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Virtual Reality Pain Intervention for Pediatric Burn Patients

Tanya Ann Hinrichs

VIRTUAL REALITY PAIN INTERVENTION

FOR PEDIATRIC BURN PATIENTS

TANYA ANN HINRICHS

Submitted in partial fulfillment of
the requirement for the degree of
Doctor of Nursing Practice

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Scholarly Project Approval Form

This is to certify that **Tanya Hinrichs** has successfully presented her scholarly doctoral project entitled **"Virtual Reality Distraction for Pediatric Burn Patients"** and fulfilled the requirements for the Doctor of Nursing Practice degree.

Date of presentation: April 13, 2023

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Table of Contents

Presentations

Virtual Reality as a Healing Modality
May 12, 2021
Hennepin Healthcare
Minneapolis, MN

Virtual Reality as a Healing Modality
April 13, 2023
Augsburg University Graduate Faculty
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Abstract

Burns can be devasting trauma in the pediatric population, leading to lifelong physical and psychological pain and anxiety. Burn pain management is complicated and undertreated traditionally. The purpose of this scholarly project is to examine the use of virtual reality (VR) for distraction in pediatric patients who have experienced a burn to determine if VR improves pain management during painful procedures. A literature review revealed a gap in pain management in pediatric burn survivors with just traditional pharmacologic analgesia during painful procedures. Leininger's Culture Care Theory provides a theoretical framework for this project's purpose to determine if implementing a virtual reality distraction program will assist pediatric burn survivors in managing pain, thereby improving psychological well-being. A partnership with an urban outpatient burn clinic was cultivated, and a Virtual Reality program was created and implemented within an outpatient burn clinic setting. Virtual reality distraction intervention was conducted during painful procedures in an outpatient setting, and evaluation was conducted following the intervention. The results of the project and evaluation revealed that virtual reality distraction is an effective non-pharmacological adjunct in reducing procedural pain for pediatric burn survivors.

Keywords: analgesia, anxiety, burn, distraction, pain, pediatrics, virtual reality

Impact of Virtual Reality on Pediatric Burn Patients

Chapter 1: Introduction

Burn injuries in children are traumatic with lifelong implications. According to Toon et al. (2011), a burn is the third leading cause of childhood trauma, and appropriate pain management remains deficient. Current research suggests fewer than half of the patients receive adequate pain management (Toon et al.). In addition, Toon et al. state that burns injuries are complex, and if left untreated, can cause physiological and psychosocial damage leading to chronic pain and anxiety, potentially delaying wound healing, and lengthening the recovery time. Some barriers to pediatric pain management include a lack of pediatric, specially trained providers proficient in pediatric pain assessments and a lack of knowledge of holistic healing modalities by primary care providers regarding treatment options. Byers et al. (2001) revealed that burn patients report higher pain levels during procedures than at rest. Ongoing treatment plans for pediatric burn patients include repeated visits for scar revisions, dressing changes, and follow-up appointments, as well as painful procedures. Pain management after burn injuries is an essential part of a comprehensive treatment program that involves multiple modalities, including long-acting and short-acting opiates, anxiolytics, and non-pharmacological techniques (Faber et al., 2013). At the Outpatient Burn Clinic, children requiring burn dressing changes currently receive narcotic pain medications while using toys as a distraction. Research shows the benefit of combining traditional pharmacologic pain management and non-traditional healing, including distraction utilizing virtual reality (VR), is beneficial (Faber et al., 2013). Consequently, the purpose of this scholarly project is to determine if the use of VR for distraction in pediatric burn patients improves pain management during painful procedures at a metropolitan Outpatient Burn Clinic.

Problem Statement

Burns can be a devastating type of trauma in the pediatric population. Burn trauma is complex resulting in local and systematic effects, inflammation, and multi-organ injuries (Evers et al., 2010). Pain management after burn injuries is an essential part of a comprehensive treatment program that involves multiple modalities, including long-acting and short-acting opiates, anxiolytics, and non-pharmacological techniques (Gandhi et al., 2010). Burns are debilitating injuries in which controlling pain can help improve healing time. Mismanaged pain control has adverse physiological and emotional effects, which leads to complications. The psychological consequences of undertreated pain include stress and anxiety, which can lower the pain threshold, and post-traumatic stress disorder symptoms. Patients with anxiety, fear, and pain can lead to poor compliance with rehabilitation therapy providing other adverse outcomes.

Children are resilient; however, burn pain is complicated. Burn treatment can last several months to even years. Undertreated pain can result in non-compliance with treatment and, consequently, prolonged healing (Faber et al., 2013). Children can sustain lifelong physical, emotional, and psychosocial injury from a burn. A comprehensive pain management program to help the pediatric population minimize the extent of long-term damage is essential.

Purpose of the Scholarly Project

The management of pain in pediatric patients who have experienced a burn is a significant concern. A comprehensive pain management program can help the pediatric population minimize the extent of long-term damage. At a metropolitan Outpatient Burn Clinic, medications and a toy for distraction help with pain during dressing changes. Research has shown that VR can be a great distraction (Faber et al., 2013). The purpose of this scholarly

project is to examine the use of VR for distraction in pediatric patients who have experienced a

burn to determine if VR improves pain management during painful procedures.

Clinical Question

Does the use of VR as a means of distraction in pediatric patients who have experienced a

burn improve their management of pain during painful procedures?

Objectives

The objectives of this scholarly project are the following:

- Explore the pain management strategies used at a metropolitan Outpatient Burn

  Clinic for pediatric patients experiencing burn treatment care

- Define the non-pharmacologic benefits of VR distraction to pediatric burn

  patients

- Discuss the proposal to trial the use of VR as a distraction intervention with

  nursing leadership at a metropolitan Outpatient Burn Clinic

- Implement the use of VR distraction with pediatric patients who have experienced

  burns

- Evaluate the results of VR as a distraction modality

Patient Population and Health Care Setting Context

This scholarly project's patient population focuses on pediatric patients who have

experienced a burn being treated at a metropolitan Outpatient Burn Clinic. The pediatric patients

who will be involved in this project will include both males and females, with an age range of

12-20. The criteria for inclusion with VR distraction are pediatric patients with second-degree

burns requiring a painful procedure such as hydrotherapy, wound care, and debridement.

At an Outpatient Burn Clinic that serves a diverse community, the adult and pediatric level one trauma center in downtown metropolitan Minnesota. The urban Outpatient Burn Center provides intensive, acute, and rehabilitative burn care to children and adults from the Twin Cities and surrounding states. They have sustained burn injuries and other complex wounds. The metropolitan Outpatient Burn Clinic provides follow-up for burn patients. This clinic treats approximately 20 patients of all ages per day.

Population That Benefits from the Practice Innovation

Traumatic injuries incurred by children affect everyone. The benefits of improved pain management in pediatric burn patients affect the patients, parents, other family members, and healthcare providers such as the nurses and doctors. Children who sustain burn injuries need comfort and support. The recovery of a burn patient is a life-long process in which supportive relationships from family members, close friends, and their healthcare team can make their transition through the stages of healing better.

DNP Essentials

This scholarly project integrates the Essentials of Doctoral Education for Advanced Nursing Practice (DNP). According to the American Association of College of Nursing [AACN] (2006), DNP Essential III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice is achieved by synthesizing the research literature and applying the evidence-based results to this project. VR distraction in pediatric burn patients utilizes DNP Essential VII: Clinical Prevention and Population Health for Improving the Nation's Health by implementing techniques to potentially prevent chronic pain and illness, leading to the overall health and healing of the pediatric burn population. Lastly, this scholarly project applies DNP Essential

VIII: Advanced Nursing Practice by focusing on caregivers' specialized and complex care to establish new ways of reaching this population to improve their health and healing.

Burn injuries in pediatric patients can result in many painful procedures, causing lifelong suffering if untreated. This scholarly project attempts to provide an alternative practice for pain management in pediatric patients by combining traditional pharmacological and non-pharmacological pain healing modalities such as VR for distraction in pediatric burn patients. Implementing a new pain management protocol will benefit pediatric patients at a metropolitan Outpatient Burn Clinic. Chapter 2 will describe the concepts of burn treatments in children, how pain is managed, adverse effects of pain management, non-pharmacological interventions, and benefits of VR distraction.

Chapter 2: Literature Support

Understanding the challenges of pediatric burn patients is essential. Children must often endure painful procedures as part of their treatment for various burn treatments (American Burn Association [ABA], 2020). Current literature on pediatric burn pain management guides this scholarly project as pain is traditionally undertreated. It is imperative to understand the most common types of burn injuries in children, how pain is managed, and where improvement in care can be made. The literature search will explore topics of the effect of burn injuries on pediatric patients and their families, pain management, virtual reality distraction as a healing modality, limitations of research, and the concept of caring.

Burn Injuries

Burns is one of the most physically and psychologically devastating forms of trauma in children and traumatic for the entire family. ABA (2020) estimated that approximately 486,000 patients suffered burn injuries that required medical care in 2015. The Centers for Disease Control and Prevention (CDC) Web-based Injury Statistics Query and Reporting System (WISQARS) showed that in 2015 there were 3220 fatal and 405,327 non-fatal burn-related injuries (CDC, 2020). Burn injuries have a multifactorial nature due to socioeconomic, environmental, and domestic factors. The 2015 ABA report that 73% of burns occur at home and that 96.8% of burns are survivable (ABA, 2020). This section will describe burn injuries in children, the effects of burn injuries on families and healthcare workers, and burn treatments.

Burn injuries are preventable. According to Johns Hopkins Medicine (n.d.), the two most common types of burn injuries in pediatric patients are scald and flame burns. Flame and fire burns are typically associated with the highest complications and most hospitalizations compared to other types of burns (ABA, 2020). Flame burns are considered burns from matches, cigarette

lighters, fireplaces, or firepits (Greenhalgh et al., 2016). In comparison, scald injuries are the second most common injury and have the lowest rate of complications (ABA, 2020). Scald burns are caused by tipping scalding liquids in the kitchen or bathtubs scalds associated with a lack of supervisor or child abuse (Greenhalgh et al., 2016). Pediatric burns are mostly preventable, so it is essential to look at the risks of burns.

