was not taken seriously and undertreated. Dr. Mitchell Max, former President of the American Pain Society, exposed the lack of improvement in pain assessment and treatment over the past 20 years (Baker, 2017). At this point, pain treatment failure was attributed to patients not telling their healthcare providers about pain and nurses not knowing how to distribute pain medications. Dr. Max concluded his findings with the statement that "Pain relief has been nobody's job" (Baker, 2017, p. 2).

In 1990 Max explained that a different approach to pain management was necessary and stated that pain must be made visible (Baker, 2017). To do this, he suggested practitioners be given bedside tools to guide physicians and nurses on the initiation and modification of analgesic treatments; however, validated tools were nonexistent at this time. To increase healthcare

provider accountability, Max called for the development of quality assurance guidelines including assessing patient satisfaction with pain management (Baker, 2017). Furthermore, Max encouraged pain management innovation and the exchange of ideas, including working with narcotic control authorities to encourage therapeutic opiate use (Baker, 2017).

In 1991, the American Pain Society released quality assurance standards for the relief of acute pain and cancer pain (Baker, 2017). However, pain assessment progress was slow until in 1999 when California legislature passed Assembly Bill 791, requiring that pain must be assessed at the same time vital signs are taken. Finally, the 106th U.S. Congress passed H.R. 3244, title VI, Sec. 1603 on October 31, 2000, establishing the "Decade of Pain Control and Research" (Baker, 2017). In 2001, The Joint Commission (JCO) declared pain assessment as a quality measure with the mindset that if pain was assessed more frequently, pain would be better controlled. At this point, formal pain assessment tools begin to emerge (Baker, 2017).

Today, there are an abundance of pain assessment tools for a variety of patient populations and patient care settings (Manworren, 2020). Tools to assess pain should be valid, reliable, responsive, feasible, and practical for use. Frequently utilized self-report pain assessment tools include the Verbal Rating Scale (VRS), Numerical Rating Scale (NRS), the Oucher scale, and the Wong-Baker FACES Pain Rating Scale. In neonates and young children, commonly used pain assessment tools include the CRIES, FLACC, PIPP, NIPS, and COMFORTneo (Manworren, 2020). These scales allow the provider to assess for pain by looking at a patient's behavior and/or physiological signs related to pain. For example, a popular behavioral pain assessment tool created by Merkel et al. (2002) called the FLACC, stands for face, legs, activity, cry, and consolability. This scale is appropriate for children two months old

to seven years old and is commonly used for individuals of all ages who are unable to communicate pain (Merkel et al., 2002).

It is important to note that the use of pain assessment tools can vary by healthcare system, hospital, department, and unit. It is essential that available pain assessment tools reflect the patient population served (Manwarren, 2020). For example, selecting the Wong-Baker FACES Pain Rating Scale, which requires the patient to choose the face that best reflects their own pain, would not be appropriate for a sedated child (Wong-Baker FACES Foundation, 2022).

**Childhood Pain**

Pain is an incapacitating and expensive health issue that affects one-third of individuals worldwide (Cousins et al., 2022). Children experience pain both acutely and chronically. Acute pain is a common occurrence in childhood as children explore and test the world around them (Peng et al., 2020). Pain can be a natural occurrence, such as teething pain in infants or can have traumatic origin, such as an abrasion from tripping on a sidewalk. Children respond differently to painful experiences, and often remember these experiences as they age (Bahise et al., 2021). For example, a child might scream or cry while getting an intramuscular immunization, while another stays still and remains calm. Both children might describe getting an immunization as painful; however, they respond differently to the painful experience.

Uncontrolled or undertreated pain, acute and chronic, can impact a child's growth, mental health, healing, and quality of life creating a negative impact on the family unit and the community. Conversely, successful pain management can increase a child's quality of life, increase satisfaction of care, and positively impact future responses to pain (Bahise et al., 2021). Managing pain before a child's experience with an intervention, such as providing lidocaine numbing cream to the site of an intravenous catheter prior to placement, can reduce adverse pain-

related emotional and social effects. This can lead to decreased anxiety and fear in the child and family, making the task more efficient for nursing staff (Suleman et al., 2022). Effective pain management leads to quicker and more productive mobilization resulting in shorter hospital stays, accelerated healing, and decreased cost associated with care (Bahise et al., 2021). To effectively manage pain in neonates and children, nurses must have the knowledge and skill to assess pain. This includes utilizing validated pain assessment tools to guide pain management practices (Manworren, 2020).

The WHO (2022) states that children have the right to enjoy life to their highest attainable standard and that access to pain management is a fundamental right. However, there is a substantial gap between knowledge of pain management theory and integrating that knowledge into practice (Dwamena et al., 2020). Since nurses play a critical role in the assessment and management of childhood pain in both the primary and acute care settings, it is essential that student nurses are provided opportunities to apply theoretical pain management knowledge to practice (SPN, 2021).

**Outside Factors that Influence Pain**

The mechanisms of perceiving and responding to pain are multifaced (Good, 2020). An individual's response to painful stimuli is affected by various interconnected biological, social, and psychological factors (Cousins et al., 2022). Research studies have shown that cultural, ethnic, and religious backgrounds can influence how an individual perceives and expresses pain (Alotaibi et al., 2022; Can et al., 2019). This is also true in children. However, a child's experience with pain is also dictated by their developmental stage, cognitive ability, and the knowledge of healthcare professionals that care for the child (Cousins et al., 2022). Additionally, collaboration amongst disciplines is key to effective pain management in all patient populations

(Earl et al., 2022). The assessment, management, and evaluation of pain in children requires healthcare professionals to understand how outside factors influence an individual's response to pain (Huth & Moore, 1998).

### *The Impact of Culture, Ethnic Background, and Religion on Pain*

There are two considerations when it comes to culture and pain: first, how a child's culture and ethnic background shape a child's pain and second, how a nurse's culture, ethnic background, and experience working with diverse populations impact pain management practices (Alotaibi et al., 2022). In all care settings, both families and healthcare providers bring their own perceptions, values, expectations, bias, and beliefs during healthcare interactions. For example, in Saudi Arabia, Islamic beliefs and gender mandated considerations greatly impact nursing care (Alotaibi et al., 2022). For example, it is expected that there is no or minimal eye contact between a health care professional and a patient of the opposite sex. There are also strict, non-permissible health treatments in the Saudi culture, including fracture reduction, cauterization, and chiropractic procedures (Alotaibi et al., 2022). Furthermore, families often provide traditional healing methods for their children such as holy water from the Zamzam well in Makkah and placing oils, honey, and black cumin on the body while reading verses from the Quran. If nurses are not familiar with Arabic culture, cultural differences can hinder pain management practices (Alotaibi et al., 2022).

The influence of culture greatly impacts a patient's pain management values and may guide nursing care for the best approach towards pain management (Can et al., 2019). For example, Indonesian and Libyan patients may request no pain medication to be given if death is near. The perception that pain is inevitable, called fatalism, may be prominent in Asian and American Indian Cultures (Can et al., 2019). Buddhism, which is prominent in Asian cultures,

teaches that pain is a natural occurrence that should be confronted while death approaches. People of Chinese background, who are predominantly Buddhist, may request to meet with a spiritual healer or use integrative pain management practices such as massage, herbs, and acupuncture (Can et al., 2019). Buddhist individuals have a high fatalism score, will endure pain for months, and are very hesitant to use pain medications. Arabic and Chinese cultures tend to include the whole family in pain management decision making whereas Western cultures tend to promote individual patient independence (Can et al., 2019).

Thus, it is crucial that nurses recognize the diversity of individuals in how they perceive pain, express pain, and seek to relieve pain based on their culture, religion, and ethnicity (Can et al., 2019). As the U.S. population continues to diversify, ensuring the cultural competence of student nurses is a key factor in improving the effectiveness of pain management practices.

### *Familial Impact on Pain Management Practices*

Primary caregivers play an important role in pain management practices as they have an intimate connection with the patient. Family members play a critical role in pain assessment and evaluation in patients of all ages. In a cross-sectional descriptive design,
Lee et al. (2018) found that in 176 patient-family dyads, hesitancy to use analgesics for cancer pain by a patient's family member was a significant factor in the patients use and adherence to a prescribed analgesic regimen ($p < 0.0001$). Additionally, patients with low to moderate adherence levels reported significantly higher levels of pain ($t=2.68$, $p< 0.05$) (Lee et al., 2018). Furthermore, Fang et al. (2023) examined the impact of family pain vigilance and awareness on adult orthopedic surgical patients ($N=77$), and found that a family's pain vigilance and awareness, and fear-of-pain were often similar to that of the patient, and their levels of pain anxiety and catastrophizing were often higher than the patient's.

**Involving the Child and Parent in Pain Care**

While studies focusing on familial impact of pain management practices in children are limited, current literature indicates that children and families want to be active participants in their pain care (Alotaibi et al., 2018; Shave et al., 2018). In a qualitative study focusing on pain experiences of children and their parents, Kammerer et al. (2022) found three themes: painful experiences significantly impact the family unit and healthcare trajectories; a mismatch between pain management expectations and the perception of how well pain was managed; and barriers to families advocating for better pain management practices for their children. Of the 12 parent-patient dyads, five children had chronic conditions that entailed continuous or intermittent pain (Kammerer et al., 2022). Ages of the children ranged from eight to 17 years, with two of the children having a developmental disability. Painful experiences related to procedures, such as intravenous catheter placement, were eased with instruction on how to cope with the painful experience for both the child and parent. However, children with chronic pain experienced little stress over procedural pain but were more likely to be influenced by the continued presence of chronic pain during their hospital stay and in their everyday life. This was echoed by one parent of a chronically ill child in which the parent lost their job over their child's health issues, placing additional stress on the child and family (Kammerer et al., 2022).

Many participants in the Kammerer et al.'s (2022) study reported being surprised that pain management was not a priority for health care providers, which created a "hurtful mismatch between the expectations and the actual experiences of pain management" (p. 1,776). This mismatch between expectation and perception occurred with participants both new and experienced to the healthcare system. One parent participant, who was also a nurse, felt she was unable to help their child unless she revealed she was a healthcare professional. While some

participants had a positive experience with pain management, those with more negative experiences tended to express their unmet expectations, even when advocating for their child's pain care. This mismatch created anxiety and stress in children and parents, leading to a more negative hospital experience. Participants in the Kammerer et al.'s study had very polarized responses to pain management in the acute care setting, either extremely positive or negative with all families expressing that their child's experience with pain had a significant impact on their lives. The researchers noted that families with positive experiences appreciated healthcare provider education and planned to use learned coping strategies in future painful experiences (Kammerer et al., 2022). Shave et al., (2018) conducted a qualitative study and found that parents whose children underwent intravenous insertion or venipuncture in a pediatric emergency department ($N$=17) expressed the need for information about the procedure and wanted to know how to best help their child during the procedure. Parents wanted to feel empowered to ask informed questions and wanted their child to be involved in their care.

These studies support the WHO's recommendation that pain management should not be treated solely as a biological response, but rather should use a broad, multidisciplinary approach that includes tailored interventions that promote the decision-making abilities of the patient and their family (Fang et al., 2023, WHO, 2022).

**Interdisciplinary Collaboration's Impact on Pain Management**

It is well established that collaboration amongst healthcare team members leads to better patient outcomes. The concept of collaboration is multifaceted and has many definitions depending on the environment and the discipline. Sims et al. (2018) described collaboration in healthcare as "team members communicating and working together in a supportive and respectful atmosphere," (p. 21) while Pajarillo (2018) explained collaboration as an evolving,

changing, and emerging process responding to a critical problem or situation that is healthcare or patient centered. Collaboration can occur within a single discipline, known as intradisciplinary collaboration, or between disciplines, which is referred to as interdisciplinary collaboration (Sims et al., 2018).

Attributes relate to qualities or characteristics of a given concept (Peterson & Bredow, 2018). Common attributes observed in the concept of collaboration include teamwork, sharing, and respect. Teamwork is an essential component to the concept of collaboration. Teamwork requires working with one another with open minds and valuing the contributions of each team member. Sharing relates to "common goals, mutual objectives, distribution of resources and decision making" (Sims et al., 2018, p. 118). Sharing ensures that information is adequately distributed to all parties to produce the best possible outcome. The final attribute of collaboration is respect. Mutual respect for each healthcare team member's role and profession is necessary for successful and impactful for collaboration (Sims et al., 2018). Respect requires all healthcare disciplines to forego hierarchical structures, allowing all members to be equal. For collaboration to occur, all team members must show respect when discussing and developing patient care plans or solutions to health system problems and willingly share knowledge and resources (Sims et al., 2018).

Collaboration, coordination, and communication amongst patient care team members is essential for successful pain management (Huth & Moore, 1998). Physicians and advanced practice clinicians rely on nurses and nursing aides to help monitor and interpret pain. This not only requires nurses to use validated and approved pain assessment tools and to document findings, but to also have in-depth knowledge and skill to decipher changes in a child's behavior (Cousins et al., 2022; Huth & Moore, 1998). Additionally, nurses must collaborate with other

providers when assessing and developing pain management interventions (Huth & Moore, 1998). Research studies have consistently shown that utilizing a Child Life Specialist (CLS) has positive effects on reducing patient and caregiver anxiety, leading to better patient outcomes in a multitude of settings (Ortiz et al., 2019; Pillai, 2020; Wallace et al., 2022). A CLS creates tailored interventions before, during, and after painful experiences, involving the child and the family in the plan of care. The CLS often becomes a trusted member of the child's medical team, leading to increased opportunities to discuss psychological issues that might be influencing or exacerbating their illness. For example, Bottino et al., (2019) found that 95% of CLS participants ($N$=110) discussed psychological issues with their patients such as mental illness, substance abuse at home, parental separation and divorce, housing concerns, food insecurity, abuse, and bullying.

The integration of chaplains into interdisciplinary care teams is associated with increased patient satisfaction and positive health outcomes, elevated employee satisfaction, and employee retention (Liberman et al., 2020; Marin et al., 2015; Sharma et al., 2016). Including CLS and chaplains into the interdisciplinary teams can enhance the teams understanding of a patient or family's reaction to the plan of care. However, the referral to chaplaincy services is strongly influenced by healthcare providers attitudes and prior experiences with religious institutions (Earl et al., 2022). A qualitative study of 38 healthcare professionals of various backgrounds found that information deficits and misconceptions about chaplaincy services hindered referrals; therefore, providing provider education about chaplaincy services may positively impact patient referrals (Earl et al., 2022). Both CLSs and chaplains have the knowledge, skill, and time to explore the patient and family's beliefs, values, and experiences that can affect their response to

treatment, including the management of pain. Thus, incorporating these professionals can positively affect both the patient and the healthcare team.

**Misconceptions and Barriers Impacting Pain Management**

Until the late 1980s, pediatric healthcare professionals believed that newborns did not perceive pain, leading to countless newborns having surgical interventions and invasive procedures without appropriate anesthesia and analgesia (Good, 2020). Research studies have clearly demonstrated that the development of pain receptors begins as early as 20-weeks'gestation, with similar amount of receptive pain fibers as seen in adults (Cohen & Raja, 2020). Most pain related nursing literature focuses on children four years and older, with very few studies conducted on children three years or younger (Dwamena et al., 2020). Those that are conducted on children less than three years of age most commonly focus on procedural pain and are mainly conducted in the emergency or the neonatal intensive care setting. There is a significant gap in nursing literature related to postoperative pain management amongst children ages zero to three (Dwamena et al., 2020). Research studies have indicated that nurses working with this age group struggle with accurately discriminating between pain or fear, leading to decreased use of analgesia when necessary (Namnabati et al., 2012; Yaz & Atay, 2022).

