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The impact of child life non-pharmacologic pain interventions on pediatric patient's pain perception in the emergency department

Wendy Lee Reynolds-Wilcox

THE IMPACT OF CHILD LIFE NON-PHARMACOLOGIC PAIN INTERVENTIONS ON PEDIATRIC PATIENT'S PAIN PERCEPTION IN THE EMERGENCY DEPARTMENT

A Thesis

Presented to the

Faculty of

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by

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ABSTRACT

The purpose of the current study was to examine the impact of non-pharmacologic pain interventions administered by trained Child Life professionals in an emergency department on pain perception in children. It was hypothesized that: 1) participants would report lower pain during the medical procedure compared to prior to the medical procedure, and 2) participants would report pain to be lowered even further after the medical procedure is completed compared to during the medical procedure.

A Child Life Intervention Record, created for use in the current study, assessed the following: age of the child, sex of the child, status of the child's hospital experience, medical procedure administered, medication given, and the type of non-pharmacologic pain intervention administered. The Wong-Baker FACES Pain Scale was used to assess pain before, during, and after the non-pharmacologic pain intervention.

Results showed that there was no significant decrease in children's pain report during the medical procedure compared to before the medical procedure. However, pain after the medical procedure was significantly less than pain during the medical procedure. Mean pain ratings by age were also examined; results showed that the youngest

group (4-6 yrs) had a significant lowering in their pain report after the medical procedure compared to the oldest children (12-16 yrs). The findings in this study suggest that non-pharmacologic interventions may be effective for controlling an excessive rise in pain during the medical procedure (allowing the child to better cope with the procedure and recover more quickly).

There were two major limitations to this study: 1) there was not a control group of children who did not receive any non-pharmacologic pain interventions, and 2) there was a lack of control for medication administered before or after the initial pain assessment. Thus, it is unclear whether the pain reports prior to the medical procedure were accurate due to the lack of control for medication administered before or after the initial pain assessment, future studies will hopefully address this.

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CHAPTER ONE

INTRODUCTION

Helping the pediatric patient cope with often painful and highly stressful procedures is related to a less painful medical emergency and/or postoperative outcome (Schneider & Workman, 2000). Pain is often a presenting symptom or a consequence of pediatric illness such as juvenile arthritis or childhood malignancies (Kwekkeboom, Maddox, & West, 2000). In addition, even healthy children experience common noxious procedures such as immunizations and blood draws during general preventive health care (Kwekkeboom, Maddox, & West, 2000). Kwekkeboom, Maddox, and West (2000) state that interventions are needed to help pediatric patients manage noxious symptoms. Past research suggests that psychological interventions that work to lessen pain in children in a hospital setting, ameliorate depression, and improve mastery over a potentially traumatic medical experience can in turn enhance quality of life (Moody & Fraser, 1993). Moreover, offering pain management strategies in addition to pain medications allows the child and family greater control over pain management and promotes the child's development of coping mechanisms in dealing with acute pain (Jakubik &

Thompson, 2000). In sum, when pain is managed in a timely and effective way it is associated with a more positive outcome for pain in children and can likely make repeat visits to the hospital less traumatic.

An effective way to manage pain is to ensure that the individuals who are providing these pain interventions are properly trained. More important, when dealing with the pediatric population the individuals not only should be trained in the implementation of non-pharmacologic pain interventions, but they should also have a background in child development. Current research has not always used specifically trained individuals for non-pharmacologic pain interventions. Unfortunately, for children who undergo a visit to the emergency department the result of not having an individual specifically trained to help them manage the fear caused by painful medical procedures may add to the intensity of pain they are experiencing (Carlson, Broome, & Vessey, 2000).

Reduction of fear or anxiety and other adverse emotions is critical to sensory pain management. When pain in children continues, their emotional distress intensifies, creating an increasing pain-emotional distress cycle (Carlson, Broome, & Vessey, 2000). Therefore, interventions for children in pain should

target emotional as well as sensory processes (Carlson, Broome, & Vessey, 2000). As well, it should involve trained individuals with an educational background in child development, as well as specific training in the implementation of non-pharmacologic pain interventions. Carlson, Broome, and Vessey (2000) state that providing a child with an age-appropriate mechanism for pain control that is under the auspices of a professional may assist the child during the painful procedure. Therefore, the purpose of the current study is to examine the impact of non-pharmacologic pain interventions by specially trained Child Life professionals in an emergency department on pain perception in children.

CHAPTER TWO

LITERATURE REVIEW

Pharmacologic verses Non-pharmacologic Pain Interventions

Pharmacologic Pain Interventions

Pain-relieving drugs, otherwise known as analgesics, include nonsteroidal, anti-inflammatory drugs (NSAIDs), acetaminophen, narcotics, antidepressants, and anticonvulsants (Barrett, 2003). NSAIDs include aspirin, ibuprofen (Motrin, Advil, Nuprin), naproxen sodium (Aleve), and ketoprofen (Orudid KT). These drugs are most often used to treat pain from inflammation, and they work by blocking the production of pain-enhancing neurotransmitters, e.g., prostaglandins (Barrett, 2003).