Burn Injuries in Children

Children are at significant risk for burn injuries due to developmental and socioeconomic reasons. Thomson et al. (2019) exert children under the age of four are at the highest risk of sustaining burns due to decreased mobility and gait, desire to explore their environment, undeveloped risk perception, and smaller total body surface area (TBSA) than adults. In addition, Thomson et al. (2019) identified that teenagers are also at increased risk for burn injuries as they exhibit high-risk behaviors experimenting with electricity, fires, fireworks, and gun powder.

Poverty is the most significant risk factor for children sustaining burn injuries. Low-income families living in rural areas can put children at risk for burn injuries (Edelman, 2007). Some rural communities lack the modern infrastructure that urban communities have. People in rural areas rely on fireplaces, propane, or kerosene for home heating sources (ABA, 2020), which can put children at risk of burns. According to Forjuoh (2006), people in rural areas also lack access to specialized burn centers requiring traveling several hours for specialized care or even primary care. Rural areas have extended response times for emergency services that limit first responders and firefighting access. Patel et al. (2018) report flame burns are the most common burns in rural areas where bonfires and camping are popular.

Poverty-stricken overcrowded urban living puts children at risk for burn injury. Patel et al. (2018) report scald burns are common in urban living areas. According to Patel et al. (2018),

children living with multiple family members in a one-bedroom apartment lack access to safe

cooking, separating meal preparation areas from children's play areas. These families also do not

have the money to afford fire safety devices such as outlet covers, infant tubs, fire extinguishers,

smoke, and carbon monoxide detectors. Renters in low-income housing units also lack access to

controlling the water heater in their apartments. The use of unsafe heating sources like kerosene

heaters is easily accessible to young children can cause burns.

Children's domestic living conditions can also put children at risk for burn injuries. Low-

income parents tend to have minimum wage jobs, little education, and live paycheck to paycheck

(Delgado et al., 2002). Parents' lack of understanding of burn injury prevention and lack of

supervision can increase the incidence of burn injury (Delgado et al., 2002). According to

Delgado et al. (2002), girls over four years old are more prone to scald injuries as they help their

mothers in the kitchen. Scald injuries occur when a child reaches for a container of hot liquid

spilling on them. Single-parent homes can also increase the risk of burn injuries (Edelman,

2007). Educating parents is imperative in burn injury prevention.

Effects of Burn Injuries on Families

Pediatric burns are traumatic events affecting the entire family. Parents are likely to

present during the child's traumatic injury and often feel guilt for the harm (ABA, 2020).

Hospitalization inevitably leads to separation from home and the disruption of family life, and

the parents of children who have burn injuries are most affected (Bakker et al., 2013). Parents of

burn survivors experience significant psychological distress with low levels of resilience (Bakker

et al., 2013). Healthcare team members need to support parents to support their burn-injured

children.

Parents need to help their children cope while in the hospital and upon discharge home. According to Martin et al. (2017), parents suffer substantial stress, anxiety, and depression while making complex treatment decisions seeing their child in pain while in the hospital. Burn parent survivors experience significantly more post-traumatic stress disorder (PTSD) symptoms than the general population (Martin et al., 2017). According to Martin et al. (2017), parents experiencing stress have lower resilience levels and have an increased incidence of PTSD. Healthcare providers need to create opportunities for parental empowerment while their child is healing from a burn injury. Virtual Reality (VR) distraction gives parents an opportunity for empowerment to assist the child with VR programming and headset use.

Parents are the child's primary caretaker upon discharge home. While at home, parents deal with the social consequences such as strained family relations and alterations in daily life after a burn injury (Bakker et al., 2013). Burn injuries affect the entire family and should be considered when caring for children with burns.

Effects of Burn Injuries on Health Care Workers

Burnout is a harsh reality for healthcare workers. Burnout is defined by feelings of inefficacy, cynicism, and emotional exhaustion, affecting healthcare providers' performance and well-being (Rafii et al., 2007). Burn care exposes healthcare workers to factors that cause burnout, such as providing direct medical care, advocating for patient needs, and comforting patients and families.

Healthcare workers become part of the burn patient's support system, much like an extended family. Burn patients can spend a lot of time recovering from a burn injury in the hospital. According to a study conducted at Johns Hopkins, burn care nurses have higher emotional exhaustion rates and burnout than other critical care nurses (Markiewitz et al., 2019).

Healthcare workers are prone to developing burnout, so managers should facilitate a supportive environment for their nurses to improve morale.

Burn Treatments

Burn treatment is a complex and evolving undertaking that involves many components, including burn dressings, infection control of the burn wound, fluid resuscitation, and burn surgeries (Greenhalgh et al., 2016). Applying dressings began in ancient times to prevent infection, promote epithelialization, avoid water and heat loss, keep the wound moist, and decrease pain (Greenhalgh et al., 2016). Traditional treatment of burn scars included debridement surgery, corticosteroid injections, and a multitude of ointments such as Vitamin A and Silvadene, as well as silicone patches and dressings (Greenhalgh et al., 2016). Burn treatments continue to evolve, improving patient outcomes.

The evolution of burn treatment has been substantial in the last decade. Tissue-engineered skin substitutes, which function the same as intact human skin and amniotic membrane allografts such as dHACM, have shown exceptional healing properties (Supp & Boyce, 2005). Recently the advancement in the laser technology has improved the treatment of burn patients. Today, pulse-dye laser (PDL) is used to treat immature scars in which the scar maturation has not yet finished (Żądkowski, 2016). However, carbon dioxide (CO_2) lasers effectively treat scars when at least one year has passed since the trauma burn injury (Żądkowski, 2016). As burn treatments evolve, scaring will lessen, and pain management will also improve.

Pain Management

Pain is a noxious stimulus that people can interpret differently, depending on many factors such as past experiences, pain perception, cultural conditioning, and pain threshold (Tully

et al., 2018). In patients with substantial burn injuries (> 20% total body surface area), Tully et al. (2018) identify that adequate sedation and pain control are difficult to obtain during dressing changes. Current practices during dressing changes include the use of benzodiazepines, NSAIDs, and narcotics for pain control. The administration of these medications has been unsuccessful in controlling pain for patients who require large total body surface area dressing changes (Tully et al., 2018). Thus, there is a need for a change in practice.

Pain does not just elicit a physical response but an emotional response as well. Evaluating pain and keeping it at an acceptable level requires proper patient care that is just as important and basic as assessing and managing temperature, blood pressure, respiratory rate, and heart rate (Walid et al., 2008). If a patient's pain is controlled, there are fewer psychological side effects, ultimately decreasing the patient's procedural time length (Walid et al., 2008). Pain is just as important as monitoring all other aspects of the patient's physical, mental, and emotional well-being.

Pain control is a significant problem in the burn patient population. According to Walid et al. (2008), pain should be viewed as the fifth vital sign to decrease patients' physical and psychological consequences and decrease health care costs. Historically burn pain has been controlled with a combination of over-the-counter analgesics, nonsteroidal anti-inflammatory medications, opioid analgesics, and sedatives (Pardesi & Fuzaylov, 2017). This section will describe the different types of pain, traditional pharmacological pain treatment, the effects of pain and psychological distress in burn patients, opioid use disorder, and the negative consequences of undertreating burn pain.

Types of Pain

Childhood burns are a profoundly traumatic and painful experience. Burn pain remains undertreated despite the prevalence and severity of burn injuries in children. Burn patients have complicated pain phases, including background pain, procedural pain, and perioperative pain (Pardesi & Fuzaylov, 2017). It is essential to understand the types of pain burn patients endure. The first type of pain is background pain.

According to Pardesi and Fuzaylov (2017), background pain is when continuous burning and throbbing sensation is present at rest and is relatively constant. The severity of background pain varies between individuals. In addition, Pardesi and Fuzaylov (2017) identify that background pain is multifactorial and complicated to control. The medications most frequently used to treat background pain include acetaminophen combined with nonsteroidal anti-inflammatory drugs. The authors state that intense background pain management also has the addition of morphine-derived opioids. Neuropathic pain is also a chronic, frequent pain that is difficult to treat and is not widely studied in the pediatric burn population. Gabapentin is used as an adjunct pain medication to treat neuropathic pain (Pardesi & Fuzaylov, 2017). Burn patients endure many procedures while recovering from a burn injury. The second type of pain is procedural pain.

Procedural pain is more intense pain than background pain. According to Pardesi and Fuzaylov (2017), procedural pain occurs when mechanical stimulation of the injured site during the removal of dressings, cleansing, and debridement occurs, and the pain can continue for minutes to hours after the procedure is complete. Pardesi and Fuzaylov (2017) described procedural pain as having an intense burning or stinging sensation. Procedural pain management varies in a combination of propofol, ketamine, and dexmedetomidine to cause deep sedation

combined with opioid analgesics. Burn patients likely require skin grafting to heal from their burn injury. The third type of pain is postoperative pain.

Postoperative pain is an anticipated and temporary pain (2 to 5 days) increase in background pain following burn excision and grafting procedures (Pardesi & Fuzaylov, 2017). It is most commonly the result of increased pain from newly created wounds at the skin graft harvesting site (Pardesi & Fuzaylov, 2017). Healthcare providers' understanding of the types of pain ensures that patients' burn pain can be better managed. Now that the types of pain are described, understanding pharmacological medications is essential.

Traditional Pharmacological Pain Treatment

Opioid analgesics remain the primary treatment for burn pain, but pain medications have many adverse side effects that limit use. A traditional pharmacological regime includes a combination of acetaminophen, a nonsteroidal anti-inflammatory such as Motrin, an opioid such as Morphine or Dilaudid, Gabapentin for neuropathic pain, and Benadryl for pruritis (Pardesi & Fuzaylov, 2016). Many types and combinations of medications are used to treat burn patients.

It's imperative to monitor medications' side effects and interactions, especially for the pediatric population. According to Greenhalgh et al. (2016), opioid side effects include respiratory depression, constipation, pruritus, nausea and vomiting, medication tolerance, and addiction. Some concerns can consist of physiological tolerance with possible dependence on opioids, medication side effects, prolonged healing times, and hospital stays (Greenhalgh et al., 2016). Burn patients are quickly dependent on prescription medications for their activities of daily living.

The epidemic of prescription narcotic dependence, overdoses, and death in the United States is substantial. According to Tully et al. (2018), from 2000-2014 in the United States,

nearly half a million people died from a drug overdose, with prescription drugs being the highest number of incidents. Recently, considerable attention regarding the effects of opioid use disorder worldwide has been termed an "epidemic" by the World Health Organization (Wu & Clark, 2013, p. 23). It is imperative to consider the possibility of narcotic dependence with patients who have experienced burns.