While there has been substantial progress in the recognition of pain in neonates and children, significant barriers to effective pain management remain (Baker, 2017; Goldman & Schafer, 2020). A well-documented barrier includes the dated belief that newborns and young children perceive and experience less pain than adults in similar situations is still prevalent worldwide (Goldman & Schafer, 2020). However, nursing research suggest that the acknowledgment of pain in neonates and young children is trending in the right direction. For example, Dongara et al. (2015) found that approximately 70% ($n$=30) of pediatric cardiac

intensive care unit (PCVICU) and pediatric intensive care unit (PICU) nurses believed that children under two years of age have decreased pain sensitivity and limited memory of painful experiences because of underdeveloped nervous systems *(N*= 43); whereas Smeland et al. (2018) found that of 193 surveyed nurses, 177 (approximately 92%) found that statement to be false.

Although there are gaps in the literature on how to effectively control pain in the neonatal and pediatric population, research has demonstrated safe options, including opioid administration (Committee on Fetus and Newborn, 2016; LaFond et al., 2019). Frequently utilized opioids in the pediatric setting include fentanyl, hydromorphone, methadone, morphine, tramadol, and oxycodone (LaFond et al., 2019). However, research has indicated significant barriers to RN administration of provider ordered narcotics to neonates and children (Smeland et al., 2018). Knowledge deficits surrounding the use of narcotics in neonates and children is frequently cited in nursing literature, with many nurses concerned about the risk of addiction and respiratory depression (Liyew et al., 2020; Peng et al., 2020; Smeland et al., 2018).

A cross-sectional survey study conducted by Liyew et al. (2020) found that of 411 nurses working at an acute care facility, 255 (65.9%), of the respondents answered that narcotics can cause respiratory depression and should not be used in pediatric patients. Regarding opioids causing addiction, Smeland et al. (2018) reported that 68 nurses (approximately 35%) surveyed believed that narcotics cause addiction and should not be used in children (*N*=193). Furthermore, in the observational portion of the study which included 138 nurses caring for 266 children in the postoperative setting, Smeland et al. (2018) found that children who received morphine post-operatively frequently received an ineffective dose. Observed nurses frequently gave the smallest dose of morphine when given a sliding scale by a provider, which resulted in repeated doses of an opioid to relieve the child's pain. Although nurses in this study had adequate knowledge of

pediatric pain management practices and access to pain assessment tools, they did not always use this knowledge and rarely used assessment tools (Smeland et al., 2018). Provider knowledge deficits and negative attitudes towards pain management are the most important factors impacting pain relief of children (Peng et al., 2020; Smeland et al., 2018).

### *Lack of Utilization of Approved Pain Assessment Tools*

To treat pain in all patient populations, one must choose an assessment tool to objectively assess pain. The assessment tool must be applicable to the population of interest and be practical to use. However, a tool is only as good as its user (Manworren, 2020). While research studies have indicated significant barriers in the knowledge and implementation of pain assessment tools in all patient populations, the lack of utilization of approved pain assessment tools in neonates and pediatrics is of great concern (Orovec et al., 2019; Smeland et al., 2018).

In a descriptive, cross-sectional study Smeland et al. (2018), found that of 193 pediatric nurses caring for 266 children, only 19% (51 of 266 children) had a documented pain assessment. This fell to 9% in children less than five years of age (eight of 89 children), and 0% for children with cognitive impairment or delay. Even though nurses reported the use of pain assessment tools and knowledge of these tools, they were not observed using the tools in the patient care setting. A secondary analysis study conducted by Orovec et al. (2019) found that out of 242 neonates a total of 11,191 painful procedures were conducted, with 722 of those procedures being repeat attempts. Of those procedures, 4,801 were tissue breaking and 5,667 were non-tissue breaking. Only 56.6% of neonates that had a tissue breaking procedure had documented pain scores using a validated pain assessment tool ($n$=2,017) and 12.2% of neonates undergoing non-tissue breaking procedures had a documented pain score ($n$=691). Overall, only 36.6% of the procedures had a documented pain score ($n$=4,095).

Dwamena et al. (2020) found similar results in a descriptive phenomenological study of nine RNs. While the nurse participants frequently looked to the behavior of a child when determining pain, they did not report the use of approved pain assessment tools despite the availability of these tools (Dwamena et al., 2020). Furthermore, LaFond et al., (2019) noted scale confusion, with a sedation scale being utilized by some nurses to assess pain. This indicated the need for additional education regarding the difference between pain assessment scales and sedation scales. While some electronic health record (EHR) systems can force nurses to complete a pain assessment to scan a patient's pain medication, other systems do not.

**Hospitalized Neonates and Children**

Neonates in the acute care setting often have complex health conditions that require close monitoring by healthcare professionals (Peng et al., 2020). Neonates in the NICU are frequently exposed to painful interventions or experience pain as the result of disease progression (Peng et al., 2020). Research has shown that in the first two weeks of life, hospitalized neonates received up to 115 painful procedures including: heel lancing, intravenous-arterial puncture and injections, surgical interventions, wound care, endotracheal/nasogastric/orogastric tube insertion, and endotracheal suctioning (Mala et al., 2022). Additionally, the NICU can be overstimulating to the neonate. Temperature irregularity, constant handling, bright and continuous lights, alarms, and other disruptive noises can also lead to discomfort and pain (Mala et al., 2022; Orovec et al, 2019).

It is a common misconception that neonates solely receive care in the NICU. Neonates are also cared for on pediatric in-patient units. Unlike neonatal nurses who solely care for newborns needing acute care services, pediatric nurses care for newborns to 18-years-old and sometimes older depending on hospital policy (SPN, 2021). The pediatric patient population is

diverse in acuity, diagnosis, complexity, age, developmental and cognitive levels (LaFond et al., 2019). This requires pediatric nurses to have vast knowledge in child development and understand how a child's developmental stage impacts a pain response (Huth & Moore, 1998; LaFond et al., 2019). Managing pain in the pediatric intensive care unit (PICU) tends to be challenging, since critically ill children typically endure more painful procedures and experience more intense pain than children on medical-surgical units. In addition to the use of opioids, children in the PICU receive sedative medications for mechanical ventilation or procedural sedation (LaFond et al., 2019). Commonly used sedative medications in the PICU include clonazepam, clonidine, dexmedetomidine, diazepam, lorazepam, midazolam, pentobarbital, and propofol (LaFond et al., 2019).

### *Nonpharmacological Pain Management Interventions in Neonates and Children*

Nurses spend more time with their patients than any healthcare professional, creating a unique bond with their patients. This bond of genuine caring is the essence of the nursing profession (Watson, 1997). Through the act of caring, nurses seek to provide comfort, relieve pain, and provide an optimal environment for healing. The use of complementary and alternative therapies as nonpharmacological pain management remains controversial (Surya et al., 2020). However, research has shown that nonpharmacological pain management practices are effective, low-cost, and low-risk (Surya et al., 2020). Nonpharmacological interventions can alleviate pain by releasing natural endorphins within the body without the use of analgesics and increase the effectiveness of pharmacological interventions when used together (Yaz & Atay, 2022).

Many nonpharmacological therapies can be initiated by the nurse as a nursing intervention (Huth & Moore, 1998). In neonates, nurses can swaddle or re-position, reduce environmental stimuli, pick up the neonate, offer breast milk, give sucrose, offer therapeutic

sucking, encourage parental kangaroo-care, or provide music/white noise (Arslan & Ekici, 2020; Popowicz et al., 2022; Suleman et al., 2022). These interventions have been shown to reduce crying, pain, and regulate oxygen saturation in neonates. In older children and teenagers, applying hot/cold compresses, therapeutic touch, massage, acupuncture, distraction, and aromatherapy have been found to be effective (Arslan & Ekici, 2020; Popowicz et al., 2022; Suleman et al., 2022).

In a quasi-experimental study, Surya et al. (2020) found that using lavender and rose essential oil postoperatively in combination with deep breathing exercises decreased pain. Similarly, Bikmoradi et al. (2017) found significant differences with lavender inhalation aromatherapy in preschool children undergoing intravenous catheter placement ($n$=30) compared to a control group ($n$=30). The mean of pain severity as rated by the Oucher scale between the aromatherapy and control groups demonstrated a significant difference after the inhaling the lavender essence ($p$=0.001). A randomized control trial study of 73 participants found that children ages six to 12 who received an art-based distraction intervention during venipuncture procedures experienced considerably lower mean values of pain and anxiety as rated by the patient, their parents, and the observer nurse compared to the control group ($n$=71; Suleman et al., 2022).

**Characteristics of RNs with Higher Knowledge of Pain Management Practices**

Research has shown that nurses working in higher acuity settings, such as intensive care units, have greater knowledge of pain management practices compared to nurses caring for lower acuity patients, such as medical-surgical nurses (Dongara et al., 2015; Ekim & Ferda- Ocakci, 2013; Popowicz et al., 2022; Smeland et al. 2018). It has been noted that RNs who are involved in strategies that incorporate evidence-based practice (EBP), such as nurses who participate in

professional nursing organizations, hold advanced degrees, hold specialty certifications, or are a part of nursing committees scored higher than their counterparts on pain knowledge and attitude surveys than those who did not participate (Brant et al., 2017; Ekim & Ferda-Ocakci, 2013; Popowicz et al., 2022; Smeland et al., 2018). Therefore, education is an effective strategy in the promotion of EBP into clinical practice (Alatawi et al., 2019; Caradoso et al., 2021).

### *Pain Curriculum in Nursing Education*

The AACN's *Essentials,* is the guiding framework for nursing education that provides direction for the development and revision of nursing curricula (AACN, 2021). Along with the spheres of care, the document contains domains, competencies, and subcompetencies for entry-level professional nursing education. The domains, competencies, and related concepts presented in the *Essentials* are intended to produce consistency amongst all nursing graduates (AACN, 2021). These elements are not to be present in every course but should be integrated throughout the program. The elements are vague enough to be applied to any nursing course. Concepts such as diversity, equity, inclusion, communication, safety, best practice, and technology are prominent throughout the document. However, the concept of pain is not mentioned in the document.

There is a significant absence of pain management guidelines at a national and international level in medical and nursing programs (Department of Health and Human Services, 2019). Because pain is not specifically addressed by the AACN *Essentials* (2021), nursing programs integrate the crucial concept of pain as educators see fit. The Department of Health and Human Services (2019) states, "More effective education and training about acute and chronic pain should occur at all levels of clinician training, including undergraduate educational curricula, graduate professional training, and continuing professional education…" (p. 2).

### *The Decline of Pediatric Curricular Content*

There is a significant lack of research regarding best practices in teaching pediatric nursing content (Betz, 2021). Nurse educators frequently disagree on the placement and necessity of pediatric nursing content in undergraduate curricula. While neonatal and pediatric curricular content vary by institution, pediatric health content taught in undergraduate nursing programs has been in a steady decline for years, with the prospects of this trend continuing (Betz, 2021). Pediatric content in nursing programs is substantially less than adult content in nursing programs, creating the perception that pediatric care is less important than adult care (Betz, 2021; SPN, 2021). Along with less exposure to pediatric health content in the classroom setting, didactic content frequently does not align with contemporary pediatric nursing care (Mott et al., 2018; SPN, 2021). Some schools have integrated didactic pediatric nursing content with women's health content, further consolidating classroom time dedicated to these unique patient populations (SPN, 2021). Furthermore, many programs are moving to concept driven curricula in which pediatric content may be neglected or removed completely as these programs emphasize training nurse generalists (SPN, 2021).

## The Decline of Pediatric Clinical Exposure

A problem statement issued by The Society of Pediatric Nursing highlights this concern by stating that the reduction of pediatric didactic content and clinical hours in undergraduate nursing education poses a serious threat to the preparation of future clinicians and to the children in their care (SPN, 2021). For example, the state of Ohio recently passed *Curriculum for Registered Nurse Education Programs* (Rule 4723-5-13) which reads:

> "The curriculum shall include clinical experiences in providing care to patients across the lifespan. The only periods of life span excepted are those related to the obstetrical patient,

> the immediate newborn, and pediatrics. Programs utilizing high fidelity simulation or mid or moderate fidelity simulation obstetrical, immediate newborn, or pediatric simulation laboratory experiences may use those experiences instead of providing clinical experience in those periods of life span" (Ohio Laws and Administrative Rules, 2022, p. 2).

Policies such as this reiterate that pediatric nursing care is less important than adult care and does not provide student nurses with the knowledge nor skill to care for children safely and competently (SPN, 2021). The majority of mistakes resulting in patient harm are from a breakdown in communication; therefore, without exposure to real children and families, undergraduate students are unable to practice developmentally appropriate communication skills. This in turn may impact patient safety and creates a fearful mindset when working with children (Reid-Searl et al., 2021; SPN, 2021).

The lack of clinical exposure to children is particularly concerning for Generation Z (i.e., Gen Z/ the silent generation) student nurses born between 1995 and the early 2010s. Gen Z currently makes up the majority of nursing students and nurses entering the workforce (Schmidt & Lancaster, 2019). These true digital natives experience underdevelopment of social and communication skills; consequently, these students appreciate hands-on, interpersonal, and active learning opportunities in the didactic and the clinical setting. The unique attributes of Gen Z student nurses combined with the challenges posed by the COVID-19 pandemic created the perfect storm when creating targeted educational strategies (Schmidt & Lancaster, 2019). With limited opportunities in the direct nursing care of neonates and children, new graduates of all generations enter the workforce with suboptimal knowledge and skill in pain management practices (SPN, 2021).

### *Lack of Clinical Sites for Undergraduate Nursing Students*

While policies such as Ohio's *Curriculum for Registered Nurse Education Programs* is gravely concerning, many nursing program administrators struggle with finding pediatric clinical placement and are forced to think creatively when it comes to pediatric experiences (Reid-Searl et al., 2021; SPN, 2021). For example, Reid-Searl et al. (2021) created a mock pediatric ward experience where student nurses could practice therapeutic communication skills through medical play with children of university staff. While educational interventions such as these are helpful in preparing student nurses to enter the clinical environment, they should not replace clinical exposure, but rather augment the learning experience (SPN, 2021).

The lack of pediatric clinical sites for student nurses in the U.S. is both alarming and increasing. In a retrospective study of 4,720 U.S. hospitals, Cushing et al. (2021) found that the availability of pediatric inpatient units decreased by 19.1% from 2008 to 2018. There was a significant decline in rural pediatric units, with 18.2 million (24.7%) children experiencing an increase in distance to the nearest pediatric inpatient unit. Children in rural areas, who are already considered vulnerable due to lack of access to pediatric services, experienced the most significant loss to inpatient access (Cushing et al., 2021). While this might allow for more expert care for children with multiple chronic conditions or for children with rare disorders, many children and families in rural areas struggle with finding specialized care. The consolidation of smaller centers into larger health systems in major metropolitan cities, a process called regionalization, has decreased the availability of potential clinical sites for student nurses in suburban and rural communities (Cushing et al., 2021). The SPN (2021) stated that regionalization has negativity impacted opportunities for student nurses to care for ill children and has created competition for clinical access in areas with multiple nursing programs.

### *New Graduate Nurses Looking to RNs for Guidance on Pain Management Practices*

Previous research has indicated that newly graduated nurses have poor knowledge of neonatal and pediatric pain management practices (Amponsah et al., 2020; Gadallah et al., 2017; Ortiz et al., 2015). In a comparative cross-sections study of 554 participants, Amponsah et al. (2020) found that final year student nurses at a four-year program in Ghana had good knowledge and attitudes centered around the nature of pain, individualized treatment, pain assessment, pharmacodynamics, and benefits of preemptive analgesia. However, knowledge and attitudes surrounding the perception of pain, non-opioid/opioid drug administration, physiology of pain, and nonpharmacological interventions were very low (Amponsah et al., 2020). These results reflect previous studies conducted with nursing students in Mexico (Ortiz et al., 2015) and Egypt (Gadallah et al., 2017).