Pain and Psychological Distress in Pediatric Burn Patients

Both pain and anxiety are experienced among pediatric burn patients. Burn patients have psychosocial adjustment challenges due to the nature of their injuries. According to Greenhalgh et al. (2016), procedural and baseline anxiety can increase a patient's perception of pain and should be treated aggressively. Burn care has to support the whole person healing the mind, body, and spirit. Druery et al. (2005) noted burn patients could achieve functional independence and reasonable quality of life in the long term with the current advances in burn treatment technology. Pain is a multidimensional complication from a traumatic burn injury in which a combination of pharmacological and non-pharmacological approaches has proven to be more effective.

Delirium is a common problem in the acute phases of burn survivor healing. The opiates and benzodiazepines required to treat pain and anxiety can also cause delirium (Patterson et al., 2017). Patterson et al. (2017) estimate that delirium is common, occurring in 17–47% of critically ill children, with young children (< 5 years) the most vulnerable. Patterson et al. (2017) report delirium can confuse, reduce environmental awareness, impaired attention, problems with short-term memory, irritability, agitation, quietness, lethargy, and hallucinations. Evaluating and intervening when a patient becomes delirious will help decrease the incidence of delirium.

The psychological distress caused by body image disturbances is common among pediatric burn patients. Over the past decade, profound medical and technological advances in burn care have made it possible for children with burns covering up to 100% of the total body surface area (TBSA) to survive (ABA, 2020). Wurzer et al. (2017) reported burned children remain self-conscious concerning body image through burn injury recovery. Post-burn scarring often causes disfigurement, which negatively impacts the quality of life (Wurzer et al., 2017). Self-image disturbances can affect a pediatric patient's psychological well-being.

Consequences of Undertreated Pain

Undertreated pain is historically common in pediatric burn patients. Greenhalgh et al. (2016) report that undertreated childhood burn pain has long-standing negative consequences on children's physical and psychological well-being. According to Greenhalgh et al. (2016), inadequate pain control is linked to increased treatment non-compliance, depression, and post-traumatic stress disorder. Pardesi and Fuzaylov (2016) noted profound psychological consequences to undertreated pain such as long-term alternations in pain processing, acute stress symptoms, intense future pain responses with dressing changes, non-compliance in physical therapy, therefore, increasing the likelihood of permanent disability and post-traumatic stress disorder. When pain and anxiety are better controlled, Pardesi and Fuzaylov (2016) found that patients had faster re-epithelialization of their wounds and a decrease in stress response, which has been shown to slow wound healing. Improved pain control allows patients to tolerate necessary dressing changes and rehabilitation that is required to minimize long-term disability (Pardesi & Fuzaylov, 2016). To aid in treating pain, non-pharmacological interventions combined with analgesics improve pain management.

Pain after burn injury is unique in many respects and has been historically undertreated, causing severe psychological consequences. Burn patients are prone to depression (PTSD), suicide, non-compliance with rehabilitation, and prolonged wound healing (Tully et al., 2018). Psychologically based adjuncts to pain medications are desirable because they seldom have side effects (Dalal et al., 2010). While opioids are necessary for burn patients during their healing and rehabilitation phases, healthcare providers need to exercise caution to avoid narcotic addiction and dependence.

Undertreated pain can be a financial hardship for families. Mashreky et al. (2008) report that the cost incurred by families for the treatment of each burn patient was $220, which is approximately four times higher than any other injury. Families with children who have experienced burns are also financially responsible for the cost of medicine, transportation, food, and accommodations while away seeking treatment for their burn injuries (Mashreky et al., 2008). So, it remains imperative to ensure adequately treated pain to minimize the length and amount of burn treatments a patient endures.

VR as a Supplement to Analgesics

VR can complement analgesics to provide better pain management. According to Faber et al. (2012), virtual reality (VR) offers a psychologically based approach to pain that seems to have potent and promising analgesic effects. A controlled study by Schmitt et al. (2010) reported a forty-four percent decrease in pain ratings using VR. Faber et al. (2012) also found that repeated virtual reality use over multiple therapy sessions maintained the analgesic effects. Das et al. (2005) reported strong evidence that VR with analgesics was significantly more effective in pain reduction than painkillers alone. According to Faber et al. (2013), VR has been shown to offer improved pain management that seems to have a potent and promising analgesic effect with

minimal side effects. A study by Sil et al. (2014) demonstrated significant improvement in pain tolerance during interactive videogame distraction conditions. According to a study by Burns-Nader et al. (2017), when patients' pain and anxiety are minimized, they can better cope and focus on healing. VR has been shown to provide improved pain management with few side effects.

The video gaming distraction proved to be an effective treatment in pain control. A controlled study by Sil et al. (2014) demonstrated significant improvement in pain tolerance during interactive videogame distraction conditions. By comparison, a study by Parker et al. (2016) utilized the Nintendo Wii as distraction therapy, which was associated with reducing pain and fear-avoidance while promoting or maintaining joint range of motion (ROM). Brown et al. (2012) found a link between reduced pain, stress, and anxiety and improved healing time in acute burn wounds. This study would be significant for patients and health care providers having applications for all health care procedures which require pain or stress management, not just acute burns. Adequate and appropriate pain management is essential to ensure that symptoms secondary to pain experiences do not become habitual. Moreover, unrelieved pain can produce severe physiological and psychological consequences leading to an increased risk of morbidity and even mortality (Greenhalgh et al., 2016). When comparing the research articles, all reported improved pain management when combining pharmacological and VR distraction.

VR treatment can make rehabilitation fun for pediatric burn patients. Schmitt et al.'s (2010) study showed a reduction in pain by patients who experienced VR distraction. They conducted a randomized, within-subjects, clinical trial quantitative study at the University of Washington at Harborview with a sample size of fifty-four patients. The researchers measured pain levels using the graphic rating pain scale, and the physical therapist measured the maximum

range of motion for the treated area using a goniometer. Findings showed that VR distraction

statistically reduced pain and made treatments fun. However, it did not significantly improve

range-of-motion (Schmitt et al., 2010). It would be beneficial to investigate further the

mechanisms and ideal applications of VR pain reduction techniques. Schmitt et al. (2010)

showed that VR distraction is a valuable and powerful adjunct for enhancing pain control during

rehabilitation therapy in the pediatric burn patient population. Schmitt et al. (2010) reported the

analgesic effects of VR were maintained with repeated treatments. Therefore, pain experiences

can significantly impact the immediate and longer-term quality of life and young people's well-

being.

Virtual Reality as a Distraction Modality

Distraction has been the most widely accepted non-pharmacological pain management

technique healthcare providers, and parents use. According to Burns-Nader et al. (2017),

distraction works on the assumption that by shifting a patient's attention to something pleasant,

their capacity to process painful stimuli is hindered, thereby reducing pain, distress, and anxiety.

Distraction works best by engaging multiple senses (Burns-Nader et al., 2017). According to a

study by Khadra et al. (2018), VR is a distraction method that provides the user with real-time

interaction, which is immersive and multi-sensory. Virtual reality is a distraction technique that

engages multiple senses, such as vision, hearing, and sometimes touch, a more significant

distraction technique.

Distraction is a promising tool to reduce pain and anxiety in the pediatric population.

Burns-Nader et al.'s (2017) clinical trial showed a reduction in pain by patients who experienced

VR distraction at the University of Alabama. The researchers measured pain levels using the

FACES pain scale. The researchers also measured emotional responses using the children's

emotional manifestation scale before, during, and after the hydrotherapy treatments. The findings demonstrated that VR distraction showed statistically reduced pain and stress levels (Burns-Nader et al., 2017). Burns-Nader et al. (2017) reported that VR distraction is a valuable tool for improving pediatric burn patients' pain and anxiety during hydrotherapy.

Virtual reality essentially delivers multi-sensory, cognitive, and engaging activities that can be modified to meet patients' individual needs to ensure motivation and engagement. Offering different VR programming options for patients provides a sense of control over what may happen during their treatments. This type of distraction diverts patients' attention away from the sights and sounds of the procedures to reduce the impact these experiences have on their fear and response to the painful procedure. Miller et al. (2010) found that the choice of distraction gave the child a sense of control and more motivation within the procedural environment. Miller et al. (2010) identified that distraction might reduce the level of anxiety about a procedure. The possibilities of a wide array of games and programs help engage patients of many different age groups and cognitive abilities.

Virtual reality is a non-pharmacological distraction tool that offers a multi-sensory healing modality that engages children, which seems to have an unusually potent and promising analgesic effect with few side effects (Burns-Nader et al., 2017). Miller et al. (2010) found it challenging to provide age and developmentally appropriate VR interventions to a child receiving burn-related procedural treatments. Treatment methods, such as VR distraction, have been shown to enhance traditional analgesic interventions improving pediatric pain management with minimal side effects (Burns-Nader et al., 2017). Thus far, the literature is still unclear regarding the efficacy of virtual reality distraction in pediatric burn patients. There is an opportunity for further research to be supported surrounding this topic. As technology advances

become cheaper as alternative therapies such as VR, further research is justified to incorporate VR distraction in other clinical settings. Nurses should advocate for VR distraction and possibly support creating a VR distraction program within inpatient and emergency department settings. Caring for the pediatric patient is essential.

Caring

Caring as a concept is embedded in nursing practice. Watson (2008) describes the caring process as encompassing factors that help a patient attain or maintain health or die with dignity in a peaceful manner. In comparison, Leininger (1995) concluded that nursing was concerned with caring behavior, caring processes, and caring relationships, unlike any other profession. According to the ABA (2020), burns are the most physically and psychologically devastating forms of trauma in children. Significant advances in burn treatment have allowed severely burned patients more remarkable survival, but these advances can overshadow the core of nursing, which is caring. VR provides a full spectrum of care for patients of any age and culture. The concept of care will be explored and applied to the pediatric burn patient population.

Caring is an elusive term; there is no consensus in defining caring, the components of care, or the process of caring. Caring is an innate human trait, but nurses have a more extraordinary ability to provide care influenced by their education and experience. According to Watson (2008), caring is a moral imperative as nurses have a duty and are committed to maintaining their patient's dignity while providing care. In addition, Watson identifies that caring is an interpersonal relationship between nurse-patient which is supportive, compassionate, and understanding. Caring is also a nursing intervention that encompasses patient physiologic and psychologic quality of care.

Patient and family-centered care are essential in pediatric burn care. The Institute for Patient and Family-Centered Care [IPFCC] (2020) defines family-centered care (FCC) as encompassing four core concepts: respect and dignity, information sharing, participation in care and decision-making, and collaboration between patients, families, and the healthcare team. In pediatrics, respect and dignity encompass how the child and the child's family are treated; information sharing involves communicating with and making information available to patients and families in formats they understand.

The caring practice promotes the holistic needs of pediatric patients. Effective caring promotes holistic health that includes family involvement, which is vital for pediatric patients. Caring is a significant concept by which the nurse develops trusting and transpersonal caring relationships while showing love and compassion, inclusive, circular, and expansive (Watson, 2008). Nurses have a moral commitment to promote human dignity and healing while showing compassion (Watson, 2008). Caring is multidimensional and inclusive of the holistic needs of the patient.

Leininger views the concept of caring as the focus of nursing. Human care refers to a specific phenomenon characterized to assist, support, or enable another human being or group to achieve one's desired goals (McFarland & Wehbe-Alamah, 2018). Care is a significant concept that includes both etic and emic care, influencing diverse cultures' health (Leininger & McFarland, 2005). Nurses who practice cultural care can incorporate nursing care activities while maintaining their cultural values related to their healthcare conditions.

Nurses and healthcare providers are strong advocates for exploring non-pharmacological coping modalities to improve pediatric burn patients' pain management techniques. This literature review examines some of the current knowledge related to VR distraction in pediatric

burn patients undergoing painful procedures. Researchers found statistically significant data to conclude that VR distraction is an effective non-pharmacological intervention (Das et al., 2005). In that case, all clinicians should support incorporating VR distraction during painful procedures regardless of a patient's age. Improving pain management may occur by combining pharmacological with non-pharmacological interventions during a painful procedure. Pain management is essential in treating pediatric burn patients to improve healing and minimize the long-term psychological effects of the necessary painful procedures required to heal.

Care is a significant concept that includes both etic and emic care, influencing diverse cultures' health. Many similar themes and outcomes surrounding the effectiveness of using VR distraction as a non-pharmacological healing modality appeared in the literature. The most common result was that VR distraction was beneficial as a non-pharmacological healing modality in pediatric burn patients (Burns-Nader et al., 2017). VR distraction literature was limited, being inpatient, but outpatient use should be expanded. This information will help provide a foundation for this scholarly project for the importance of VR distraction as a non-pharmacological healing adjunct with pharmacological pain treatment. Burn patients benefit from adequate pain management and family support to heal from their burn injury. Chapter three will discuss the conceptual and theoretical framework used to guide this project.

Chapter 3: Conceptual and Theoretical Framework

Providing care by minimizing suffering is especially important when working with pediatric patients. The management of burns in pediatric patients is unique and should be individualized. Traditionally burn pain in pediatric patients has been managed with pharmacological pain interventions; however, pain is rarely well managed (American Burn Association, 2020). Virtual reality (VR) promotes individualized patient care by offering interventions that allow distraction capability to improve pain management with pediatric patients ultimately. Leininger's theory of Culture Care Diversity and Universality (CCDU) will guide this scholarly project. Leininger believed that culture was the broadest, most comprehensive, holistic, and universal feature of human beings where care is embedded in culture (Leininger & McFarland, 2005). Leininger's (1995) theory encourages Doctor of Nursing Practice (DNP) family nurse practitioners (FNP's) to provide patients care that is culturally congruent and holistic. Using Leininger's Sunrise Enabler as a guide, this scholarly project will focus on the concepts of culture care, the cultural and social structure dimensions, and nursing care decisions and actions of negotiation and accommodation.

Theoretical Framework Guiding Project and Application of Leininger's Concepts

Our multicultural world has made it essential that nurses understand that people of different cultures have varying values. Leininger (1995) exerted that care is the essence of nursing, but culture care was lacking and required more inclusive care to people of diverse backgrounds. Leininger (1995) developed her Sunrise Enabler Model to help nurses assess persons' cultural worldview and social structures within a culture. She emphasized that there are shared cultural features, values, and individual variations within a cultural group. Leininger's theory encourages nurses to discover care knowledge within the culture or emic knowledge.

Professional care is based on etic knowledge, which is considered the outside perspective, as

learned from outside one's culture (Leininger, 2006). The Sunrise Enabler provides a meaningful

conceptual guide for nurses to gather emic (insider) information about their patients' cultural and

social dimensions. Leininger's (2006) Sunrise Enabler emphasizes three key nursing actions for

promoting health and well-being: culture care repatterning, culture care negotiations, and culture

care maintenance (see Figure 1). These nursing actions are essential to guide culture caring.

Figure 1

Leininger's Sunrise Enabler
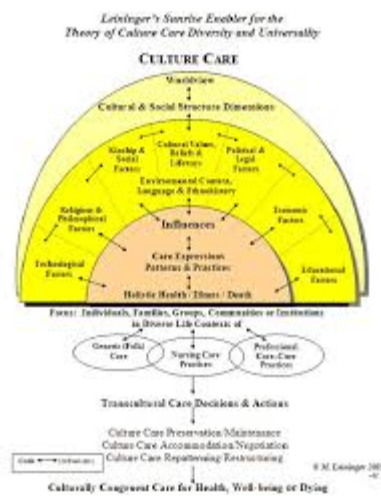
(Leininger & McFarland, 2006)

The cultural and social dimensions unique to a culture provide the basis for care

expressions, which lead to holistic health patterns and practices. The nurse's awareness to

understand the customs and traditions within the worldview of an individual, group, family,

community, or institutional setting can help identify the specific meanings and expressions

related to their care and health (Leininger & McFarland, 2006). When caring for diverse patient

populations, it is imperative to understand each patient's emic or insider view, as well as their

lived experience, when developing an inclusive plan of care.

The theoretical framework by Leininger (1995) will be used to guide the scholarly project of integrating a non-pharmacological healing modality for pediatric patients experiencing burns while exploring ways to improve culturally competent care. The Sunrise Enabler highlights "religion/spirituality, kinship/social ties, politics, legal issues, education, economics, technology, political factors, philosophy of life and cultural beliefs and values with gender and class differences," as areas that influence worldview and lifeways (Leininger & McFarland, 2006, p.14). These cultural and social dimensions are essential to consider when caring for patients.

Culture Care

Nursing is a calling, and care is an essential concept in nursing. Many nurses instinctively provide the concept of caring without thinking about theories. Healthcare professionals must be sensitive to how cultural or emic practices can affect patients and families in all phases of the burn recovery process. Nurses need to be sensitive to patients' needs based on their cultural traditions and understand the importance of providing culturally congruent care.

Nurse Practitioners build rapport by providing culturally congruent care, which improves the provider-patient relationship. Cultural congruent care can increase patient satisfaction, improve patient outcomes, enhance patient collaboration, and provide a faster recovery rate (McFarland & Wehbe-Alamah, 2018). By understanding the patient's perspective on what they determine to be good care based on their cultural perspective, healthcare professionals can provide an environment of holistic healing.

Cultural and Social Structure Dimensions

In today's society, cultural and social dimensions are more diverse and intertwined as our global community expands, and our healthcare system should evolve to include cultural care. Cultural attributes of children and families should not be limited to race or ethnicity but also

inclusive to kinship, social factors, educational factors, economic and technological factors (Leininger, 2006). These attributes require establishing trust in the healthcare team and culturally appropriate communication patterns, which may include educational and language barriers for some patients.

Trust and Communication

Trust and communication with the healthcare team can be challenging. Healthcare professionals must develop a trusting relationship with pediatric patients and their families to establish a trusting healing relationship. Building a trusting relationship between patients and healthcare providers can improve patient outcomes (Parker & Smith, 2010). At the same time, barriers in communication can cause barriers such as mistrust of the healthcare professionals (Parker & Smith, 2010). Healthcare professionals can easily be misunderstood as judging when speaking to patients and their families. Developing a trusting relationship with the healthcare team is vital for all patients but establishing this trust within a cultural context is essential for providing pediatric patients' cultural care.

Trust is the first step to developing a rapport with pediatric patients and their families. Trust is a universal obstacle to overcome, as each patient may have a diverse worldview. Healthcare providers who build a trusting relationship with their patients can improve their patients' health literacy by engaging in health education and information sharing, ultimately improving patient experiences and engagement in their care. Leininger noted that when patients trust healthcare professionals, they are confident that the care plan is guided by emic knowledge (Leininger & McFarland, 2006). Promoting efforts to gain trust is a foundational concept in culturally competent care. VR can improve the nurse-patient and nurse-family relationship's

trusting relationship by involving the patient and families in choosing which VR distraction programming will be used during painful procedures.

Cultural Values, Beliefs, and Lifeways

Pain is multifaceted. Cultural beliefs and values are deeply entrenched in how patients and their families deal with pain. Cultural beliefs regarding pain influence the patient and family's preferences for their pain management regime (Bakker et al., 2013). Healthcare providers should identify cultural pain perceptions, review any cultural barriers to pain management techniques, identify cultural pain management differences, then formulate a pain management plan inclusive of patients' input.

Healthcare professionals who learn to incorporate culturally sensitive pain management will be more effective in managing their patients' pain. When treating pain, cultural healing or emic modalities (Leininger, 2006) should be included to provide holistic care. If healthcare workers eliminate cultural biases when treating pain, patients will have a more rewarding recovery process.

Kinship and Social Factors

Kinship or family are essential to the healing of pediatric burn patients. Family is prominent in the decision-making of pediatric burn patients. It is vital to understand the cultural background of families in order to provide culturally congruent care. Leininger & McFarland (2006) noted that values stemmed from familiar upbringing and teaching. Finding out who has the decision-making rights in a family is significant to a caregiver's ability to improve care. Leininger's theory's etic or professional view may be at odds with familial decision-making when viewed through the Western medical model of care, emphasizing individuality in decisions regarding self-determination of care. Accommodating domestic decision-making variations and

exploring the emic view is a premise of Leininger's culturally congruent care (Leininger & McFarland, 2006). Creating culturally competent caregivers requires nurses to look at the whole picture; nurses need to explore the emic values of individuals, families, and community practices to integrate into their care. Leininger guides nurses trained in transcultural techniques to understand the universality and diversity in individuals, families, and communities to provide culturally congruent care.