The decline of pediatric classroom and clinical experiences creates limited opportunities to practice developmentally appropriate communication techniques and pain management skills in the real-world setting (SPN, 2021). With dwindling clinical hours dedicated to hands-on care of neonates and children across the nation, new graduates enter the work force unprepared with the knowledge and skill to assess, manage, and evaluate pain (Liu et al., 2020). New graduates thus then look to more experienced nursing staff for guidance on pain management practices. However, this is particularly concerning as research has consistently shown poor pain management knowledge and practices among registered nursing staff across all patient populations (WHO, 2022). With nursing students and new graduates relying on experienced nursing staff and nurse leaders for guidance on pain management practices, it is crucial that evidence-based practice (EBP) is implemented in clinical context (WHO, 2022).

### *The Role of Evidenced-Based Practice in Nursing Academia*

EBP integrates well-designed research, patient preferences, patient assessments, and expert knowledge to solve healthcare related problems (Banakar et al., 2019). EBP establishes nursing as a discipline, guides decision-making processes, ensures that nursing care is current and relevant, and increases confidence in nursing care. Implementing EBP increases patient safety, leads to better patient outcomes, and lowers healthcare costs (Banakar et al., 2019). A key factor in nursing staff implementing EBP is the organizational culture of a healthcare facility. Organizational culture is the implicit knowledge, values, and beliefs within an organization that reflects the traditions and customs of an organization (Banakar et al., 2019). However, the use of EBP remains below desired levels in both the clinical and academic environments (Duncombe, 2018).

While the benefits of and need for EBP is well-established in the patient-care setting, evidence-based teaching practices and evidence-based curriculum content is often resistant to change in the academic setting (Arslan-Yurumezoglu & Gokce, 2020). Researchers have shown that education is an effective strategy in the promotion of EBP into clinical practice (Alatawi et al., 2019; Caradoso et al., 2021). Thus, academic institutions play a crucial role in educating student nurses to incorporate EBP into their future clinical practice (Cardoso et al., 2021). It is essential that schools of nursing review nursing curricula and ensure that evidenced-based pain management content is embedded throughout the program across all age groups in a variety of settings, including pediatrics (Caradoso et al., 2021; SPN, 2021).

### *Impact of the Decline in Pediatric Classroom and Clinical Exposure*

Researchers speculate that the decline in classroom and clinical content has impacted how many new graduate nurses are entering the pediatric nursing practice (Betz, 2021). Every

two years, the National Council of State Boards of Nursing (NCSBN) and the National Forum of State Nursing Workforce Centers conduct the only nationwide survey on the US nursing workforce (Smiley et al., 2022). The 2020 national, randomized sample survey consisted of 42,021 RNs (of 157,459 total RNs) and 39,765 Licensed Vocational Nurses (LPNs; of 172,045 total LPNs). In 2013, 6% of the nursing workforce in the U.S. were employed as pediatric nurses; in 2017 that percentage was reported as 4.7%, and 4.2% as of 2020 (Smiley et al., 2022). As the number of children with chronic conditions continues to rise in the U.S., the lack of new graduate nurses entering pediatrics is very concerning (SPN, 2021). With one-third of the nursing workforce reaching retirement age within the next 10-15 years and the decline of new graduates choosing pediatrics, access to pediatric services will become more limited and challenging (Haddad et al., 2023; SPN, 2021). These facts, combined with the decrease in overall pediatric in-patient units will have a direct impact on the health and well-being of our nation (Cushing et al.,2021; SPN, 2021).

### *The Role of Elective Nursing Courses in Undergraduate Curriculum*

Undergraduate elective courses serve a multitude of purposes within nursing curricula. These courses allow students to individualize and prioritize their learning and career goals (Smith, 2021). Elective courses expose students to specialty nursing practice areas, supply students with additional knowledge and skills in an area of interest, enhance career readiness, provide opportunities for certification, and increase student satisfaction (Maneval et al., 2021). However, elective courses vary by institution and are often tailored by community partnerships (Smith, 2021). Courses may be taught in person, online, or a combination of both. Electives may be didactic, didactic with observation, or didactic with a clinical component (Maneval et al., 2021).

Didactic courses offer in-depth knowledge in caring for specific patient populations or pertinent health topics. Didactic nursing courses are offered on a variety of topics, often reflecting an instructor's specialty or passion, such as emergency care, neonatal intensive care, opioid crisis, oncology, perioperative nursing, disaster management, environmental health, or end-of-life care (Maneval et al., 2021). The addition of observation or clinical hours enhance the elective experience, often exposing students to future employers (Maneval et al., 2021). In the current study, three elective courses containing neonatal and pediatric pain management practices were of interest: Strategies for End-of-Life Care, Pain Management, and the Pediatric Intensive Care Certification Course.

## Summary

Pain management knowledge and skill amongst nursing students is subpar (Cousins et al., 2022). Research has shown that student nurses have sufficient knowledge about pain and pain medications; however, student nurses report a knowledge deficit related in the application of pain management practices to case studies and real-life situations (Cousins et al., 2022). Thus, nursing students and new graduate nurses look to senior nursing staff for guidance on pain management practices when in the clinical setting. This is worrisome, as research has continually shown that pain management practices amongst registered nurses is suboptimal (WHO, 2022). With the steady decline of pediatric classroom and clinical experiences, student nurses have limited opportunities to practice developmentally appropriate communication techniques and pain management skills in the real-world setting (SPN, 2021).When students are not provided with hands-on experiences to care for neonates and children, new graduate nurses enter the work force unprepared with the knowledge and skill to assess, manage, and evaluate pain (Liu et al., 2020). While academia is often resistant to change, using Huth and Moore's (1998) prescriptive theory

of acute pain management in infants and children can expose the need for best practices in the academic environment. Evaluating undergraduate baccalaureate nursing student knowledge and attitudes towards neonatal and pediatric pain management practices before and after elective nursing courses can guide future educational initiatives and curricular revision.

# CHAPTER THREE: METHODS

## Overview

This study used the Pediatric Healthcare Providers Knowledge and Attitudes Survey Regarding Pain (PHPKAS) in a quasi-experimental one group pretest-posttest design on undergraduate baccalaureate nursing students in three elective nursing courses: Strategies for End-of-Life Care, Comprehensive Pain Management, and Advanced Strategies for the Critically Ill Maternal-Child Populations Certificate. Using a paired samples *t*-test for data analysis, the researcher measured the difference in knowledge and attitudes of undergraduate baccalaureate nursing students before and after elective nursing courses. This chapter orients the reader to the rationale for the design, the population and setting of interest, sampling methods, instrumentation, and statistical analysis.

## Design

This study used a quasi-experimental one group pretest-posttest research design in which the same dependent variable was measured in one group of participants before (pretest) and after (posttest) three separate elective courses, with a *p*-value of .05 being used to determine statistical significance (Appendix B). Quasi-experimental designs seek to establish a cause-and-effect relationship between an independent and dependent variable; unlike a true experiment, a quasi-experimental design does not rely on random assignment (Gall et al., 2007; Reichardt, 2019). The nature of elective courses does not allow for random assignment as students choose their elective course based on interest, availability, and acceptance into the course. An advantage of utilizing a pretest and posttest study design is that it allows for directionality of the research, meaning that testing a dependent variable (i.e., undergraduate baccalaureate nursing student knowledge and attitude towards neonatal and pediatric pain management practices) before and

after an educational intervention with an independent variable (i.e., elective nursing course) can indicate associations. Though outcome causality cannot be determined since it is not a true experiment, associations between interventions and outcomes can be made (Siedlecki, 2020).

A disadvantage to using a quasi-experimental design is that because student participants are not randomly assigned, threats to internal validity are higher than with experimental designs (Gall et al., 2007; Siedlecki, 2020). Threats to internal validity to this deign include history, maturation, regression toward the mean, and spontaneous remission/chance (Appendix C; Siedlecki, 2020). History includes any event that happens between the first and second measure that can impact the dependent variable. Maturation involves changes to the dependent variable related to normal learning that occurs over time or aging of the participants. Regression towards the mean occurs when participants are selected because of their extreme dependent variable scores. Lastly, a condition of interest that changes or improves spontaneously is referred to as spontaneous remission/chance (Siedlecki, 2020). There are a variety of ways to minimize these threats by anticipation and thorough planning. While history and maturation are expected in student participants involved in elective nursing courses, ensuring that instrumentation is reliable can help with regression towards the mean (Siedlecki, 2020). Using a paired samples *t*-test can help minimalize spontaneous remission/chance (Reichardt, 2019).

## Research Question

**RQ1:** To what extent do undergraduate baccalaureate nursing student neonatal and pediatric pain management knowledge and attitudes differ before and after three elective nursing courses already containing pain management education?

## Hypotheses

**$H_0$1:** There is no difference in undergraduate baccalaureate nursing student neonatal and pediatric pain management knowledge and attitudes before and after three elective nursing courses already containing pain management education.

**$H_A$1:** There is a difference in undergraduate baccalaureate nursing student neonatal and pediatric pain management knowledge and attitudes before and after three elective nursing courses already containing pain management education.

## Participants and Setting

A convenience sample of undergraduate baccalaureate nursing students was taken at a private, Christian-based university in the southeastern U.S. In convenience sampling, the researcher selects participants that are more easily accessible. Therefore, the opportunity for all qualified individuals to participate is not the same and study results are not necessarily generalizable to the population of interest (Zhi, 2014). Sample size for this study was conducted via G*Power 3, a statistics calculator that reveals the appropriate number of participants needed for the study. Sample size was calculated using a 95% confidence level ($a$ = .05), a medium effect size, and a statistical power of 0.7. The G*Power 3 revealed a minimum sample size of 21 using these values (Faul et el., 2007; Appendix D). The effect size is an estimate of the magnitude in which the phenomenon is present in the population being studied or to which the null hypothesis is false (Gall et al., 2007). A medium effect size was chosen by the researcher due to the extent to which neonatal and pediatric pain management education is present in each elective nursing course was unknown. A one-tailed test was chosen over a two-tailed test because it was not anticipated that student participants will lose knowledge; however, this is a topic of disagreement upon researchers. Some researchers suggest consistently using two-tailed

hypothesis testing because it is considered more compatible with social science testing (Gall et al., 2007).

Student participants were enrolled within the school of nursing and were in their Junior or Senior year of a four-year baccalaureate program. Student participants chose their own elective course based on interest, availability, and acceptance; therefore, group formation was naturally occurring as classes were already formed. Student participants who were in enrolled in the elective nursing courses completed both the pediatric nursing course and the obstetrics nursing course that is required to graduate. The setting included three undergraduate baccalaureate elective nursing courses: Strategies for End-of-Life Care (10 potential participants), Comprehensive Pain Management (19 potential participants), and Advanced Strategies for the Critically Ill Maternal-Child Populations Certificate (12 potential participants). The extent to which neonatal and pediatric pain management practices were covered in each elective nursing course was unknown to the researcher.

**Strategies for End-Of-Life Care Elective Course**

Undergraduate nursing students experience an array of emotions providing end-of-life care. Nursing students and new graduate nurses often feel ill prepared delivering end-of-life care and are challenged with navigating their own feelings while caring for patients and their families (Shorey & Chua, 2022). Research indicates that students are often riddled with feelings of fear, anxiety, helplessness, and inadequacy when caring for the dying. These turbulent feelings are magnified when caring for a sick and dying child (Berndtsson et al.,2019). Providing end-of-life care and experiencing the death of infants, children, and teenagers remains one of the most challenging and traumatic events for both nursing students and registered nurses (RNs). Nursing education concerning end-of-life care varies by institution in both content and length (Berndtsson

et al., 2019). Research has consistently shown that nursing students who participate in palliative care or end-of-life courses have more positive attitudes towards working with the dying and their families (Berndtsson et al., 2019; Shorey & Chua, 2022). A crucial component of working with a dying child is alleviating pain and providing comfort, highlighting the Hospice/Palliative Care Sphere of Care in the *Essentials*. Strategies for the End-Of-Life Care elective course at the Christian-based university in the southeast was established in the mid-2000s as a three credit-hour course. The course is offered residentially during both the spring and fall semesters, with 10-30 students enrolled each semester. This course is designed both nursing and non-nursing students.

**Comprehensive Pain Management Elective Course**

The Comprehensive Pain Management elective course was created in the late 2000s in response to the Joint Commissions statement on addressing pain assessment as a quality measure. At the time of the study, the school of nursing had asked instructors to create new electives for undergraduate nurses. While this course has changed over the past 20 years, the course continues to emphasize the assessment, evaluation, and treatment of acute and chronic pain in all patient populations. Additional topics include substance abuse, leadership principles, ethical and legal considerations, acknowledging biases and attitudes towards patients in pain, and the role of the nurse in the development of a therapeutic culture for pain management. This elective is offered in the spring and fall semesters to Junior and Senior level nursing students, and ranges from five to 80 students per semester. It is a three-credit hour course that meets one day a week for 16 weeks and does not include a clinical component. There is a lack of educational research on undergraduate nursing electives focusing exclusively on pain management practices. However, researchers have found that elective interdisciplinary courses

focusing on pain management practices and opioid crisis management to be beneficial to student knowledge and attitude towards pain management practices (Watt-Watson, 2019; Whelpley & Feurer, 2019).

**Advanced Strategies for the Critically Ill Maternal-Child Populations Certificate Course**

In the late 2000s, community stakeholders surrounding a private Christian-based university in the Southeast began to express the need for new graduate nurses to have more knowledge and preparation for the caring of critically ill patients. In response to this need, an adult-based critical care elective certificate course was created. Hospital administrators around the area praised the program and by 2012, the first pilot course dedicated to the care of critically ill maternal-child populations was employed. This three-credit hour elective course is highly competitive as students must apply to gain entry. The course is offered in the spring and fall semesters, with approximately 40 students applying to the course each semester and only 12-14 students being accepted. Students must complete an official application to be considered. The process has objective and subjective components, with students being assigned points based on several markers, including: grade point average (GPA), grades achieved in lower-level pediatrics and obstetrics courses, and an essay regarding their interest in the course. Students must also turn in a pathophysiology-flow (i.e., a diagraming strategy used for critical thinking) from any previous course, which is graded based on content, critical thinking, and creativity. Students then participate in a group interview and surveys are sent to faculty members for feedback on student performance in the classroom setting.

Once accepted into the course, students are required to become S.T.A.B.L.E (i.e., sugar, temperature, airway, blood pressure, lab work, and emotional support) and Pediatric Advanced Life Support (PALs) certified. Students are also expected to review Neonatal Resuscitation

Program (NRP) content but are not required to test for the certification. Students are required to complete an additional 48 laboratory/clinical hours in the course, above what is required for graduation in an intensive care setting. There are 24 hours dedicated to simulation laboratory training and 24 hours dedicated to a clinical component in which students go to the neonatal intensive care unit (NICU), pediatric intensive care unit (PICU), and various critical care obstetric units.

## Instrumentation

This study used two instruments, the Pediatric Healthcare Providers Knowledge and Attitude Regarding Pain (PHPKAS; Manworren & Laprise, 2021), and a self-developed demographic data questionnaire. The PHPKAS is free to use in clinical practice, education, and research (Appendix F). This PHPKAS, and its previous version the Pediatric Nurses Knowledge and Attitudes Survey Regarding Pain (PNKAS), is frequently used to gauge neonatal and pediatric pain management knowledge and attuites of healthcare providers to determine baseline knowledge and/or to determine the effectiveness of an educational intervention. The survey instrument takes approximately 20 minutes to complete (Manworren & Laprise, 2021).

### Demographic Survey

Demographics may describe the sample and to make sense of the findings (Gall et al., 2007). The researcher created a group demographic questionnaire for this study. Group demographics were collected on the following: generational cohort, gender, level of student (junior or senior), frequency of providing direct-care to neonates in pain (under one month of age), frequency of providing direct-care to infants in pain (one month to one year old), frequency of providing direct-care of young children in pain (one year to four years old), frequency of providing direct-care of children in pain (five to 12 years old), frequency of taking care of

adolescents in pain (13 to 17 years old), frequency of simulation experiences involving the care of neonates in pain, frequency of simulation experiences involving the care of infants in pain, frequency of simulation experiences involving the care of young children in pain, frequency of simulation experiences involving the care of children in pain, frequency of simulation experiences involving the care of adolescents in pain, history of taking care of a friend or family member in acute or chronic pain, and desired nursing specialty. Please refer to Appendix E for this demographic questionnaire.