Family and friends are essential in the successful recovery of pediatric burn patients. Pediatric patients rely on their families for love and support. Pediatric patients who have experienced burns social circle is crucial, as acceptance is essential to their psychosocial well-being and long-term burn recovery. Advances in technology allow pediatric patients to stay connected to their friends via Facetime and interactive gaming. Virtual reality is another way pediatric burn patients can stay connected to their peer group by interactive gaming (Faber et al., 2013), which is crucial for their self-esteem.

Family support is imperative to pediatric burn patient recovery. Families can play an active role in pediatric burn patients' VR programs by interacting and offering appealing software choices. Advanced practice registered nurses (APRNs) need a multidisciplinary approach to focus on parents and their children to support them during the burn healing phases. APRN's should focus on medical, psychological, and general aftercare support and ask the pediatric patients and parents what helps them heal. Pediatric burn families need to feel supported and learn coping skills by attending support groups and coping skills from the healthcare team (American Burn Association, 2020). APRN's need to give the parents tools to empower them in handling societal and psychological issues. Empowering and educating parents ensures they can provide competent care, especially with scars on children.

Educational and Economic Factors

Prevention is key to overcoming additional burn injuries. According to the Centers for Disease Control (2020), many burn patients are from low socioeconomic families. Poverty is the most significant risk factor for children sustaining burn injuries (CDC, 2020). Delgado et al. (2002) report that overcrowding, lack of parental education, not being a child of the head of household, and single-family homes resulting in poverty are significant risk factors leading to child burn injuries. Patel et al. (2018) also identified low-income housing, single-parent families, low parental education as risk factors for pediatric burn injuries. Regardless of rural or urban communities, children living in poverty are marginalized and can have difficulty advocating for themselves.

Poverty-stricken families with low educational levels put children at risk for prolonged healing. Patel et al. (2018) report scald burns are common in pediatric burn patients; these types of injuries require extensive dressing changes. Burn patients require extensive and complicated dressing changes several times a day. Parents with low educational levels may have difficulty understanding the proper steps of these complex dressing changes and wound care even after being instructed (Patel et al., 2018). The substantial cost of the dressing change supplies also puts a financial burden on an already poverty-stricken family. APRN's need to ensure parents can be included in dressing changes while at office visits and teach-back wound care and dressing changes. Poverty-stricken families living in rural areas might also find it a financial burden to come to the Outpatient Burn Clinic for their follow-up appointments, which should also be considered. APRNs need to assess parents' educational and economic status, not assuming that they can afford the necessary wound and dressing care supplies.

Nursing Care Decisions and Actions Using Culture Care Negotiation

Virtual reality is a fast-evolving intervention with new applications devised each day to improve the health care industry. In this scholarly project, VR is being used to distract pediatric patients during or in preparation for medical procedures. VR offers a unique opportunity to combine immersive multisensory distraction (Burns-Nader et al., 2017). Ultimately the goal is to utilize VR as an adjunct to opioid analgesics to decrease opioid use for pediatric burn patients while individualizing the VR intervention that is age-appropriate and culturally and educationally congruent. VR distraction allows the healthcare team to accommodate and negotiate with the pediatric burn patients while providing the necessary painful procedure to recover from their burn injury. VR allows for cultural care accommodation to occur.

Healthcare workers need to be savvy in accommodation when working with pediatric burn patients to gain trust. Culture care accommodation and negotiation allow nurses to provide a supportive role enabling patients to participate in their healing process (Leininger & McFarland, 2006). Pediatric patients have multiple painful procedures in their recovery process, and often they are reluctant to cooperate because of the history of traumatic procedures they have endured. VR allows the healthcare professional and the patient to negotiate which VR distraction programming the patient will experience while remaining still for their painful procedure.

This doctoral project aims to explore the knowledge upon implementing VR distraction as a non-pharmacological healing modality, identify themes of significance, and ultimately disseminate this information to improve cultural humility and sensitivity and promote culturally competent care for pediatric burn patients. Leininger's (2006) social and cultural dimensions guide the scholarly project as each patient has unique needs and life experiences. VR will ensure age and educational appropriate VR programming options for each patient to individualize care.

It is essential to gain an emic, or inside view, of pediatric burn patients' experience through a cultural lens. The themes of trust, communication, kinship, and social factors represent an individual's cultural identity (Leininger, 1995). Nursing care decisions and actions of negotiation and accommodation (Leininger, 1995) take an inclusive, supportive, collaborative journey with pediatric patients and their families to optimize health and healing. Chapter Four will discuss the project, the evaluation process, and critical reflection.

Chapter 4: Methodology and Evaluation

Pain management in pediatric burn patients may be construed as a challenging task. A scholarly project using VR distraction for pain during dressing changes was implemented at an urban clinic specializing in treating patients who have suffered a burn injury requiring outpatient follow-up and continued care. The organization cares for approximately 5,200 burn survivors each year (Hennepin Healthcare, 2019). The healthcare organization employs FNPs to provide primary care in specialties that manage health across the lifespan, including family medicine and pediatrics. The practitioners at the clinic offer follow-up care, rehabilitation after burn injury, and burn dressing changes. The care is individualized to each patient's needs. This chapter will discuss the implementation of VR distraction as a process improvement project for pediatric burn survivors.

Project Implementation

The implementation of this project began by seeking organizational support within the burn department of nursing of a large healthcare facility in metropolitan Minnesota. Considering the potential impact of undertreated pain in pediatric burn patients, the director of nursing acknowledged great benefits to implementing this scholarly project. The individuals who participated in the Virtual Reality were burn survivors 10-20 years of age and consisted of both male and female participants. The participants were recruited through a referral from the child life specialist and primary care provider working at the clinic. Twelve participants participated.

The project setting is a specialty clinic that resides within an urban hospital campus. Care delivery by this team includes evaluation and management of burn survivors for patients of all age spectrums throughout the lifespan. Patients referred to this specialty undergo a multidisciplinary assessment to identify the most appropriate management of burn injury. The

complete workup results in a multidisciplinary plan of care that includes psychiatric support, nutrition support, physical and occupational therapy, wound care, and pain management after a burn injury. This clinic setting as a project site offered engagement in inter-professional collaboration between a multidisciplinary care team to ensure holistic healing for the burn survivors.

Intervention and Data Collection

The participants came to the clinic for their routine follow-up appointment for dressing changes. The child life specialist and provider evaluated their daily patient list and informed this author on appropriate patients for the virtual reality distraction intervention. Due to the nature of the VR intervention, patients with extremity burns were the best candidates for participation. The author met with the patient and their families to discuss the opportunity for the virtual reality distraction during their dressing change. The twelve approached patients agreed to proceed with the virtual reality distraction intervention during their dressing change. The participants received an informational brochure (Appendix A) about the virtual reality distraction intervention during the clinic visit to guide them during the program. The participants also signed the pre-intervention agreement form (Appendix B), which served as their agreement to participate. The participants completed a pre-intervention questionnaire (Appendix C). The participant was oriented to the Oculus Quest virtual reality headset and shown various age-appropriate programs that they could choose from according to their interests. Once this author completed the prep work, the provider was notified that the participant was ready for the procedure. During the procedure, the author evaluated the intervention using the intervention log sheet (Appendix D). The procedures lasted anywhere from 10 minutes to 45 minutes. As a note, patients were also given their standard sedation analgesia regime for the procedure. The author used the

intervention log sheet to record participant age, type of procedure, length of procedure, total body surface area burns, burn location, and sedation analgesia medications administered (Appendix D). At the end of the intervention, the participants with their families were asked to answer the post-intervention questionnaire (Appendix C).

Findings

The findings from the pre-and post-intervention questionnaire data on all twelve participants proved that Virtual Reality distraction was an effective adjunct non-pharmacological healing modality to the traditional medication-only regime. Pre-intervention patient questionnaire data revealed all twelve patients had a baseline pain rating ranging from 1-3 on a FACES scale (Appendix C). Eleven of the 12 participants reported feeling anxious about having their dressing changed because it's a painful procedure. Six of the 12 participants reported being scared before the procedure "crying in the car when driving to their clinic appointment."

Post-intervention questionnaire data revealed that all twelve patients felt the virtual reality distraction pain rating of 2-4 on a FACES scale. Participants reported the VR sessions were soothing, calming, forgot all worries, and were no longer scared. Four of the 12 participants reported they forgot they were at the clinic because they felt like they were "swimming in the ocean with the fish and dolphins." (Participant 6, June 7, 2021) One participant described their VR experience as being "blindfolded and transported somewhere magical and pleasant instead of the treatment room at the clinic" (Participant 12, July 6, 2021). The participants reported that their pain decreased by 24 % after the VR session compared to their regular treatment session. The participants said that VR helped alleviate most of their procedural pain and anxiety about the painful procedure.

The intervention log tracked those six males and six females ages 12- 20 who participated. The procedural medication regime used was weight-based doses of Ketamine. The total body surface area percentage (TBSA) of burn ranged from 3%-30%. The procedure time and the number of VR minutes were the same ranging from 10-45 minutes. All 12 participants had wound debridement dressing changes in the outpatient clinic. Four out of 12 had side effects likely attributed to the VR. One male and one female participant experienced nausea. Two other female participants experienced motion sickness and dizziness. The intervention log provided good procedural information about the length of the procedure, TBSA burn, and side effects.

Developmental Evaluation

The patients and their families provided the primary source of feedback in the post-procedure questionnaire. There is an affirmation that the VR distraction lessened the suffering of pediatric burn survivors. The feedback also provided constructive critique in future applications of VR during painful procedures. The most common suggestion provided in the post-procedure questionnaire among the respondents reported was to have the program available when they come to the clinic for their dressing changes in the future. One of the respondents recommended not using the roller coaster program in the future because he "got a bit motion sick" during the procedure (Participant 1, June 7, 2021). Three other participants recommended having more diverse programming options available as everyone has different interests. The feedback received from the participants was encouraging in moving forward with implementing virtual reality distraction in other clinical situations. The participants reported unanimously that virtual reality distraction was an effective adjunct non-pharmacological healing modality to the traditional medication regime.

The objectives set forth for this project have been met and prove that VR distraction can lessen the suffering of pediatric burn survivors. VR as a distraction was implemented in an Outpatient Burn Clinic in a metropolitan medical facility. The collaboration of the provider and the child life specialist in pre-screening appropriate patients for the virtual reality distraction project implementation was vital in identifying appropriate patients. The participants and their families were excited about trying something new to improve pain management during their dressing changes. The scholarly project improved pain management during painful procedures for pediatric burn survivors.