**Pediatric Healthcare Providers Knowledge and Attitude Regarding Pain (PHPKAS)**

The instrument used in this study was the Pediatric Healthcare Providers Knowledge and Attitude Regarding Pain (PHPKAS; Manworren & Laprise, 2021). The purpose of the instrument is to measure healthcare provider knowledge and attitudes towards pediatric pain management practices. This survey is a revision of the Pediatric Nurses Knowledge and Attitudes Survey Regarding Pain (PNKAS-1999) and PNKAS-Shriner's (2002) version (does not include pediatric cancer care items), both of which have been heavily cited within nursing literature (Manworren & Laprise, 2021). Publications using the PNKAS have been cited by authors from 42 countries on six continents in various settings including developed and non-developed countries, within various pediatric acute care-based units (e.g., medical/surgical, intensive care, hematology/oncology, post-operative care, emergency care, etc.), and on undergraduate nursing students in Mexico (Ortiz et al., 2015), Ghana (Amponsah et al., 2019), and Egypt (Gadallah et al., 2017). The supporting references for these surveys are dated, and clinical guidance on pain management in infants and children has changed since the 1990s/2000s; therefore, the original creator modified the survey in 2019 (Manworren & Laprise, 2021).

The modifications incorporated in the PHPKAS incorporated the addition of interdisciplinary team member roles, the inclusion of current pain management evidence, gender bias elimination, and item clarity improvement (Manworren & Laprise, 2021). The original PNKAS survey had 42 items. Based on previous survey performance, expert relevance ratings, and expert comments, 21 items were retained for the PHPKAS without changes, seven items were changed to reflect current pediatric pain management evidence, three items were deleted, and two items were added (Manworren & Laprise, 2021). Changes were made to the remaining 11 PNKAS survey items to reflect interdisciplinary team member roles, improve item clarity, and eliminate gender bias. A total of 41 items remain on the PHPKAS after the changes were made. The score ranges from zero to 41, with high scores indicating high levels of mastery (Manworren & Laprise, 2021). Healthcare providers in clinical roles that do not involve medication prescribing, dispensing, or administering (i.e., child life specialists, social workers) complete 27 of the 41 items (Manworren & Laprise, 2021). The instrument uses true or false questions, multiple choice questions, and two case studies for the last four questions. The case studies require the participant to rate the patient's pain from zero (no pain) to 10 (worst pain) and ask participants to treat the patient's pain (Manworren & Laprise, 2021).

### *Validity and Reliability of the Instrument*

To establish content validity, 12 international pediatric pain management experts evaluated the items (Manworren & Laprise, 2021). An acceptable level of internal consistency was noted with a Cronbach's alpha of 0.80, which was found in first-time responses of 302 pediatric health care providers and students. Construct validity was established by comparing scores before and after participation in an education program ($N = 14$), and by comparing scores from 94 pediatric nurses and 126 nursing students ($p < 0.0005$; Manworren & Laprise, 2021).

Test-retest reliability, the way a test produces similar results over time, was established ($r$ = 0.89) by repeat testing of 41 healthcare professionals at two intervals (20 to 30 days apart) prior to an interdisciplinary pain management education course (Gall et al., 2007; Manworren & Laprise, 2021). Gall et al. (2007) stated that a reliability coefficient of .80 or higher is sufficient for research purposes. Given this information, the PHPKAS is a valid and reliable instrument that measures healthcare provider knowledge and attitudes towards neonatal and pediatric pain management practices. According to Manworren and Laprise the instrument does not contain sub-scales, dimensions, or constructs and can be used to gather data at a single point of time, or longitudinally across time. The PHPKAS was uploaded to Qualtrics, an approved online surveying platform, to organize data and ensure student participant anonymity.

## Procedures

Before starting the proposal process, approval was obtained by the Dean of the School of Nursing (Appendix G). After initial approval from the Dean, lead instructors from the three elective courses of interest were contacted via email with an introduction letter (Appendix H). After initial email correspondence, the researcher met with each of the lead instructors in person and received verbal permission to implement the study in each elective course. The dissertation proposal was submitted to the dissertation chair, and following appropriate revisions, the proposal was submitted to the committee for review. Following the proposal defense, the Institutional Review Board (IRB) granted approval before the implementation of the study (Appendix I). The purpose of the study, the study recruitment letter (Appendix J), collection dates, and the link to the survey via Qualtrics was addressed with the course leads prior to sending out the survey. The researcher sent out the recruitment letter to all eligible participants towards the beginning of the fall 2023 semester. The course leads announced the survey was

active during the elective nursing courses. Interested participants clicked on the attached link that sent participants to Qualtrics where the recruitment letter was located (Appendix J). Because this was a pretest/posttest study, participants chose a four-digit code to link the two surveys.

### *Pretest Procedures for Data Collection*

The initial data set was collected and recorded via Qualtrics towards the beginning of the semester. Student participants who completed the first survey were entered to win a $10 gift card to a local grocer via an external survey that was not linked to the research survey. Three students from each elective nursing course who participated in the gift card entry were chosen at random to receive the gift card. Twenty-eight student participants completed the first survey. Data were extracted from Qualtrics and exported into Excel, where the data were prepared and scored. The survey consisted of 41 items and the unit of analysis was the participants individual response. Item responses were treated as dichotomous variables (correct versus not-correct), and a sum score for the total number of correct responses was created with the formula: (obtained scores/41)*100. Categorical variables (demographic data) were exported from Qualtrics to Excel where they were scored. Data are listed in table format in Chapter 4. To prevent incomplete data sets, Qualtrics was set so that all survey items had to be completed before submission.

### *Posttest Procedures for Data Collection*

Towards the end of the semester, student participants completed the final survey. The second and final data set was extracted from Qualtrics and exported into Excel where it was prepared and scored as the initial data set. Participants who did not complete both the pretest and posttest survey were removed from the data set. Twenty-one student participants completed both surveys. Outliers, those with extreme scores, were set to be removed from the data set per the survey recommendations of Manworren & Laprise (2021). All participants who completed the

first and second survey received a 10$ gift card, with one student receiving a $50 gift card. Student participants provided an email address in an external survey to receive their gift card, which was optional. Participants' pretest/posttest survey results were compared using a paired samples t-test using SPSS 20 with the alpha set at $p$=.05 and effect size to be reported with Cohen's D. Data are displayed in a table format in Chapter 4.

## Data Analysis

Following data collection, the researcher analyzed the research question: To what extent do undergraduate baccalaureate nursing student neonatal and pediatric pain management knowledge and attitudes differ before and after three elective nursing courses already containing pain management education? The researcher sought to understand the impact of elective nursing courses on student participant knowledge and attitudes towards neonatal and pediatric pain management practices. In this study, the researcher used IBM-SPSS 20 for statistical analysis. Using a paired samples *t*-test, the student participant (unit of analysis) was measured twice (towards the beginning of the elective nursing course and towards the end of the elective nursing course) using the formula (obtained scores/41)*100, resulting in matched pairs of observation. A paired samples *t*-test compares the means of two variables (pretest and posttest scores) for a single group (student participant). The paired samples *t*-test computes the differences between values of the pretest and posttest for each case and tests whether the average differs from 0. The procedure also automates the *t*-test effect size computation, which is reported with Cohen's D and Hedges' correlation (Gall et al., 2007).

### Research Question Analysis

A paired samples *t*-test was conducted with IBM-SPSS 20 to address the research question and hypotheses. The paired samples *t*-test allows for the comparison of two means and

is considered appropriate when analyzing matched pairs on the same subject (Gall et al., 2007). Thus, a paired samples *t*-test was an appropriate selection for this study. The null hypothesis for this study states: There is no difference in undergraduate baccalaureate nursing student neonatal and pediatric pain management knowledge and attitudes before and after three elective nursing courses already containing pain management education. If elective nursing courses do not have an effect on nursing student knowledge and attitudes towards neonatal and pediatric pain management practices, the average difference between the measurements is equal to zero and the null hypothesis holds (Gall et al., 2007). If the elective nursing courses did have an effect, the average difference is not zero, the null hypothesis is rejected and the alternative hypothesis is accepted. For this study, a *p*-value of 0.5 (one-tailed) was used to determine statistical significance. Therefore, it can be concluded that if the mean of the differences does not differ from zero to a statistically significant extent (if the *p*-value is equal to or greater than .05) the researcher fails to reject the null hypothesis. In contrast, if the *p*-value is less than .05, statistical significance is found, and the null hypothesis is rejected (Gall et al., 2007).

**Underlying Assumptions of the Paired Samples *t*-test**

Gall et al. (2007) states that strategically using the paired samples t-test can increase the test's statistical power without the expense of increasing the sample size. Underlying assumptions of the paired samples *t*-test include:

1. The dependent variable must be continuous (interval or ratio).
2. The independent variable is dichotomous, and its groups are paired or matched.
3. There should be no significant outliers.
4. The dependent variable is normally distributed in the two conditions (Gall et al., 2007; Reichardt, 2019).

### Testing Underlying Assumptions of the Dependent t-test

The first assumption states that the dependent variable must be continuous. The dependent variable in this study, undergraduate baccalaureate nursing student knowledge and attitude towards neonatal and pediatric pain management practices, was measured by the PHPKAS. The PHPKAS is scored as a continuous, interval variable, meeting the first assumption. The second assumption states that the independent variable should consist of two categorical matched-pairs. This assumption was met by the pretest and posttest, in which the same student participants were measured on two occasions on the same dependent variable. The third assumption is that there should be no significant outliers, data points within the data set that do not follow the usual pattern creating asymmetry of scores. This assumption was met by removing outliers per survey recommendations of Manworren & Laprise (2021). The final assumption is the dependent variable is normally distributed in the two conditions. This was tested by the Shapiro-Wilk test of normality within SPSS, monitoring skewedness, and evaluating the distribution of scores with a histogram (Gall et al., 2007; Reichardt, 2019).

## Summary

This study used the Pediatric Healthcare Providers Knowledge and Attitudes Survey Regarding Pain (PHPKAS) in a quasi-experimental one group pretest-posttest design on undergraduate baccalaureate nursing students in three elective nursing courses: Strategies for End-of-Life Care, Comprehensive Pain Management, and Advanced Strategies for the Critically Ill Maternal-Child Populations Certificate Course. A convenience sample of undergraduate baccalaureate nursing students was taken at a private, Christian-based university in the southeastern U.S. The setting included naturally occurring groups, as students choose their elective nursing course based on interest, availability, and acceptance. The PHPKAS and

demographic data were collected via Qualtrics towards the beginning (pretest) and towards the end (posttest) of the semester. Student participants' pretest/posttest answers were collected within Qualtrics and exported to Excel where the data were scored. A paired samples *t*-test was used within SPSS for data analysis, with a *p*-value set at .05 (one tailed) to measure statistical significance. Measures of central tendency and measures of variability were used for demographic data, which can help make sense of the sample (Gall et al., 2007).

# CHAPTER FOUR: FINDINGS

## Overview

This chapter provides the results of a quasi-experimental one group pretest-posttest study utilizing the Pediatric Healthcare Providers Knowledge and Attitudes Survey Regarding Pain (PHPKAS) on undergraduate baccalaureate nursing students in three elective nursing courses: Strategies for End-of-Life Care, Comprehensive Pain Management, and Advanced Strategies for the Critically Ill Maternal-Child Populations Certificate. The dependent variable in this study is undergraduate baccalaureate nursing student knowledge and attitudes towards neonatal and pediatric pain management practices and the independent variable is elective nursing courses. An advantage of using a pretest and posttest study design is that allows for directionality of the research, although outcome causality cannot be concluded since it is not a true experiment. However, associations between interventions and outcomes can be made (Siedlecki, 2020).

## Research Question

**RQ1:** To what extent do undergraduate baccalaureate nursing student neonatal and pediatric pain management knowledge and attitudes differ before and after three elective nursing courses already containing pain management education?

## Hypotheses

**$H_0$1:** There is no difference in undergraduate baccalaureate nursing student neonatal and pediatric pain management knowledge and attitudes before and after three elective nursing courses already containing pain management education.

**$H_A$1:** There is a difference in undergraduate baccalaureate nursing student neonatal and pediatric pain management knowledge and attitudes before and after three elective nursing courses already containing pain management education.

## Descriptive Statistics

A total of 21 participants completed both the pretest and posttest survey (*N*=21). Twenty-eight participants completed the pretest survey; 21 participants completed both the pretest and posttest survey. The sample included five participants from the Strategies for End-Of-Life Care course, eight participants from the Comprehensive Pain Management course, and eight participants from the Strategies for the Critically Ill Maternal-Child Populations Certificate course (refer to Table 1). All participants were between 18-24 years of age, a part of Generation Z (i.e., born between 1995 and the early 2010s), female, and were seniors within the nursing program (refer to Table 1). There was no random assignment in this study; group formations were naturally occurring due to elective nursing courses being chosen by the students based on availability and acceptance to the course. Statistical significance for this study was identified as an alpha level of *p*=.05 and statistical power of 0.7.

**Table 1**

*Elective Nursing Course Study Sample*

| Elective Nursing Course | *n* | *Percentage* |
|---|---|---|
| Strategies for End- Of-Life Care | 5 | 24% |
| Comprehensive Pain Management | 8 | 38% |
| Critically Ill Certificate Course | 8 | 38% |

*Note. N*=21. All participants were female, white, and seniors within the program.

### Demographic Data

Group demographics were collected on generational cohort, gender, and level of student (junior versus senior within the nursing program). Additionally, student participants were questioned in the frequency of providing direct-care and the frequency in participation in simulation experiences involving neonates in pain (under one month of age), infants in pain (one

month to one year old), young children in pain (one year to four years old), children in pain (five to 12 years old), adolescents in pain (13 to 17 years old), and desired nursing specialty.

***Hands On Care of Neonates, Infants, Young children, Children, and Adolescents in Pain***

Using a Likert scale (1=very frequently, 2=frequently, 3=occasionally, 4=rarely, 5=very rarely, 6=never), participants reported the extent of hands-on nursing care experiences involving neonates, infants, young children, children, and adolescents in pain. In the pretest survey, the majority of participants reported *very rarely* to *never* providing hands-on care to neonates, infants, and young children in pain. The majority of participants also reported *rarely* to *very rarely* providing hands-on care of children and adolescents in pain. In the posttest survey, the majority of participants reported *rarely* to *never* providing hands-on care to neonates and to infants in pain, and the majority of respondents reported *occasionally* to *very rarely* providing hands-on care to young children, children, and adolescents in pain (refer to Table 2).

**Table 2**

*Frequency and Percentage of Hands-On Care*

| Likert Rating | Neonates | | Infants | | Young Children | | Children | | Adolescents | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Pre | Post | Pre | Post | Pre | Post | Pre | Post | Pre | Post |
| Very Frequently | 1 *4.8%* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Frequently | 1 *4.8%* | 4 *19.0%* | 1 *4.8%* | 1 *4.8%* | 2 *9.5%* | 1 *4.8%* | 2 *9.5%* | 0 | 2 *9.5%* | 1 *4.8%* |
| Occasion-ally | 1 *4.8%* | 2 *9.5%* | 4 *19.0%* | 3 *14.3%* | 4 *19.0%* | 6 *28.6%* | 3 *14.3%* | 7 *33.3%* | 4 *19.0%* | 6 *28.6%* |
| Rarely | 5 *23.7%* | 3 *14.3%* | 4 *19.0%* | 6 *28.6%* | 4 *19.0%* | 3 *14.3%* | 7 *33.3%* | 4 *19.0%* | 6 *28.6%* | 6 *28.6%* |
| Very Rarely | 9 *42.9%* | 6 *28.6%* | 9 *42.9%* | 5 *23.8%* | 9 *42.9%* | 6 28.6% | 5 *23.8%* | 7 *33.3%* | 6 *28.6%* | 6 *28.6%* |
| Never | 4 *19.0%* | 6 *28.6%* | 3 *14.3%* | 6 *28.6%* | 2 *9.5%* | 5 *23.8%* | 4 *19.0%* | 3 *14.3%* | 3 *14.3%* | 2 *9.5%* |

*Note: N*=21

***Exposure to Simulation Experiences***

Using a Likert scale (1=very frequently, 2=frequently, 3=occasionally, 4=rarely, 5=very rarely, 6=never), participants reported the extent of participation in simulation experiences involving the nursing care of neonates/infants (under the age of one year old), young children, children, and adolescents in pain. This question combined student participation of simulation experiences in neonates and infants because the same manikins are used in these experiences; therefore, it may be difficult for student participants to remember how many days and months old the manikin was during the simulation experience. In the pretest survey, the majority of participants reported *occasionally* to *rarely* participating in simulation experiences involving neonates/infants, young children, children, and adolescents in pain. In the posttest survey, some participants reported *frequently* participating in simulation experiences involving neonates/infants, young children and children, which was not seen in the pretest survey. However, the majority of participants reported *occasionally* to *rarely* in the participation in simulation experiences involving the nursing care of neonates/infants in pain, young children, children, and adolescents in pain (refer to Table 3).

**Table 3**

*Frequency and Percentage in Simulation Experiences*

| Likert Rating | Neonates/ Infants | | Young Children | | Children | | Adolescents | |
|---|---|---|---|---|---|---|---|---|
| | Pre | Post | Pre | Post | Pre | Post | Pre | Post |
| Very Frequently | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Frequently | 0 | 2<br>*9.5%* | 0 | 3<br>*14.3%* | 0 | 2<br>*9.5%* | 2<br>*9.5%* | 1<br>*4.8%* |
| Occasion-ally | 5<br>*23.7%* | 8<br>*38.1%* | 6<br>*28.6%* | 9<br>*42.9%* | 6<br>*28.6%* | 9<br>*42.9%* | 6<br>*28.6%* | 8<br>*38.1%* |
| Rarely | 8<br>*38.1%* | 4<br>*19.0%* | 9<br>*42.9%* | 2<br>*9.5%* | 8<br>*38.1%* | 2<br>*9.5%* | 7<br>*33.3%* | 2<br>*9.5%* |
| Very Rarely | 2<br>*9.5%* | 4<br>*19.0%* | 1<br>*4.8%* | 4<br>*19.0%* | 0 | 5<br>*23.8%* | 0 | 6<br>*28.6%* |
| Never | 6<br>*28.6%* | 3<br>*14.3%* | 5<br>*23.8%* | 3<br>*14.3%* | 4<br>*19.0%* | 3<br>*14.3%* | 3<br>*14.3%* | 4<br>*19.0%* |

*Note: N*=21

### *Area of Nursing Interest*

Participants (*N*=21) were asked what area of nursing interest them most. Survey results indicated that participants were most interested in adult nursing care (*n*=4), pediatric nursing care (*n*=4), women's health nursing (*n*=4), neonatal nursing care (*n*=3), and perioperative nursing care (*n*=3). Participants were less interested in other nursing areas (*n*=2), emergency nursing care (*n*=1), and hematology/oncology nursing (*n*=0). Please refer to Table 4.

**Table 4**

*Area of Nursing Interest*

| Nursing Interest | Frequency | Percentage |
|---|---|---|
| 1.Emergency Care | 1 | 4.8% |
| 2.Adult | 4 | 19% |
| 3.Neonatal | 3 | 14.3% |
| 4.Pediatirc | 4 | 19% |
| 5.Women's Health | 4 | 19% |
| 6.Perioperative | 3 | 14.35 |
| 7.Hematology/Oncology | 0 | 0% |
| 8.Other | 2 | 9.5% |
| *Total Participants* | 21 | 100% |

*Note:* Other areas of nursing include but are not limited to community health nursing, mental health nursing, hospice/palliative care nursing, school nursing, etc.

The PHPKAS has a total of 41 items. The instrument uses true or false questions, multiple choice questions, and two case studies for the last four questions in which participants are required to rate the patient's pain and treat the patient's pain. The minimum score is zero and the maximum score is 41. The pretest mean is the average score of all student participants towards the beginning of the elective nursing course ($M$=28.76). The posttest mean is the average score of all student participants upon conclusion of the elective nursing course ($M$=28.05). Standard deviation measures the extent to which scores deviate from their mean, pretest ($SD$=4.795) and posttest ($SD$=5.714; refer to Table 5). Confidence intervals of 95% were used to measure the variability of the mean difference.

**Table 5**

*Paired Samples Statistics*

| *Pair 1* | Mean | N | Standard Deviation | Standard Mean Error |
|---|---|---|---|---|
| Pretest | 28.76 | 21 | 4.795 | 1.046 |
| Posttest | 28.05 | 21 | 5.714 | 1.247 |

*Note:* 95% confidence intervals were used to measure the variability of the mean difference.

## Data Screening

The researcher screened each participant's response (both pretest and posttest) for inconsistencies, ensuring no errors or inconsistencies existed within the data set. Assumption testing began following the data screening process.

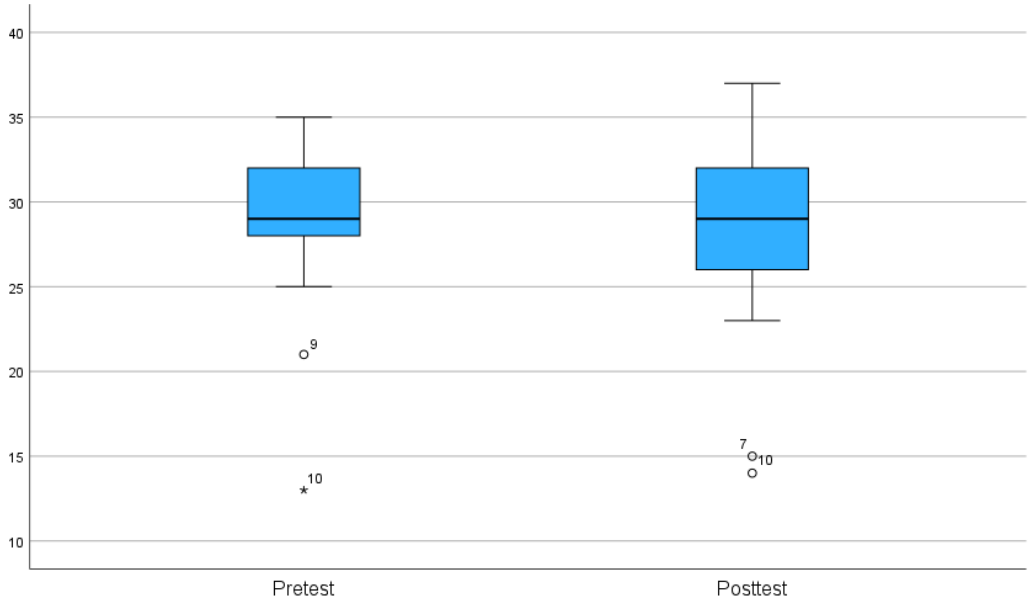
## Testing Assumptions of the Paired Samples t-test

To use a paired samples *t*-test, the first assumption states that the dependent variable must be continuous (Reichardt, 2019). The dependent variable in this study, undergraduate baccalaureate nursing student knowledge and attitudes towards neonatal and pediatric pain management practices, was measured by the PHPKAS. The PHPKAS is scored as a continuous, interval variable, meeting the first assumption. The second assumption states that the dependent variable should consist of two categorical matched-pairs (Reichardt, 2019). This assumption was met by the pretest and posttest, in which the same student participants were measured on two occasions on the same dependent variable. Student participants created a code to link the two surveys. Only pretest and posttest surveys with matching codes were used in this study, meeting the second assumption. The third assumption is that there should be no significant outliers, data points within the data set that do not follow the usual pattern creating asymmetry of scores (Reichardt, 2019). However, this study did have a significant outlier, case 10. While this

participant scored considerably lower than other participants on both the pretest (31.70%) and posttest (34.15%), the validation study conducted by Manworren and Laprise (2021) stated that first time participants (*N*=302) scored between 30% and 100% in the validation study; therefore, case 10 was included in the sample (Refer to Figure 1.1).

**Figure 1.1**

*Box and Whisker Plots Comparing Pretest and Posttest Scores on PHPKAS*




*Note:* N=21

The final assumption, the dependent variable is normally distributed in the two conditions, which is traditionally tested by the Shapiro-Wilk test of normality (Refer to Table 6). The Shapiro-Wilk test revealed a violation, in that the data deviated from normal distribution (Gall et al., 2007; Reichardt, 2019).

**Table 6**

*Shapiro-Wilk Test of Normality*

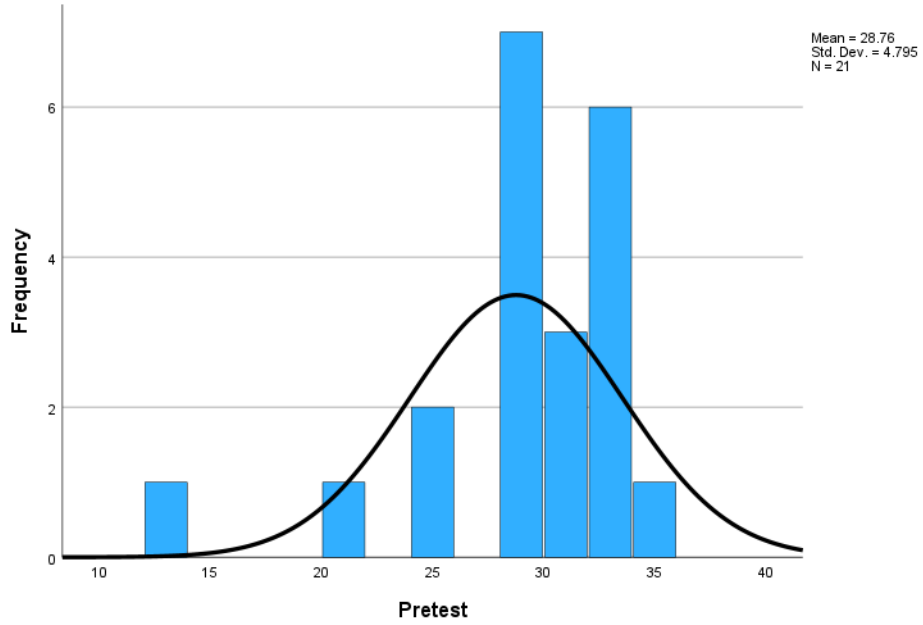
| | Statistic | df | Significance |
|---|---|---|---|
| Pretest | .814 | 21 | .001 |
| Posttest | .895 | 21 | 0.28 |

*Note:* The significance of the Shapiro-Wilk Test is .001 for pretest data and 0.28 for posttest data. A result below 0.05 indicates that the data do not follow a normal distribution.

Normality was also assessed with a histogram of the pretest scores (Figure 1.2) and posttest scores (Figure 1.3), which allows the reader to visualize the distribution of scores.

**Figure 1.2**

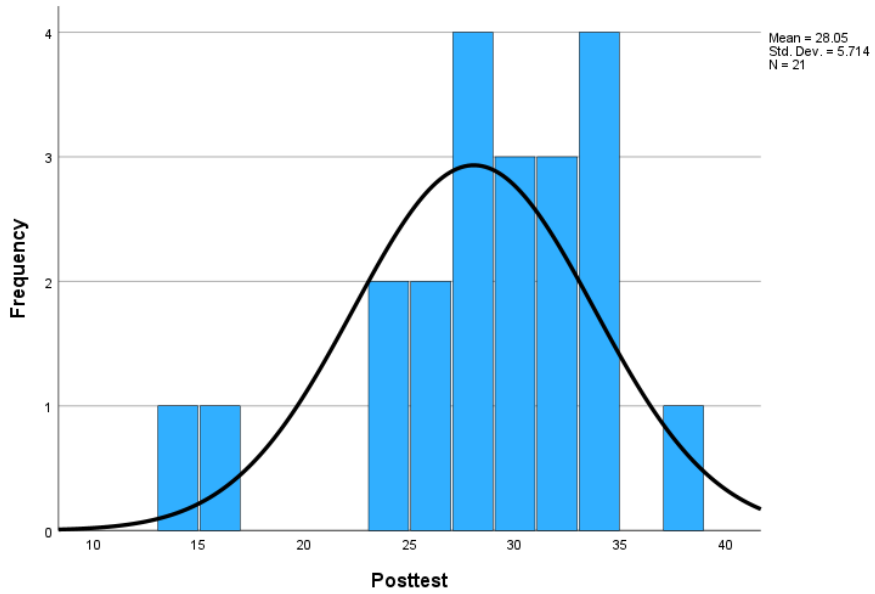
*Histogram of Pretest Data*




*Note:* N=21

**Figure 1.3**

*Histogram of Posttest Data*




*Note:* N=21

Looking at pretest descriptives (Table 7) and posttest descriptives (Table 8), pretest data are more skewed than posttest data. A perfect skewness is zero; therefore, the further away from zero indicates that the data are skewed.

**Table 7**

*Pretest Descriptives*

| | | | Statistic | Std. Error |
|---|---|---|---|---|
| Pretest | Mean | | 28.76 | 1.046 |
| | 95% Confidence Interval for Mean | Lower Bound | 26.58 | |
| | | Upper Bound | 30.94 | |
| | 5% Trimmed Mean | | 29.28 | |
| | Median | | 29.00 | |
| | Variance | | 22.990 | |
| | Std. Deviation | | 4.795 | |
| | Minimum | | 13 | |
| | Maximum | | 35 | |
| | Range | | 22 | |
| | Interquartile Range | | 4 | |
| | Skewness | | -1.982 | .501 |
| | Kurtosis | | 5.227 | .972 |

*Note:* Skewness is -1.982. A perfect skewness is 0.0. Further away from zero means the data are skewed.

**Table 8**

*Posttest Descriptives*

| | | | Statistic | Std. Error |
|---|---|---|---|---|
| Posttest | Mean | | 28.05 | 1.247 |
| | 95% Confidence Interval for Mean | Lower Bound | 25.45 | |
| | | Upper Bound | 30.65 | |
| | 5% Trimmed Mean | | 28.34 | |
| | Median | | 29.00 | |
| | Variance | | 32.648 | |
| | Std. Deviation | | 5.714 | |
| | Minimum | | 14 | |
| | Maximum | | 37 | |
| | Range | | 23 | |
| | Interquartile Range | | 7 | |
| | Skewness | | -1.158 | .501 |
| | Kurtosis | | 1.476 | .972 |

*Note:* Skewness is -1.158. A perfect skewness is 0.0. Further away from zero means the data are skewed.

**Hypothesis**

The null hypothesis for this study reads, “There is no difference in undergraduate baccalaureate nursing student neonatal and pediatric pain management knowledge and attitudes before and after three elective nursing courses already containing pain management education.” This null hypothesis was tested by analyzing the scores of student participants on the PHPKAS before (pretest) and after (posttest) elective nursing courses.

## Results

Participants scored an average of 28.76 out of 41 (*SD*=4.795), or 70.14 out of 100 on the pretest PHPKAS survey; scores ranged from a minimum of 13 (31.70%) to a maximum of 35 (85.36%; Figure 1.1). Results from the PHPKAS previous version, the PKNAS, are often reported by the 10 most frequently missed items and the 10 most correctly answered items

(Manworren & Laprise, 2021). The most frequently incorrectly answered pretest questions were "Sedation always proceeds opioid related respiratory depression;" "Respiratory depression rarely occurs in children/adolescents who have been receiving stable doses of opioids over a period of months;" and "Non-drug interventions…are effective for treatment of mild-moderate pain but are rarely helpful for more severe pain" (Appendix K).