In the next chapter of this paper, the significance of this scholarly project will be discussed concerning the role of the Advanced Practice Nurse and provider as the project relates to VR distraction as an adjunct intervention for pain management. Implications, significance, and further development of these practice ideas will be discussed. Reflections regarding how this project meets the requirements of the NONPF and the Essentials of Doctorate Nursing Practice will be reviewed. Chapter Five will discuss the application of the AACN Essentials and NONPF competencies to the VR distraction scholarly project and explain the significance of VR for pain management.

Chapter 5: Significance and Implications

Virtual reality distraction enhances pain management during painful procedures provides an alternative healing modality for pediatric burn patients. The literature review conducted for this project revealed the complexity of pain management as both a physiological and psychological phenomenon that is intensely complex for pediatric patients and their families. The purpose of VR distraction as a pain management technique is to help relieve patients' existential symptoms of pain and suffering while minimizing the long-term effects of the trauma experienced from painful procedures. The American Association of Colleges of Nursing (AACN) Essentials (2006) and National Organization of Nurse Practitioner Faculties (NONPF), and National Panel for Nurse Practitioner Practice Doctor Competencies (2011) were demonstrated in this quality improvement project. This scholarly project has far-reaching significance and implications in clinical practice for the role of advanced practice nurses, patient care, and the prevention and management of pain in pediatric burn patients. The application of the VR scholarly project and meeting AACN (2006) Essentials and NONPF (2014) competencies and implications for clinical practice will be described.

Essentials of Doctoral Education for Advanced Practice Nursing

As advanced practice nurses progress through their education, an educational framework exists to support the integrity and rigor of the professional practice. The eight essentials of Doctoral Education for Advanced Nursing Practice serve as a foundational guide for nurse practice advancement through the doctoral scholarly projects (American Association of Colleges of Nursing, 2006). The goal of the essentials is to serve as a blueprint for DNP-FNP students to impact nursing practice, health outcomes, and inclusion of culturally and diverse patient populations. This scholarly project is supported by Essentials III, VII, and VIII in order to

innovate nursing knowledge to lead the advancement of nursing practice. This project endeavors to use evidence-based practice contributions to expand the CCDU theory and holistic pain modalities with the VR distraction intervention during painful procedures for pediatric burn survivors.

III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice

Scholarly nursing practice is constantly evolving as we make discoveries and search for ways to improve the health and well-being of our patients. Advanced practice nurses should synthesize the research literature and apply the evidence-based results to their practice. This project is the foundation for Essential III. The AACN (2006) calls upon the advanced practice nurse to discover and integrate to solve a problem via the scholarship of practice in nursing to implement a quality improvement project. VR can complement analgesics to provide better pain management. According to Faber et al. (2013), Das et al. (2005), and Burns-Nader et al. (2010), VR offers a multimodal-based approach to pain that seems to have potent and promising analgesic effects. In fact, a controlled study by Schmitt et al. (2010) reported a forty-four percent decrease in pain ratings with the use of VR. This scholarly project with pediatric burn patients focused on improving pain management with an alternative non-pharmacological healing modality that lessened the suffering of burn survivors.

VII: Clinical Prevention and Population Health for Improving the Nation's Health

Advanced practices nurses need to advance and innovate ways to lessen the suffering of their patients. Clinical prevention in Essential VII is defined as risk reduction and health promotion to prevent illness for individuals and families (AACN, 2006). Pediatric pain management is historically undertreated in burn survivors (Faber et al., 2013). Barriers to pediatric pain management this author bore witness to be the lack of specially trained providers

proficient in pediatric pain assessment and management and the lack of knowledge of holistic healing modalities. Furthermore, Faber et al. (2013) noted pain management after burn injuries is an essential part of a comprehensive treatment program that involves multiple modalities, including long-acting and short-acting opiates, anxiolytics, and non-pharmacological techniques.

Innovative thinking and leadership from doctorate-prepared nurses are powerful change agents. Through advanced nursing education, the DNP can identify high-risk groups and formulate and implement techniques to potentially ease the suffering from chronic pain and illness in pediatric burn survivors, leading to the overall health and healing of the pediatric burn population and minimizing the gap of inequities and promoting the health of our diverse population. Improving the quality of patient care is the foundation of Essential VII. According to the AACN (2006), the role of an advanced practice nurse within quality improvement initiatives in health promotion, risk reduction, and illness prevention for individuals and their families. This scholarly project synthesizes holistic adjuncts to pain management in health promotion and illness prevention while caring for pediatric burn survivors. During project implementation, it was noted that patients could lie still, which minimized the procedure time, improving the healthcare experience for participants and their families. Although it is impossible to avoid all pain using traditional pharmacological interventions, utilizing VR distraction reduces patients' pain and anxiety with minimal side effects.

VIII: Advanced Nursing Practice of the Essentials of Doctoral Education for Advanced Nursing Practice

The advanced practice nursing role is multi-faceted, providing a holistic, patient-centered approach to patient care across the lifespan, encompassing physical, psychosocial, cultural, and socioeconomic status. Current practices during dressing changes include the use of

benzodiazepines, NSAIDs, and narcotics for pain control. The administration of these

medications has been unsuccessful in controlling pain for patients who require large total body

surface area dressing changes (Tully et al., 2018). Thus, there is a need for a change in practice.

This scholarly project applies DNP Essential VIII by focusing on caregivers' specialized and

complex care to establish new ways of reaching this population to improve their health and

healing. Children must often endure painful procedures as part of their various burn treatments

(ABA, 2020). The enhancement and application of clinical knowledge and evidence-based care

are vital attributes to the advanced nurse practitioner (AACN, 2006) to find ways of lessening

suffering endured by pediatric burn survivors. This scholarly project promotes the advancement

of the nursing practice through the collaborative efforts in designing, implementing, and

evaluating a quality improvement project regarding the effects of VR distraction as an adjunct

healing modality for pediatric burn patients. Applying the key learnings from this scholarly

project augments the evidence-based resources available to the nursing practice in treating

existential pain and suffering for pediatric patients.

<div align="center">**Core Competencies**</div>

The National Organization of Nurse Practitioner Faculties (NONPF) has published a list

of nine core competencies specific to nurse practitioners (NONPF, 2014; Thomas et al., 2017).

The scientific foundation and leadership were two core competencies throughout the quality

improvement project process.

Core Competency: Scientific Foundation

The research based on scientific data validated that VR use during painful procedures

could improve the lives of pediatric burn survivors. The first core competency was met directly

through critical analysis of existing evidence and integrating this knowledge into the context of

nursing science (Thomas et al., 2017). As stated by Thomas et al. (2017), the scientific

foundation requires: 1) analyzing data and evidence to improve advanced nursing practice, 2)

integrating evidence-based knowledge from science into the context of nursing, 3) translating

research to improve practice outcomes, 4) then developing new practice guidelines based on

research that VR distraction is an appropriate non-pharmacological healing modality for

pediatric burn survivors. This author translated evidence-based practice to improve the practice

and outcomes for pediatric burn survivors' pain management and nursing theory using the

concept of caring to develop new practice approaches to reduce the suffering of pediatric burn

survivors. For this project, research focused on improving pediatric burn survivor pain

management and improving their quality of life and outcomes. A scientific basis for adverse

effects with inadequate pain management includes but is not limited to long-term psychological

trauma, altered body image disturbance, increased risk of infection, and dependence on opioids

for chronic pain from inadequate healing after burn injury. This knowledge was integrated into

the project's development and was vital when collaborating with healthcare providers.

Additional studies by Toon et al. (2011) & Byers et al. (2001) concluded that VR distraction

successfully improved pain management and anxiety in burn survivors. These studies provided

the data needed to create a plan to implement a non-pharmacological adjunct such as VR

distraction during painful procedures.

Core Competency: Leadership

The leadership competencies were met through collaboration with multiple stakeholders

to lessen the suffering of pediatric burn survivors. According to Thomas et al. (2017), leaders

initiate and guide change, collaborate with various stakeholders to improve healthcare, and

advocate improving access, quality, and cost-effective healthcare. This project required engaging

and collaborating with numerous stakeholders. Physicians, nurses, child life specialists, leaders, and this author collaborated effectively throughout the project, all-seeing the value and possibilities of improving care to the pediatric burn population. Providers, child life specialists, and nurses were open to sharing their knowledge and experience of pain and anxiety management in pediatric burn survivors. The groups' goal was aligned, which opened the possibility of implementing the VR process improvement project. Patients and their families were open and willing to try non-pharmacological treatment options that were cost-effective with minimal side effects. Both providers and patients appreciated the integrative approach to treating procedural pain and anxiety using VR distraction. The VR project had no cost to implement; therefore, it was further embraced by patients and providers. Working with multiple stakeholders encouraged other departments to implement this process improvement project in the emergency department and pre-operative and post-operative areas in the healthcare facility.

The NONPFCC of independent practice was addressed through this scholarly project by establishing relationships built on empathy, authenticity, and collaboration, but in addition, creating a climate of individualized patient-centered care focused on lessening suffering, respect, mutual trust, and emotional support (Thomas et al., 2017). This scholarly project is a foundation for this author's journey to becoming a competent, caring Doctor of Nursing Practice specializing as a Family Nurse Practitioner.

Critical Reflection

VR distraction for pain management advances nursing practice by improving the health outcomes of patients from diverse groups using Leininger's CCDU theory to provide culturally congruent care in the context of pediatric burn survivors. Leininger's CCDU theory embodies the concepts of culture and cultural care negotiation as a transformative way to weave together the

patient's needs with their unique culture in a congruent manner that has meaning for them and offers choices in their healthcare (McFarland & Wehbe-Almah, 2019). VR distraction connects the patient as it provides care choices tailored to the individual considering their interests, development, age, language, and culture. This project has embodied Leininger's CCDU theory and the elements of VR distraction as part of a comprehensive practice to help manage procedural pain more holistically.

Significance and Implications for Advanced Nursing Practice

The participant survey demonstrated the importance of non-pharmacological healing modalities to improve pain management in pediatric burn patients. Completing a scholarly project requires leadership and collaboration. The collective vision and knowledge of a multidisciplinary team were drawn upon to construct the foundation of this project. Professional relationships built throughout the project provided opportunities for continued knowledge growth and an avenue to disseminate knowledge gained throughout the project. Collaboration of the multidisciplinary team ensured a holistic approach to pain management for these pediatric burn survivors.