The most frequently correctly answered pretest questions were: "Combining analgesics and non-drug therapies that work by different mechanisms…may result in better pain control with fewer side effects than using a single analgesic agent;" "Children less than 8 years cannot reliably report pain intensity and therefore, the healthcare provider should rely on the parents assessment of the child's pain intensity;" and "After the initial dose of opioid analgesic is given, and subsequent doses should be adjusted based on the individual patient's response" (Appendix L).

**Posttest Survey Results**

Participants scored an average of 28.05 out of 41 (*SD*=5.714), or 68.41 out of 100 on the posttest PHPKAS survey; scores ranged from a minimum of 14 (34.15%) to a maximum of 37 (90.24%; Figure 1.2). The most frequently incorrectly answered posttests questions were "Sedation always proceeds opioid related respiratory depression;" "The recommended route of administration of opioid analgesics to children with prolonged cancer pain is…;" and "Non-drug interventions…are effective for treatment of mild-moderate pain but are rarely helpful for more severe pain" (Appendix M). The most frequently correctly answered pretest questions were "Infants/children/adolescents may sleep in spite of severe pain;" and "Because their nervous system is underdeveloped, children under 2 years of age have decreased pain sensitivity and limited memory of painful experiences" (Appendix N).

**Paired Samples *t*-test Results**

A paired samples *t*-test was used to test if the means of two paired measurements (pretest and posttest PHPKAS survey scores) were statistically significant. A paired samples *t*-test with an alpha set at .05 showed that student participant knowledge and attitudes towards neonatal and pediatric pain management practices before ($M$=28.76; $SD$=4.795) and after ($M$=28.05; $SD$=5.714) elective nursing courses was not statistically significant, $t$[20]=.765; $p$=.227 (one tailed). There was not a statistically significant difference between the mean scores ($p$ >.05; Gall et al., 2007); thus, the researcher failed to reject the null hypothesis and the alternative hypothesis was not accepted. Therefore, there was no significant change in the knowledge or attitudes of undergraduate baccalaureate nursing student neonatal or pediatric pain management practices before and after an educational intervention (Refer to Table 9). It is important to note that while there was not a statistically significant difference in pretest versus posttest scores, student participants lost knowledge over the course of the semester (pretest $M$=28.76; posttest $M$=28.05).

**Table 9**

*Paired Samples t-test Results*

| | | Mean | Std. Deviation | Std. Error Mean | *t* | df | One-Sided p | Two-Sided p |
|---|---|---|---|---|---|---|---|---|
| Pair 1 | Pretest - Posttest | .714 | 4.280 | .934 | .765 | 20 | .227 | .453 |

*Note*: Mean is the average difference between the pretest and posttest scores.

**Reliability**

In general, reliability is a measure of consistency over time. In a pretest/posttest study, the researcher would want higher scores to be associated with higher scores and lower scores to be associated with lower scores. For example, a high achieving student should remain high

achieving over the course of the semester. The analysis in this study was completed using two variables, the pretest and posttest score, which was measured by Cronbach's alpha with <0.7 indicating acceptable internal consistency (Gall et al., 2007; Johnson & Christensen, 2020). The Cronbach alpha for this study was .937, indicating excellent internal consistency. This indicates that the same student participant took both the pretest and posttest.

**Effect Size**

Effect size measures the strength or magnitude of the difference between two variables. Effect size can be considered small ( ≥0.2), medium (≥0.5), or large (≥0.8). A large effect size would indicate that the data have practical significance or a strong relationship between the two variables, while a small effect size would indicate data have limited significance or a weak relationship between the two variables. When the null hypothesis has not been rejected, such as the case in this study, it can be expected that the effect size would be close or equal to zero. The effect size for this study was 0.167, as reported by Cohen's D, indicating a weak relationship between the two variables. This result mirrors what was to be expected by failing to reject the null hypothesis (Gall et al., 2007; Johnson & Christensen, 2020).

**Table10**

*Paired Samples Effect Sizes*

| | Standardizer[a] | Point Estimate |
|---|---|---|
| Cohen's D | 4.280 | .167 |

*Note*: Cohen's D used the sample standardized deviation of the mean difference.

## Summary

The purpose of this study of this quantitative quasi-experimental, one-group pretest/posttest design study was to evaluate neonatal and pediatric pain management knowledge and attitudes of undergraduate baccalaureate nursing students before and after three elective

nursing courses containing pain management education. To determine the difference between pretest and posttest scores, a convenience sample of undergraduate baccalaureate nursing students at a Christian-based university in the southeastern U.S. was taken. Twenty-one student participants completed both the pretest and posttest survey to answer the question: "To what extent do undergraduate baccalaureate nursing student neonatal and pediatric pain management knowledge and attitudes differ before and after three elective nursing courses already containing pain management education?" Assumptions testing for a paired samples *t*-test was not met due to the pretest and posttest scores not following a normal distribution, which is likely from a small sample size. A paired samples *t*-test was conducted to answer the following null hypothesis: "There is no difference in undergraduate baccalaureate nursing student neonatal and pediatric pain management knowledge and attitudes before and after three elective nursing courses already containing pain management education." The researcher failed to reject the null hypothesis ($p>.05$) and failed to accept the alternative hypothesis. Results demonstrated there was not a significant difference in participant knowledge and attitudes towards neonatal and pediatric pain management practices before and after elective nursing courses ($t[20]=.765$; $p=.227$). While findings were not statistically significant, this research can guide future educational research and interventions.

# CHAPTER FIVE: CONCLUSIONS

## Overview

This chapter discusses the findings described in Chapter Four, which indicated that elective nursing courses had no significant impact on student knowledge and attitudes towards neonatal and pediatric pain management practices. This chapter examines whether the results of this study support results of other studies, including the PHPKAS validation study conducted by Manworren and Laprise (2021). Lastly, this chapter discusses the study's implications, limitations, and future recommendations for research.

## Discussion

The purpose of this study was to evaluate neonatal and pediatric pain management knowledge and attitudes of undergraduate baccalaureate nursing students before and after three elective nursing courses containing pain management education utilizing a quantitative quasi-experimental, one-group pretest/posttest design. The research question guiding this study was "To what extent do undergraduate baccalaureate nursing student neonatal and pediatric pain management knowledge and attitudes differ before and after three elective nursing courses already containing pain management education?" Results demonstrated there was not a statistically significant difference in student participant knowledge and attitudes towards neonatal and pediatric pain management practices before and after elective nursing courses. To date, the PHPKAS has not be used in any other research studies; however, the results of the current study reflect the findings from Manworren and Laprise's (2021) survey validation study where nursing students ($n$=126, $N$=302) scored an average of 68.8% on the PHPKAS ($SD$=10.45, $t$ [218] = 6.24, $p < 0.0005$ (two-tailed). This score is similar to that of the pretest survey ($M$=70.14%) and the posttest survey ($M$=68.41%) of the undergraduate nursing students in the

current study. Furthermore, in Manworren and Laprise's (2021) survey validation study, the test-retest reliability showed that 41 participants completed the online survey twice (20 to 30 days apart), prior to an educational intervention ($N$=302, $n$=41). The first mean score of the PHPKAS was 69.95% (with participants scoring between 38% to 100%), and their second PHPKAS score (mode=21 days after) was 71.66% (with participants scoring between 50% to 98%, [$r$=0.8]). Results from the current study are similar to that of the test-retest reliability results from Manworren and Laprise (2021), which could indicate that while the elective nursing courses contained pain management content, the courses did not contain targeted neonatal and pediatric pain management content.

**Findings Related to Literature**

The descriptive statistics suggested that the participants lacked exposure in both the clinical and simulation setting to children of all ages in pain, partially to children under the age of four in the clinical setting. Research studies have indicated that nurses working with neonates, infants, and young children often struggle with accurately discriminating between pain or fear, leading to decreased use of analgesia when necessary (Namnabati et al., 2012; Yaz & Atay, 2022). The findings in the current study are reflective of the concerns addressed by the Society of Pediatric Nurses (SPN), in that nursing students lack the opportunities to practice developmentally appropriate communication techniques and pediatric pain management skills in the real-world setting which can impact their ability to assess, manage, and evaluate pain (Liu et al., 2020; SPN, 2021). This concern of the SPN is reflected in the responses to the case study portion of the survey, questions 38, 39, 40, and 41. Questions 38 (pretest $M$=85.71%; posttest $M$=80.95) and 40 (pretest $M$=90.48%; posttest $M$=90.48) asked participants to rate a child's pain; whereas questions 39 (pretest $M$=57.14%; posttest $M$=52.38%), and 41 (pretest $M$=57.14%;

posttest *M*=61.90%) asked participants how to treat the child's pain following their pain assessment/rating. Participants had a difficult time applying their pain assessment to their nursing actions. This is reflected in nursing literature as research has indicated that student nurses have sufficient knowledge of pain and pain medications; however, student nurses report a knowledge deficit related to implementing pain management practices to case studies and real-life situations (Cousins et al., 2022).

### *Questions Related to Respiratory Depression, Sedation, and Sedation Medications*

Questions related to respiratory depression, sedation, and sedation medications were frequently missed on the survey in the current study. The true or false question "Sedation always precedes opioid related respiratory depression" was the most incorrectly answered pretest and posttest question, with 4.76% of pretest participants and 9.52% of posttest participants answering the question correctly. Additionally, the true or false question "Respiratory depression rarely occurs in children/ adolescents who have been receiving stable doses of opioids over a period of months" was answered correctly by 14.29% of pretest participants and 38.10% of posttest participants. The true or false question "Benzodiazepines do not reliably potentiate the analgesia of opioids unless the pain is related to muscle spasms" was answered correctly by 38.10% of pretest participants and 47.62% of posttest participants. Lastly, the true or false question "Anxiolytics, sedatives, and barbiturates are appropriate medications for the relief of pain during painful procedures" was answered correctly by 38.10% of pretest participants and 42.86% of posttest participants. All questions related to respiratory depression, sedation, and sedation medications within the study were among the top 10 most frequently missed questions on both the pretest and posttest surveys (Appendix J and Appendix L). The results from the current study support findings from LaFond et al., (2019), which noted confusion between the use of sedation

scales and pain assessment scales among registered nurses.

***Pediatric Cancer Related Questions***

The majority of questions related to the care of children with cancer pain were among the top 10 most frequently missed pretest (Appendix J) and posttest questions (Appendix L). The true or false question "Ibuprofen and other non-steroidal anti-inflammatory agents are NOT effective analgesics for pain from bone metastases," was answered correctly by 28.57% of pretest participants and 38.10% of posttest participants. This is reflective of Zaabi et al.'s (2023) findings in which 25.4% of registered nurses correctly answered the question "Aspirin and other nonsteroidal anti-inflammatory agents are NOT effective analgesics for painful bone metastases"(N=118). The multiple-choice question "The recommended route of administration of opioid analgesics to children with prolonged cancer-related pain is…," was answered correctly by 33.30% of pretest participants and 19.05% of posttest participants. Furthermore, the multiple-choice question "Which of the following drugs are potentially useful for the treatment of children's cancer pain?" was answered correctly by 76.19% of pretest participants and 47.62% of posttest participants. This posttest result of the current study is similar to that of Zaabi et al.'s (2023) findings in which 45.8% of registered nurses answered this question correctly (N=118). The multiple-choice question "Which of the following analgesic medications is considered the drug of choice for the treatment of prolonged moderate to severe pain for children with cancer?" was answered correctly by 38.10% of pretest participants and 57.14% of posttest participants.

The question "Analgesia for chronic cancer pain should be given…," was one of the most frequently correctly answered items in the pretest survey with 95.24% of participants answering the question correctly. However, that same question experienced a significant decrease in score with 80.95% of students answering the question correctly in the posttest survey. It should be

noted that questions related to the care of children with cancer were not only some of the most frequently missed items, but these items actually exhibited a loss of knowledge from the pretest to the posttest. This suggests confusion amongst student participants on best practices regarding the care of children with cancer pain. Demographic data showed that no student participants were interested in hematology/oncology nursing (*n*=0; *N*=21), which could have potentially affected how students responded to cancer pain in children.

***Questions Related to Misconceptions***

The item that experienced the greatest increase in accuracy was the true or false question "Pediatric patients (infants, children, adolescents) who can be distracted from pain do not have severe pain." In the pretest survey 57.14% of participants answered this item correctly, and in the posttest survey 95.24% of participants answered the item correctly. The neonatal specific true or false question "Because their nervous system is underdeveloped, children under 2 years of age have decreased pain sensitivity and limited memory of painful experiences" was answered correctly by 90.48% of pretest participants and 95.24% of posttest participants. This is reflective of Smeland el al.'s (2018) findings in which 92% of participants (*N*=193) found this statement to be false.

Conversely, the true or false question "Young infants, less than 6 months of age, cannot tolerate opioids for pain relief" was answered correctly by 76.19% of pretest participants and 57.14% of posttest participants. The results from the present study reflect findings from Liyew et al. (2020), who found that 65.9% of respondents (*N*=255) answered that narcotics can cause respiratory depression and that they should not be used in pediatric patients. The true or false question "Opioid/narcotic addiction is defined as a chronic neurobiological disease, characterized by impaired control over drug use, compulsive use, continued use despite harm,

and craving…Given this definition, all children/adolescents whose pain has been treated with opioids for longer than a month are addicted to opioids" was answered correctly by 100% of pretest participants and 90.48% of posttest participants and the true or false question "Adolescents with a history of substance abuse should not be given opioids for pain because they are at high risk for repeated addiction," was answered correctly by 90.48% of pretest participants and 61.90% of posttest participants. Each of these questions exhibited evidence of a loss in knowledge from pretest to posttest. This could indicate that while the acknowledgment of pain in pediatric patients is trending in the right direction, how to treat pain and misconceptions towards pain still exists. These questions reflect findings from Smeland et al. (2018), who found knowledge deficits, mainly in pharmacologic management (such as in risk of addiction and respiratory depression) among registered nurses (*N*=193).

### *Theoretical Framework*

The results of the current study, the PHPKAS validation study (Manworren & Laprise, 2021) and numerous studies involving the previous version of the PHPKAS (i.e., the PNKAS) have shown neonatal and pediatric pain management knowledge deficits in health care providers; however, there is a significant lack of educational research regarding how to close this knowledge gap. The current study examined the impact of an educational intervention (i.e., elective nursing courses) on student participant knowledge and attitudes towards neonatal and pediatric pain management practices. However, the extent to which neonatal and pediatric pain management practices was covered in each elective nursing course was unknown. In this study, student participants actually lost knowledge from the pretest (*M*=28.76; *SD*=4.795) to the posttest (*M*=28.05; *SD*=5.714). Eighteen of the 41 items experienced a decrease in accuracy from pretest to posttest. Two questions from the top 10 most frequently correctly answered items in

the pretest survey, exhibited a decrease in the top 10 most frequently answered items in the posttest. The multiple-choice question "Analgesics for post-operative pain should initially be given…," was answered correctly by 95.24% of participants in the pretest and 76.19% in the posttest. The multiple-choice question, "Analgesia for chronic cancer pain should be given…," decreased from 95.24% accuracy in the pretest to 80.95% in the posttest. Nurse educators can apply the prescriptive theory of acute pain management in infants and children (Huth & Moore, 1998) to develop targeted neonatal and pediatric pain management educational interventions and help promote the incorporation of evidenced-based practice (EBP) in nursing curriculum. Using the theory's three propositions, nurse educators can help identify misconceptions and learning needs, and expose areas in need of EBP.

## Implications

The purpose of this study was to understand the impact of an educational intervention on participant knowledge and attitudes towards neonatal and pediatric pain management practices. The findings from the current study align with what researcher predicted would happen, which was that there would be no difference in undergraduate baccalaureate nursing student neonatal and pediatric pain management knowledge and attitudes before and after an elective nursing course. Students cannot gain adequate knowledge without exposure to targeted neonatal and pediatric pain management practices in the didactic, clinical, and laboratory setting. However, in this study participants lost knowledge from the pretest to the posttest, which was not predicted per the use of the one-tailed over the two-tailed test. This could indicate that participants did not fully understand the material, or they may have received conflicting information.

This study adds to existing nursing literature by supporting findings from previous nursing research that suggests healthcare providers (including student nurses) knowledge and

attitudes towards neonatal and pediatric pain is inadequate. Participant demographics indicated minimal exposure to the hands-on care of neonates and children in pain along with minimal simulation experiences dedicated to neonates and children in pain. This is reflective of the issue statement provided by the Society of Pediatric Nurses, which raised awareness regarding the impact of decreased pediatric nursing content and clinical hours dedicated to the care of children in undergraduate nursing programs. These findings may impact policies affecting nursing curricula, such as that Ohio's *Curriculum for Registered Nurse Education Programs*, showing the importance dedicated learning experiences related to the care of children. Additionally, this study shows the necessity of including the concept of pain in nursing curricula frameworks that guide nursing curricular content. This is the first study to date that has used the newly revised PHPKAS; this study will hopefully spur others to use the PHPKAS rather than the previous version (i.e., the PKNAS).

The results from this study may help guide future educational initiatives and curricular revision within the academic setting. For example, neonatal and pediatric pain management content could be embedded throughout the entirety of the nursing curriculum, added to an existing course, or an immersive lecture or experience for all students could be implemented. Potential topics could include clarifying the use of sedation medications versus pain medications, the difference between sedation and pain assessment tools, understanding respiratory depression related to opioid use, the role of pain assessment and treatment in cancer pain, clarifying common misconceptions regarding narcotic use in neonates and children, and applying pain management knowledge to real life situations. This could be accomplished in a variety of settings including the classroom, clinical, or simulation experiences. Creating targeted neonatal and pediatric pain management educational strategies could have a lasting impact on student

nurses' knowledge and attitudes as they enter the workforce as RNs. This positively affect children, families, communities, the healthcare system, and society at large.

## Limitations

There are several limitations to this study. The first limitation is that the data were skewed, not following normal distribution. The second limitation is the small sample size. While the minimum sample size for this study was achieved ($N$=21), having a larger sample would have been ideal. The combination of a sample not following normal distribution and small sample size could have impacted results. Additionally, the study sample lacked diversity. All participants were between 18-24 years of age, female, and were seniors within the nursing program. The small sample size and lack of diversity of the sample impacted external validity and the application of the study's findings to a broader population.

Threats to internal validity are higher in quasi-experimental designs compared to experimental designs due to the lack of randomization of participants. Since the researcher failed to reject the null hypothesis, threats to internal validity were minimalized (i.e, history, maturation, regression toward the mean, and spontaneous remission/chance). However, attrition (i.e., spontaneous dropout of participants) could have impacted the study results and the internal validity of the study, as 27 participants began the study (i.e., completed the pretest survey) and 21 finished the study (i.e., completed both the pretest and posttest survey).

## Recommendations for Future Research

The sample in this study was small and lacked diversity. Future researchers should consider using multiple locations, and/or multiple nursing programs to enhance generalizability of the research findings. This could lead to a larger sample size and an increase in diversity of the sample, which would be more reflective of the population. Future researchers should

consider testing instrumentation on various populations, including all undergraduate healthcare professional students (e.g., nurses, physicians, child life specialist, ect.). Since collaboration amongst healthcare providers is a popular point of discussion, and successful pain management requires collaboration between healthcare providers, future researchers should consider educational interventions that bring together various disciplines to promote pain management practices across diverse populations (including neonates and pediatrics).

Future researchers should consider using the PHPKAS. While the PKNAS (the previous version of the PHPKAS) has been extensively used in nursing literature, the PHPKAS has not. To see how the instrument preforms over time and in various populations, more researchers should consider using the instrument in their studies. Lastly, future researchers should consider studying the effects of targeted neonatal and pediatric pain management content in nursing courses. Researchers should consider integrating neonatal and pediatric pain management content throughout multiple undergraduate nursing courses or creating a targeted educational intervention within a single class. Applying the prescriptive theory of acute pain management in infants and children (Huth & Moore, 1998) can help guide educational interventions and ensure that the curriculum is current and evidence-based.

## Summary

Pain is the most common reason for an individual to seek healthcare services (Good, 2020). RNs are frequently the first healthcare professionals to encounter an individual in pain, assess the individual's level of pain, and deliver appropriate pain-relieving measures (Shahmoradi et al., 2021). However, research has consistently indicated that pain management practices of RNs across all age groups and settings is inadequate, especially in neonatal and pediatric patient populations (Smeland et al., 2018; World Health Organization, 2022).This

research sought to understand the impact of elective nursing courses on undergraduate baccalaureate nursing student knowledge and attitude towards neonatal and pediatric pain management practices. The findings suggest that elective nursing courses have no statistical impact on participant knowledge and attitude. The problem remains in that there is a distinct gap in nursing literature on how to alleviate this breach in knowledge and attitudes prior to students entering the nursing profession. Thus, future research is warranted on how to improve nursing student knowledge and attitudes towards neonatal and pediatric pain management practices.

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# APPENDIX A

## AACN (2021) Spheres of Care

***Spheres of Care and Entry-Level Professional Nursing Education***

All entry-level professional nurses need knowledge and proficiencies to practice across a variety of settings. Accordingly, curricula for entry-level professional nursing education prepare the learner for generalist practice across the lifespan and with diverse populations, focusing on four spheres of care: promotion of health and well-being/disease prevention; chronic disease care; regenerative or restorative care; and hospice/palliative/supportive care (AACN, 2019; Lipstein et al., 2016; Figure 2). Didactic, simulated, laboratory, and clinical learning experiences prepare nurses to practice in these diverse settings. Level 1 sub-competencies apply across the spheres of care, requiring learners to

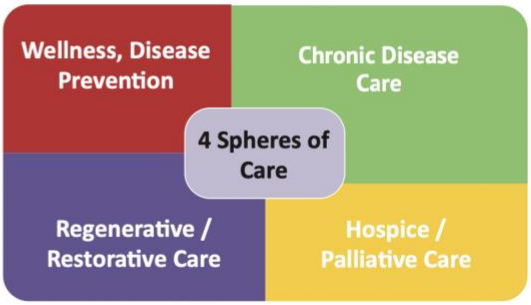
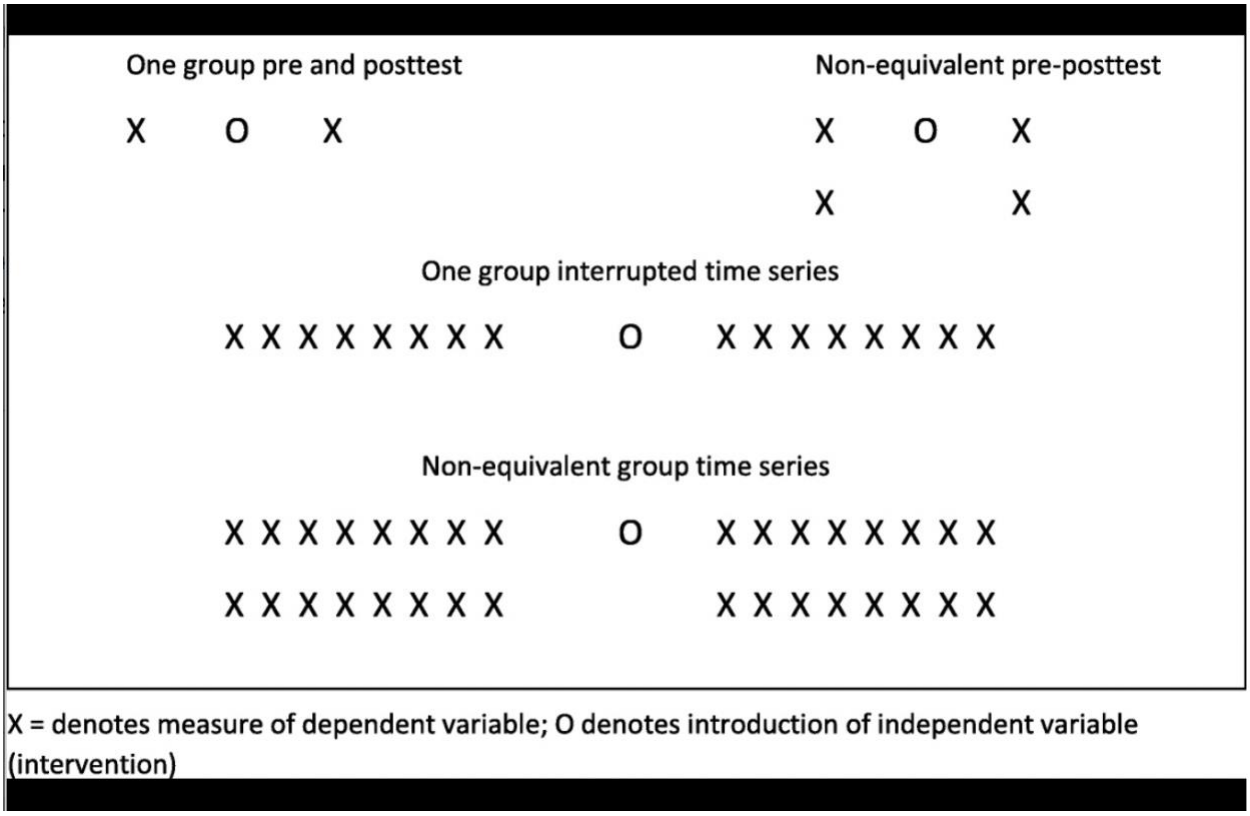



**Figure 2:** Four Spheres of Care

# APPENDIX B

## One Group Pre and Posttest Design




X = denotes measure of dependent variable; O denotes introduction of independent variable (intervention)

# APPENDIX C

## Threats to Internal Validity for Quasi-Experimental Designs

| Threat | Definition | Minimization Recommendations |
|---|---|---|
| Selection[6] | When subjects in one group differ from those in another because of lack of random assignment or because of how the treatment was assigned. This is only a threat in 2-group designs | Match groups based on major characteristics |
| History[6] | When some event happens between the first and second measure that impacts the dependent variable | Using a 2-group instead of a 1-group design will allow researcher to detect this |
| Maturation[6,7] | Changes in the dependent variable are due to normal aging or learning that occurs over time | Using a 2-group instead of a 1-group design will allow researcher to detect this |
| Regression to the mean[6] | Occurs when subjects are selected because of their extreme dependent variable scores. Reliability of the tool used to measure the dependent variable will increase this threat | Assess reliability of measures and consider using > 1 way to measure the dependent variable |
| Attrition[6] | Attrition or mortality occurs because of the dropout rate and is especially important when one group is affected more than another. As a rule of thumb, < 5% should not make a big difference in analysis and findings, but > 20% presents a serious threat | Monitor dropout rates<br>Keep interventions and data collection burden as low as possible |
| Testing[6] | When exposure to the pretest impacts scores on the posttest. This is only a threat to the 1-group design | Using a 2-group instead of a 1-group design will allow researcher to detect this |
| Instrumentation[6] | When the instrument or methods of measuring the dependent variable change over time or are different for one group compared with another | Careful training and monitoring of all data collectors and data collection |
| Intervention infidelity[8] | When the treatment or intervention is delivered differently to different people or when the delivery methods change over time | Careful training and monitoring of all research nurses responsible for implementing or teaching the intervention |
| Spontaneous remission[6] | When a condition of interest changes or improves spontaneously | Using a 2-group instead of a 1-group design will allow researcher to detect this |

**Table 4**

Threats to Internal Validity for Quasi-Experimental Designs

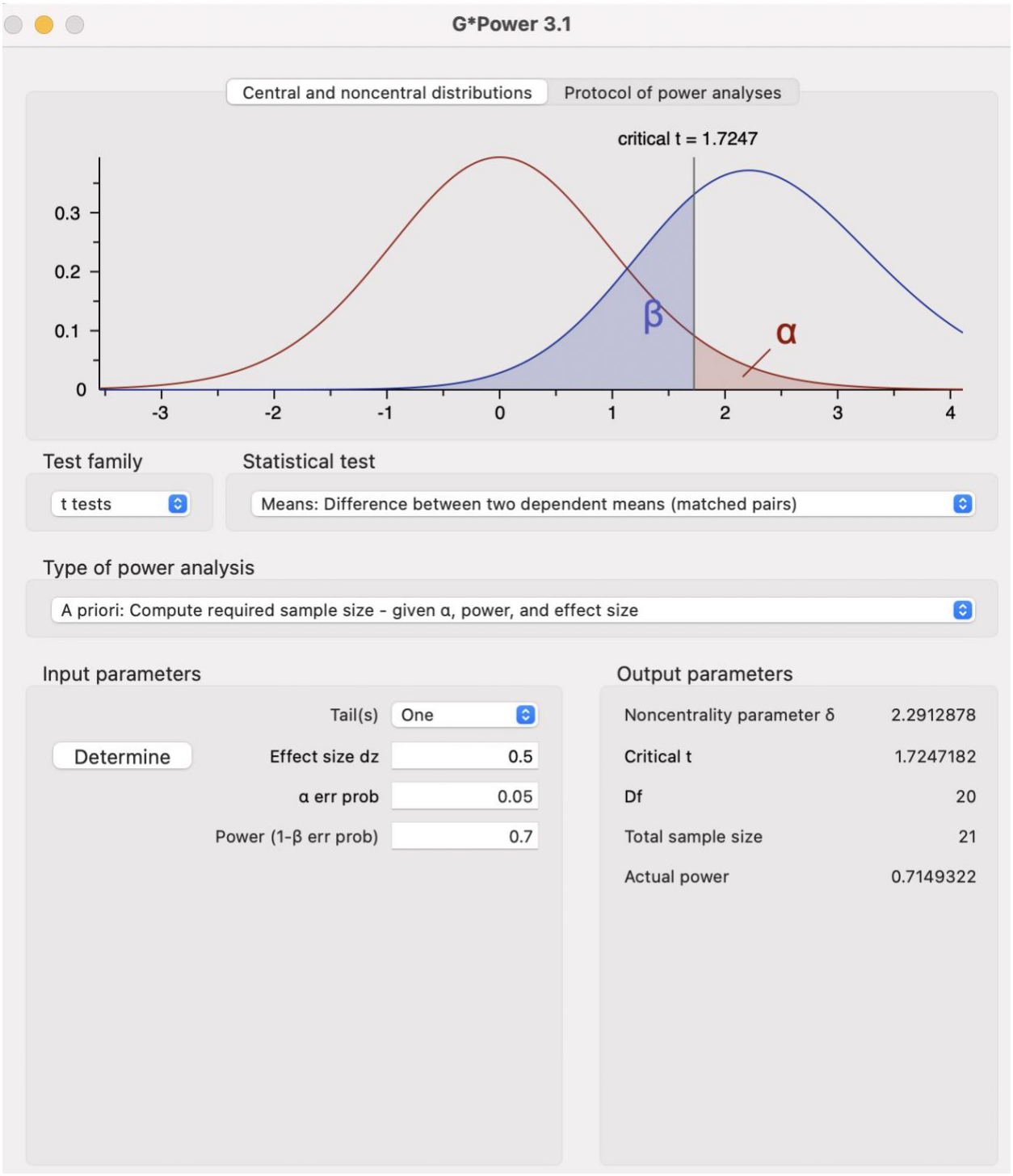
**Source**

Quasi-Experimental Research Designs

Clinical Nurse Specialist34(5):198-202, September/October 2020.