This project has an impact on nursing and advanced practice nursing. The findings of this project, in addition to the evidence from Faber et al. (2013), Das et al. (2005), and Burns-Nader et al. (2010), suggest VR distraction decreases pediatric burn survivors' pain and suffering. Although this project focused on pediatric burn patients, literature also reveals that other patients would find VR distraction helpful in managing chronic pain in adults.

Future Integration of Scholarly Project

The participant survey results demonstrated that VR distraction improved patients' pain during painful procedures unanimously. Replication of this study would be appropriate in different settings, such as inpatient, other outpatient clinics, and the emergency department. Although this project only included 12 participants, a more significant number of participants would be beneficial.

Offering more diverse programming options would be helpful as each participant had different interests. Implementation of a broader participant population and age range would be beneficial. The use of standard pharmacological analgesia was still used with the participants of this project due to the standards of care at this outpatient clinic practice standard. However, it would be helpful to compare the effects of VR distraction without analgesia in the future.

Pain is undertreated in the pediatric burn population (ABA, 2020). A quality improvement project introducing VR distraction as an adjunct to pharmacological pain management has proven effective and acceptable to healthcare providers and patients. Incorporating VR distraction reduces pain with minimal side effects. Primary care providers can collaborate with their patients to provide individualized pain management interventions depending on the interests of their patients with a variety of programming options. Findings in the scholarly project concur with current literature suggesting VR distraction is an effective non-pharmacological pain management technique that decreases pain and suffering.

Throughout this project, all participants benefited and gained new insight and knowledge with a shared goal of decreasing the suffering that pediatric burn survivors endure. Providers learned that VR distraction is an effective non-pharmacological adjunct that improves pain management with minor side effects. VR also provided these patients a sense of control over

their care as they could choose the VR programming. Patients and their families grew and learned ways to manage chronic pain while taking back some independence in their healthcare. During this project, this author learned to utilize leadership skills to collaborate with other healthcare professionals to implement quality improvement projects that affect how patients receive care. This project has an opportunity to impact many patients and improve how we can care for chronic pain.

Burn survivors endure long-term suffering from chronic pain. The literature showed a gap in chronic pain management in burn survivors that traditional pharmacological medication was not meeting. Therefore, additional non-pharmacological interventions are necessary for a multi-modal, multi-sensory adjunct is necessary to lessen suffering. This scholarly project has demonstrated a 24 percent improvement in pain management after painful procedures using VR distraction. VR distraction can improve the quality of care for pediatric burn survivors during painful procedures while also giving them back some independence and choices in the care they render. The evolution of VR distraction applications in healthcare, including pain management, has substantially improved patient outcomes. This scholarly project will continue to have influence and relevance as the author begins practice as a DNP-FNP and carry the teachings of Leininger's CCDU theory. Pain management and patient collaboration will be a constant concern in primary care and using the metis knowledge of the patient in conjunction with personal awareness of CCDU will be instrumental for holistic care. The collaboration, research, and implementation of new care practices through VR distraction for pain management have demonstrated doctorate nursing education's synthesis and critical application. The author used these skills to implement process improvement in burn survivors. This scholarly project has

exemplified the commitment and moral obligation of caring at the heart of our work as advanced

practice nurses.

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Appendix A

Participant Informational Brochure

Virtual Reality

Dear Participants and Parents

I'm a nurse practitioner student at Augsburg University. I am working on my doctoral process improvement project which is implementing virtual reality distraction during painful procedures to help improve pain management for burn patients.

Benefits:

Virtual reality has been shown to help improve pain management as it uses multiple senses to help minimize pain signals in the body with few side effects.

Possible Side Effects:

Possible side effects include motion sickness in less than 1% studies

How to Help:

By participating in this process improvement project, we just ask for your honest feedback.

Appendix B

Participant Agreement Form

Virtual Reality

Dear Participants and Parents

I'm a nurse practitioner student at Augsburg University. I am working on my doctoral process improvement project which is implementing virtual reality distraction during painful procedures to help improve pain management for burn patients.

Benefits:

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Possible Side Effects:

Possible side effects include motion sickness in less than 1% studies

How to Help:

By participating in this process improvement project, we just ask for your honest feedback.

I agree to participate and give honest feedback
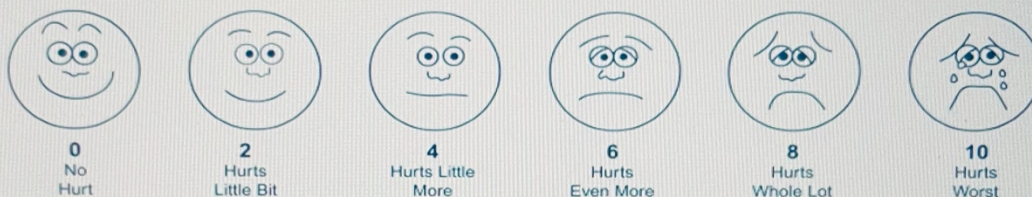
Participant: _____
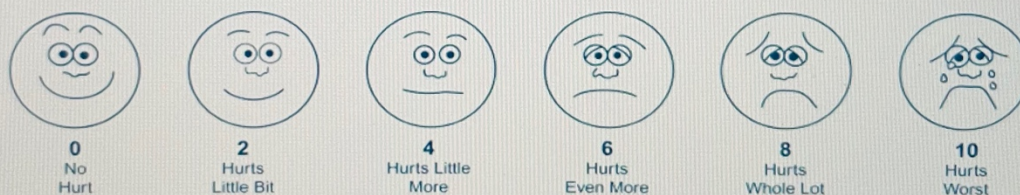
Parent: _____

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Appendix C

Participant Evaluation Form

Virtual Reality Pain Assessment

1. Please rate your pain level before the Virtual Reality Session on a scale of 0-10:

0	2	4	6	8	10
No Hurt	Hurts Little Bit	Hurts Little More	Hurts Even More	Hurts Whole Lot	Hurts Worst

2. Please rate your pain level after the Virtual Reality Session on a scale of 0-10:

0	2	4	6	8	10
No Hurt	Hurts Little Bit	Hurts Little More	Hurts Even More	Hurts Whole Lot	Hurts Worst

3. Would you recommend having Virtual Reality Sessions in the future?

        Yes   No

4. What could be improved if Virtual Reality Sessions were offered again?

5. What did you find most beneficial? Do you have any other comments about this experience?
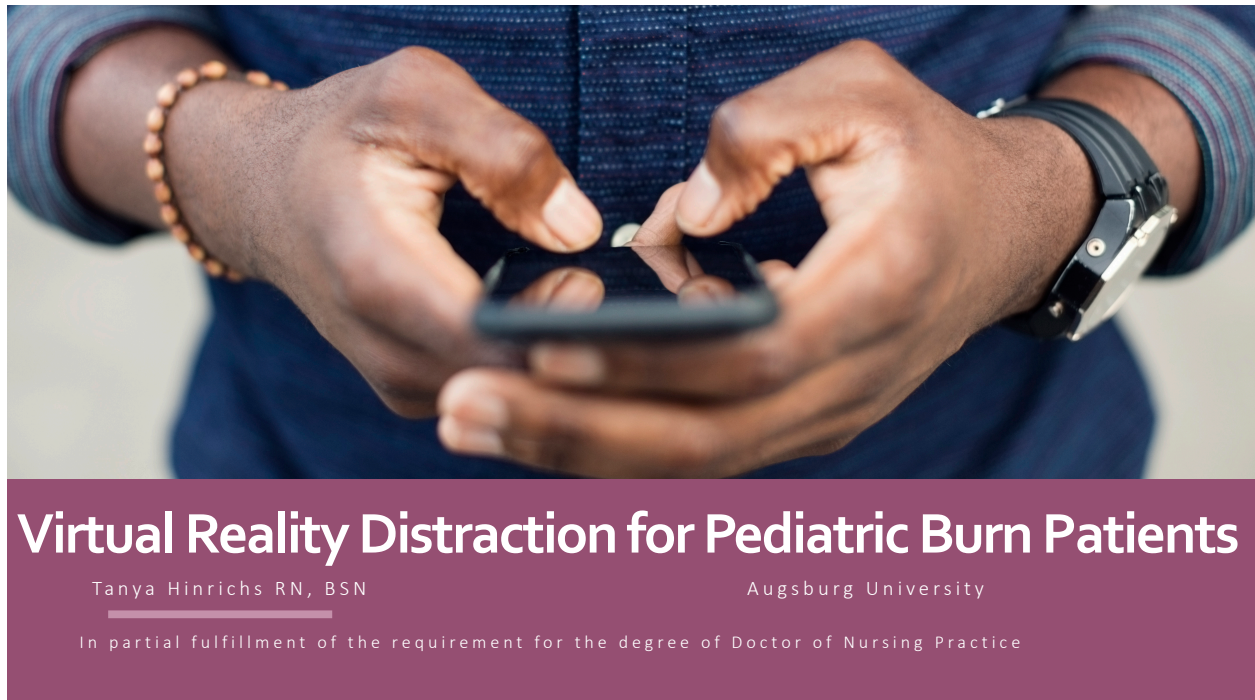
Appendix D

Intervention Data Collection Log Sheet

Virtual Reality Data Collection

Age Date	Gender	Procedures	Where burn located	TBSA% Burn	Procedure length time	VR # min	Meds used	Side effects
16 6/7/21	F K.S.	Wound debridement Dressing change	Hands/arms From Fire pit	23	30	30	Ketamine IV bolus Weight based 55kg 1 mg/kg IV x1 dose	Motion sick Dizzy
16 6/7/21	F M.W.	Wound debridement Dressing change	Hands/arms From Fire pit	23	30	30	Ketamine IV bolus Weight based 60kg 1 mg/kg IV x1 dose	nausea
12 6/7/21	F M.M.	Wound debridement Dressing change	Hand From Deep fryer	3	10	10	Ketamine IV bolus Weight based 45kg 1 mg/kg IV x1 dose	none
16 6/7/21	M M.W.	Wound debridement Dressing change	Hands/arms From Fire works	30	45	45	Ketamine IV bolus Weight based 70kg 1 mg/kg IV x2 doses	none
14 6/7/21	M J.K.	Wound debridement Dressing change	BLE From Bonfire	30	45	45	Ketamine IV bolus Weight based 60kg 1 mg/kg IV x2 doses	none