# APPENDIX D

## G*Power 3.1 Results



# APPENDIX E

## Demographic Questionnaire

1. What is your age group?
    a. 18-24 years old
    b. 25-40 years old
    c. 41-56 years old
2. What is your gender?
    a. Male
    b. Female
    c. Prefer not to answer.
3. What is your level within the program?
    a. Junior
    b. Senior
4. To what extent have you provided direct hands-on care to neonates in pain, babies less than one month old?
    a. Very frequently
    b. Frequently
    c. Occasionally
    d. Rarely
    e. Very rarely
    f. Never
5. To what extent have you provided direct hands-on care to infants in pain, one month to one year old?
    a. Very frequently
    b. Frequently
    c. Occasionally
    d. Rarely
    e. Very rarely
    f. Never
6. To what extent have you provided direct hands-on care to young children in pain, ages one to four years old?
    a. Very frequently
    b. Frequently
    c. Occasionally
    d. Rarely
    e. Very rarely
    f. Never
7. To what extent have you provided direct hands-on care to children in pain, ages 5 to 12 years old?
    a. Very frequently
    b. Frequently
    c. Occasionally
    d. Rarely
    e. Very rarely
    f. Never
8. To what extent have you provided direct hands-on care to adolescents in pain, ages 13 to 17 years old?
    a. Very frequently
    b. Frequently
    c. Occasionally
    d. Rarely
    e. Very rarely
9. To what extent have you participated in simulation experiences involving the nursing care of newborns/infants in pain, under the age of one year old?
    a. Very frequently
    b. Frequently
    c. Occasionally
    d. Rarely

e. Very rarely
f. Never

10. To what extent have you participated in simulation experiences involving the nursing care of young children (ages one to four years old) in pain?
    a. Very frequently
    b. Frequently
    c. Occasionally
    d. Rarely
    e. Very rarely
    f. Never
11. To what extent have you participated in simulation experiences involving the nursing care of children (ages 5 to 12) in pain?
    a. Very frequently
    b. Frequently
    c. Occasionally
    d. Rarely
    e. Very rarely
    f. Never
12. To what extent have you participated in simulation experiences involving the nursing care of adolescents (ages 13 to 17) in pain?
    a. Very frequently
    b. Frequently
    c. Occasionally
    d. Rarely
    e. Very rarely
    f. Never
13. Have you ever taken care of a friend or family member in pain? Acute or Chronic.
    a. Yes
    b. No
14. What area of nursing interest you the most?
    a. Emergency Care
    b. Adult Nursing Care (critical care, med/surg, progressive care)
    c. Neonatal Intensive Care
    d. Pediatric Nursing Care (critical care, med/surg, progressive care)
    e. Women's Health (Antepartum, Labor and Delivery, Postpartum, mother/baby unit)
    f. Perioperative Nursing Care
    g. Hematology/ Oncology
    h. Other

# APPENDIX F

## Manworren and Liprise (2021) Approval of PHPKAS use in Research

shared understanding among PHPs by the variability of survey respondents test scores (range 30% to 100%) and potential for clinical translation that results in poor pediatric pain management reflected by the failing mean test score (69.5%).

Over 20 years of research indicates knowledge and attitudes regarding pain improves with education. Initial pre- and post-test scores of PHPs demonstrated the sensitivity of the PHPKAS to education. Although the group was small, there was a statistically significant increase in PHPKAS scores. However, given the barriers of complex care environments, improvements are not consistently translated into clinical practice, and improvements are not retained. As demonstrated by this validation study, even pediatric pain management experts differ in their interpretation of current pediatric pain management knowledge, evidence, and clinical

## Conclusion

Use of the PHPKAS for clinical and educational purposes is encouraged. The complete PHPKAS regarding pain is available in English by weblink at LurieChildrens.org/PRNpain. The PHPKAS is copyrighted by Manworren, but duplication for clinical practice and education is permitted. The use of the PHPKAS for pre- and post-test assessments of knowledge attainment by participants in IEPs is recommended. Ongoing validation and evaluation are needed to determine how the survey performs with other samples in various pediatric and health care education settings. Additional data are also needed to determine if satisfactory results on the PHPKAS correlate with satisfactory clinical practice and improved pain management for pediatric patients.

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# Appendix G

## Study Approval by Dean Turner

LIBERTY UNIVERSITY | SCHOOL of NURSING

June 12, 2023

Dear Jordan Lee Slowik,

After careful review of your research proposal entitled, *Undergraduate Nursing Students Knowledge and Attitudes Towards Neonatal and Pediatric Pain Management Practices Before and After Elective Nursing Courses*, I have decided to grant you permission, pending IRB approval, to conduct your research at Liberty University's School of Nursing recruiting our pre-licensure baccalaureate nursing students enrolled in NURS 419, NURS 420, and NURS 466 as participants.

The study has the full support of the course lead faculty and myself.

Please let me know if you have any questions.

Sincerely,

[redacted]

Tracey Milton Turner, EdD, MSN, RNC-OB
Interim Dean, Liberty University
[redacted]

# APPENDIX H

## Course Lead Study Invitation Letter

Dear Course Lead,

My name is Jordan-Lee Slowik and I am a PhD student at Liberty University. I am thrilled to say that I have successfully completed comprehensive exam and I am in dissertation planning. Praise the Lord! To describe my dissertation topic, I first should inform you how I got here.

In 2018, I was an MSN in Nursing Education student at LU. My husband and I welcomed our greatest gift and adventure, Pearce Andrew Slowik on July 12th 2018. Over the span of 10 days, I watched my beautiful son slowly deteriorate. Doctor after doctor told us he was fine. Until day 10, when his orbital sockets and fontanelles were completely sunken, his urine output was scant and bloody, he couldn't move, and couldn't cry. I knew something was very wrong. I got down on my knees and begged Jesus to save my son. I then heard the audible voice of God, telling me to "go now". Pearce was rushed to emergency surgery for a volvulus as the result of intestinal malrotation. If we would have gotten there any later, he would not be with us today.

The following days after Pearce's surgery were a blur, but I distinctly remember how nervous his nurses were when it came to post-operative pain management. As a pediatric ICU/PACU nurse, I saw the impact the lack of education of current pain management practices had on his nurses. They were hesitant in their care, lacked confidence, and had poor judgment. As years went on, I noticed this same trend at various hospital systems and units as an academic nurse educator. For LU's 2022 Research Week I conducted a narrative literature review titled *RN Hesitancy in Providing Narcotics to Post-Surgical Neonates.* Following this review, I realized the gravity of the situation. Neonates and children around the world are needlessly suffering from outdated knowledge and misconceptions about neonatal/pediatric pain. Undertreated pain in neonates and children can lead to devastating consequences including but not limited to poor wound healing, longer/costly hospital stays, and disrupted sleep leading to neurodevelopmental disturbance.

To address this concern, nurse educators must minimize the knowledge gap of neonatal and pediatric pain management practices prior to nurses entering the workforce. However, there is no research addressing this topic. I believe the solution to this problem lies within undergraduate elective nursing courses. With your blessing, Pediatric Healthcare Providers Knowledge and Attitudes Survey Regarding Pain (PHPKAS) before and after four undergraduate elective nursing courses. As Dr. Whorley said to me years ago, "a dissertation is not your life's work, it's just the beginning". I pray this research shows the benefit of elective nursing courses and how tailored curriculum positively impacts student learning and pain management practices. I look forward to all questions and comments. I am so grateful to be on this journey with each of you!

Respectfully,

Jordan Lee Slowik, PhD(c), MSN, RN, CPN
Liberty University
School of Nursing
[redacted]

# APPENDIX I

## IRB Approval

IRB #: IRB-FY23-24-262
Title: Undergraduate Baccalaureate Nursing Student Knowledge and Attitude Towards Neonatal and Pediatric Pain Management Practices Before and After Elective Nursing Courses
Creation Date: 8-16-2023
End Date:
Status: Approved
Principal Investigator: Jordan Slowik
Review Board: Research Ethics Office
Sponsor:

### Study History

| | | |
|---|---|---|
| Submission Type Initial | Review Type Exempt | Decision Exempt |
| Submission Type Modification | Review Type Exempt | Decision Exempt |

### Key Study Contacts

| | | |
|---|---|---|
| Member Elizabeth Whorley | Role Co-Principal Investigator | Contact [redacted] |
| Member Jordan Slowik | Role Principal Investigator | Contact |
| Member Jordan Slowik | Role Primary Contact | Contact |

# APPENDIX J

## Study Recruitment Letter

Dear Students,

My name is Jordan Lee Slowik. As a doctoral candidate in the school of nursing at Liberty University, I am conducting research in your elective nursing course as part of the requirements for a PhD in nursing education. The purpose of my research is to understand the knowledge and attitudes of undergraduate baccalaureate nursing students regarding neonatal and pediatric pain management practices, and I am writing to invite you to join my study!

Participants must be 18 years of age or older, a nursing student at Liberty University, and enrolled in one of the following classes Fall semester of 2023: NURS 419 (Strategies for End-of-Life Care), NURS 420 (Comprehensive Pain Management), or NURS 466 (Advanced Strategies for the Critically Ill Maternal-Child Populations Certificate). Participants will be asked to take an anonymous, online survey towards the beginning of the semester and towards the end of the semester. The survey should take approximately 20-25 minutes to complete. Participation will be completely anonymous, and no personal, identifying information will be collected or shared with your instructors. Students who choose to participate in the study and complete both surveys will be entered to win a $25 dollar gift card to a local grocer. Three students from each course will be selected to win.

A consent document is provided on the first page of the survey. Because participation is anonymous, you do not need to sign and return the consent document unless you would prefer to do so. After you have read the consent form, please click to proceed to the survey. Doing so will indicate that you have read the consent information and would like to take part in the study. Thank you for your time and consideration!

Respectfully,

Jordan Lee Slowik, PhD (c), MSN, RN, CPN
Liberty University
School of Nursing
[redacted]

## Appendix K

### Pretest Most Incorrectly Answered Items

| Question # | Question | Percentage Correct (N=21) |
|---|---|---|
| Q24 | T/F: Sedation always precedes opioid related respiratory depression | 4.76% |
| Q7 | T/F: Respiratory depression rarely occurs in children/ adolescents who have been receiving stable doses of opioids over a period of months | 14.29% |
| Q10 | T/F: Non-drug interventions (e.g., guided imagery, biofeedback, transcutaneous electrical nerve stimulation (TENS) etc.) are effective for treatment of mild-moderate pain but are rarely helpful for more severe pain. | 14.29% |
| Q9 | T/F: Ibuprofen and other non-steroidal anti-inflammatory agents are NOT effective analgesics for pain from bone metastases. | 28.57% |
| Q26 | T/F: The recommended route of administration of opioid analgesics to children with prolonged cancer-related pain is… | 33.30% |
| Q4 | T/F: The usual duration of analgesia of Morphine IV is 4-5 hours. | 38.10% |
| Q12 | T/F: Benzodiazepines do not reliably potentiate the analgesia of opioids unless the pain is related to muscle spasms. | 38.10% |
| Q20 | T/F: Anxiolytics, sedatives, and barbiturates are appropriate medications for the relief of pain during painful procedures. | 38.10% |
| Q29 | Which of the following analgesic medications, is considered the drug of choice for the treatment of prolonged moderate to severe pain for children with cancer? | 38.10% |
| Q37 | What do you think is the percentage of patients who over report the amount of pain they have? | 38.10% |

## Appendix L

### Pretest Most Correctly Answered Items

| Question # | Question | Percentage Correct (N=21) |
|---|---|---|
| Q11 | T/F: Combining analgesics and non-drug therapies that work by different mechanisms (e.g., using acetaminophen, topical anesthetics, sucrose, and non-nutritive sucking) may result in better pain control with fewer side effects than using a single analgesic agent | 100% |
| Q19 | T/F: Children less than 8 years cannot reliably report pain intensity and therefore, the healthcare provider should rely on the parents' assessment of the child's pain intensity. | 100% |
| Q21 | T/F: After the initial dose of opioid analgesic is given, subsequent doses should be adjusted based on the individual patient's response. | 100% |
| Q25 | T/F: Opioid/narcotic addiction is defined as a chronic neurobiological disease, characterized by impaired control over drug use…given this definition, all children/adolescents whose pain has been treated with opioids for longer than a month are addicted to opioids. | 100% |
| Q17 | T/F: Spiritual beliefs may lead a child/ adolescent to think that pain and suffering are necessary. | 95.24% |
| Q18 | T/F: The child/ adolescent with pain should be encouraged to endure as much pain as possible before resorting to an opioid for pain relief. | 95.24% |
| Q31 | Analgesics for post-operative pain should initially be given: | 95.24% |
| Q32 | Analgesia for chronic cancer pain should be given: | 95.24% |
| Q33 | The most likely reason a child/ adolescent with pain would request increased doses of pain medication is: | 95.24% |
| Q8 | T/F: Infants/children/adolescents may sleep in spite of severe pain. | 95.24% |

## Appendix M

### Posttest Most Incorrectly Answered Items

| Question # | Question | Percentage Correct (N=21) |
|---|---|---|
| Q24 | T/F: Sedation always precedes opioid related respiratory depression. | 9.52% |
| Q26 | T/F: The recommended route of administration of opioid analgesics to children with prolonged cancer-related pain is.. | 19.05% |
| Q10 | T/F: Non-drug interventions (e.g., guided imagery, biofeedback, transcutaneous electrical nerve stimulation (TENS) etc.) are effective for treatment of mild-moderate pain but are rarely helpful for more severe pain. | 23.81% |
| Q9 | T/F: Ibuprofen and other non-steroidal anti-inflammatory agents are NOT effective analgesics for pain from bone metastases. | 38.10% |
| Q7 | T/F: Respiratory depression rarely occurs in children/ adolescents who have been receiving stable doses of opioids over a period of months. | 38.10% |
| Q15 | T/F: Beyond a certain dosage of morphine increases in dosage will NOT provide increased pain relief. | 42.86% |
| Q20 | T/F: Anxiolytics, sedatives, and barbiturates are appropriate medications for the relief of pain during painful procedures. | 42.86% |
| Q37 | What do you think is the percentage of patients who over report the amount of pain they have? | 42.86% |
| Q12 | T/F: Benzodiazepines do not reliably potentiate the analgesia of opioids unless the pain is related to muscle spasms. | 47.62% |
| Q27 | The usual time to peak effect for traditional analgesics (acetaminophen, NSAIDs, and opioids) given orally is: | 47.62% |
| Q34 | Which of the following drugs are potentially useful for the treatment of children's cancer pain? | 47.62% |

*Note:* Questions in red are also the most incorrectly answered pretest items.

## Appendix N

### Posttest Most Correctly Answered Questions

| Question # | Question | Percentage Correct (N=21) |
|---|---|---|
| Q8 | T/F: Infants/children/adolescents may sleep in spite of severe pain. | 100% |
| Q2 | T/F: Because their nervous system is underdeveloped, children under 2 years of age have decreased pain sensitivity and limited memory of painful experiences. | 100% |
| Q22 | T/F: The child/ adolescent should be advised to use non-drug techniques alone rather than concurrently with pain medications. | 95.24% |
| Q3 | T/F: Pediatric patients (infants, children, adolescents) who can be distracted from pain do not have severe pain. | 95.24% |
| Q11 | T/F: Combining analgesics and non-drug therapies that work by different mechanisms (e.g., using acetaminophen, topical anesthetics, sucrose, and non-nutritive sucking) may result in better pain control with fewer side effects than using a single analgesic agent | 95.24% |
| Q18 | T/F: The child/ adolescent with pain should be encouraged to endure as much pain as possible before resorting to an opioid for pain relief. | 95.24% |
| Q19 | T/F: Children less than 8 years cannot reliably report pain intensity and therefore, the healthcare provider should rely on the parents' assessment of the child's pain intensity. | 95.24% |
| Q21 | T/F: After the initial dose of opioid analgesic is given, subsequent doses should be adjusted based on the individual patient's response. | 95.24% |
| Q33 | The most likely reason a child/ adolescent with pain would request increased doses of pain medication is: | 95.24% |
| Q35 | The most accurate judge of the intensity of the child's/adolescent's pain is the: | 95.24% |

*Note:* Questions in red are also the most correctly answered pretest items.