Appendix E

DNP Scholarship Project Presentation Slides

Virtual Reality Distraction for Pediatric Burn Patients

Tanya Hinrichs RN, BSN   Augsburg University

In partial fulfillment of the requirement for the degree of Doctor of Nursing Practice

Presentation Objectives

Introduce: Burn injuries with children

Review: Concept of Virtual Reality and the use for distraction

Describe: Implementation of virtual reality with pediatric patients during dressing changes for treatment of burns

Review: Data Collection & Results

Discuss: DNP Essentials, NONPF Competencies and Future Implications

Burn Injuries

Burn injury Physiology

Burn Treatments

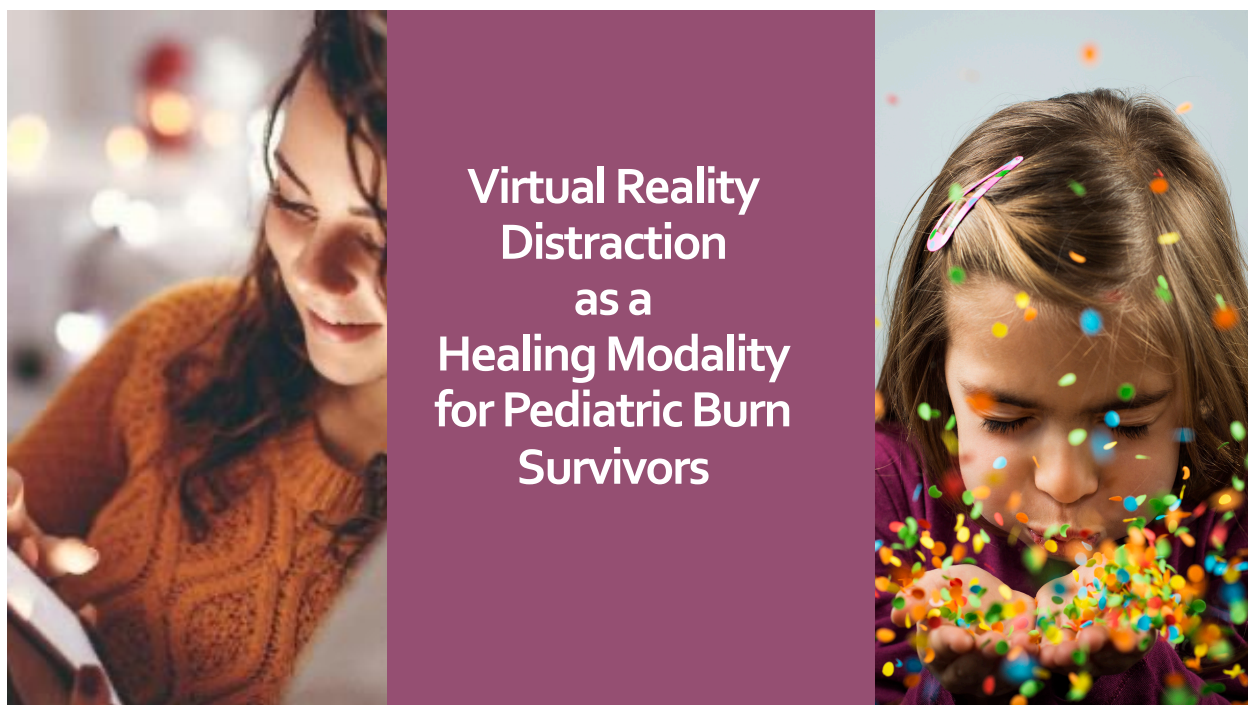Burns in Children

Effects of Burn Injuries on Families

Pain Management

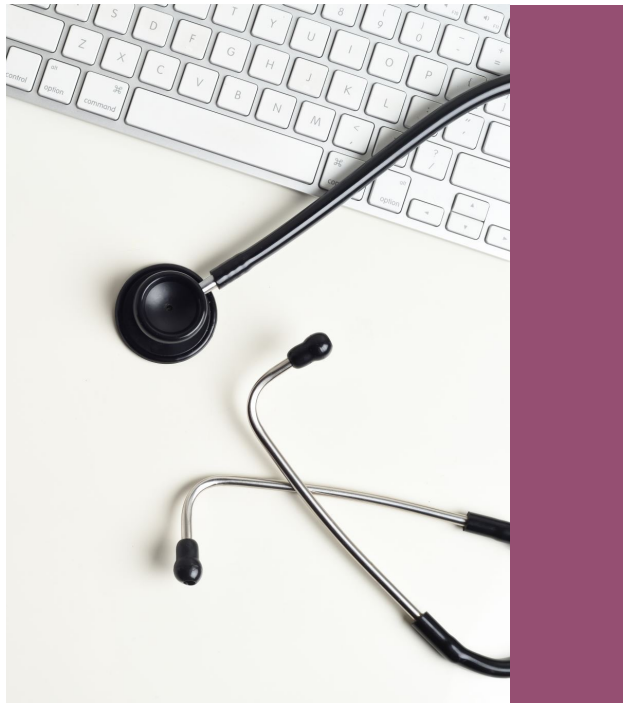## Virtual Reality Distraction Modality

VR is Multisensory

Vision

Hearing

Touch

Virtual Reality Distraction as a Healing Modality for Pediatric Burn Survivors

Literature Review Limitations and Gaps

Limitations
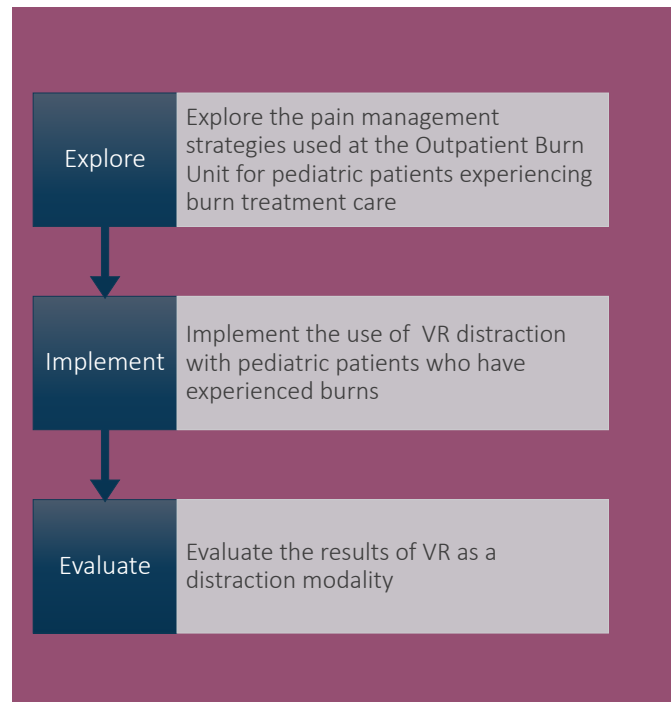
Gaps

Biases

Purpose of Scholarly Project

Examine the use of Virtual Reality for distraction in pediatric patients who have experienced a burn to determine if VR improves pain management during painful procedures

Clinical Question:

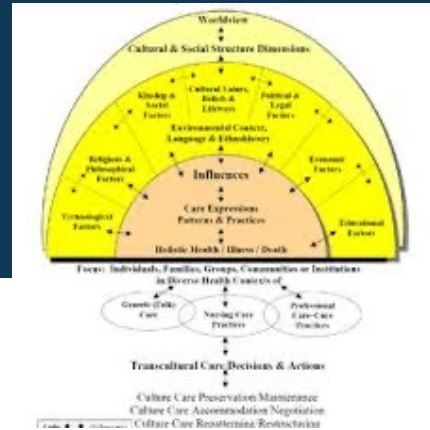## Can Virtual Reality Distraction Improve Pain Management?

**Objectives
of
Scholarly
Project**

Explore	Explore the pain management strategies used at the Outpatient Burn Unit for pediatric patients experiencing burn treatment care
Implement	Implement the use of VR distraction with pediatric patients who have experienced burns
Evaluate	Evaluate the results of VR as a distraction modality

Concept of Caring

Leininger's Culture Care

(Leininger & McFarland, 2006)

Pediatric Burn Patients Culture Care

Cultural and Social Dimensions

Trust and Communication

Kinship and Social Factors

Educational and Economic Factors

Patient Population and HealthCare Setting

Pediatric patients who experience burns both male and female age 10-20 being treated at Outpatient Burn Clinic

Virtual Reality Distraction Intervention

Projection Implementation

Participant Informational Brochure

Virtual Reality

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Possible Side Effects:

Possible side effects include motion sickness in less than 1% studies

How to Help:

By participating in this process improvement project, we just ask for your honest feedback.

Pre- and Post-Procedure Evaluation

Virtual Reality Pain Assessment

1. Please rate your pain level before the Virtual Reality Session on a scale of 0-10:

0 No Hurt — 2 Hurts Little Bit — 4 Hurts Little More — 6 Hurts Even More — 8 Hurts Whole Lot — 10 Hurts Worst

2. Please rate your pain level after the Virtual Reality Session on a scale of 0-10:

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3. Would you recommend having Virtual Reality Sessions in the future?
   Yes   No

4. What could be improved if Virtual Reality Sessions were offered again?

5. What did you find most beneficial? Do you have any other comments about this experience?

Virtual Reality Data Collection

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16 6/7/21	F M.W.	Wound debridement Dressing change	Hands/arms From Fire pit	23	30	30	Ketamine IV bolus Weight based 60kg 1 mg/kg IV x1 dose	nausea
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16 6/7/21	M M.W.	Wound debridement Dressing change	Hands/arms From Fire works	30	45	45	Ketamine IV bolus Weight based 70kg 1 mg/kg IV x2 doses	none
14 6/7/21	M J.K.	Wound debridement Dressing change	BLE From Bonfire	30	45	45	Ketamine IV bolus Weight based 60kg 1 mg/kg IV x2 doses	none

Analysis &
Developmental Evaluation

Essentials of Doctorate Education
for
Advanced Nursing Practice

3   Clinical Scholarship and Analytical Methods
for Evidence Based Practice

7   Clinical Prevention and Population Health for
Improving the Nation's Health

8   Doctoral Education for Advanced Nursing Practice

(AACN 2006)

NONPF Competencies

Scientific Foundation	Leadership

Implications for Practice

Burn pain is unique, VR uses multiple sense and has been proven effective in pain management

Children are given sense of control with VR by choosing their own VR programs

Future Use of Virtual Reality

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Thank You & Questions

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