NSAIDs and acetaminophen, which are also effective against pain but limited in their ability to reduce inflammation, are effective for most forms of acute pain. Moderate and severe pain may require stronger medication (Barrett, 2003). Narcotics, antidepressants, and anticonvulsants tend to be used for more chronic pain (Barrett, 2003).

Some drugs can only be used for acute pain or as adjuncts in chronic pain management due to the toxicity in the body over the long term. NSAIDs have a well-known side

effect of causing gastrointestinal bleeding, and long-term use of acetaminophen has been linked to kidney and liver damage (Barrett, 2003).

Other drugs, especially narcotics, have serious side effects such as constipation, drowsiness, and nausea. In addition, mood swings, confusion, bone thinning, cataract formation, and increased blood pressure may accompany pharmacological therapies. These problems may discourage or prevent the use of some analgesics (Barrett, 2003). In addition, a traditional concern about narcotics use has been the risk of promoting addiction (Barrett, 2003).

In sum, while pharmacologic interventions may be beneficial in controlling pain in hospitalized children, there are limitations to their use due to serious side effects, damage to organs with long-term use, and risk of addiction (Barrett, 2003).

Non-pharmacologic Pain Interventions

Non-pharmacological pain management techniques are pain treatment options that do not use drugs and are often used as adjuncts to, rather than replacements for, drug therapy.

Unlike pharmacologic interventions, non-pharmacologic pain interventions carry little or no risk at all (Barrett, 2003). A number of non-pharmacologic techniques

exist for lessening the perception of pain and, when used with analgesics, can enhance the effectiveness of these drugs (Wong, 1995). Non-pharmacologic methods are extremely safe, and are effective by either inhibiting or modulating the transmission of noxious stimuli from the brain to the spinal cord (Wong, 1995).

One of the many benefits of non-drug therapies is that an individual can take a more active role in their treatment of pain. Allowing children a sense of control during a medical procedure makes them feel less helpless and out of control of their own bodies, while helping them cope with pain and anxiety during the procedure (Jacob & Puntillo, 1999).

Types of Non-pharmacologic Pain Interventions

Non-pharmacological methods for relieving pediatric pain include a wide variety of approaches that make pain more tolerable and give children a sense of control over the situation (Polkki, Vehvilainen-Julkunen, & Pietila, 2001). In most hospitals that specifically focus on pediatric care, non-pharmacologic pain interventions are provided by a Certified Child Life Specialist whose specific training and educational background is in child development and the implementation of non-pharmacologic

pain management techniques. However, there are still many hospitals and clinics nationwide that do not have Certified Child Life Specialists on staff to service pediatric patients and instead use other individuals to provide these interventions (i.e., nurses, volunteers, and/or parents) leading to possible confounds in the research literature regarding their effectiveness. Examples of non-pharmacologic pain interventions include a) pre-procedural/psychological preparation, which includes medical play, and b) cognitive-behavioral techniques, which includes guided imagery, distraction/diversion therapy, and breathing exercises.

Pre-procedural/Psychological Preparation

Preparing children for medical procedures can be done in many different ways such as explaining the procedure using educational books, engaging in medical play, and familiarization/touring the clinic or hospital environment.

All children who are cognitively capable of understanding simple explanations of events and procedures should receive preparation (Thompson & Stanford, 1981). Information should be provided to children at a level commensurate with their cognitive abilities (Thompson & Stanford, 1981). Explaining medical procedures to children

should be done in simple and clear terms, being honest and concrete about what the procedure entails, and also why it needs to be done. It is also important to use sensory modalities to describe how it will feel, how it will smell, taste, and sound, and what he/she needs to do (i.e., hold still). Examples of tools for implementing pre-procedural/psychological preparation include written materials such as educational books, hands-on materials that are used in medical play, and tours of the medical facility area.

Educational books have both advantages and disadvantages. An unfortunate problem with many commercially-produced materials is that they are either too general to be of much benefit to a child's specific situation as they discuss materials unrelated to the child's condition, or they are misleading (Thompson & Stanford, 1981). Each child is unique and because of this a drastic difference in the hospital experience can be seen from one child to the next. One child, for instance, may have severe asthma and therefore might be required to stay the night after a tonsillectomy in order to monitor their breathing overnight. Another child, without this complication, might go home directly after the procedure, which is what most books seem to state. In addition,

specifics are often left out. For instance, most books about having your tonsils out state that children can eat their favorite ice cream after they are done, when in fact directly after the procedure they can only have ice chips and water until their stomach is able to handle more. Also, if their favorite ice cream has chunks or other pieces that can scratch their throat, they are unable to eat this. Because of this, a number of hospitals have developed preparation materials specifically suited to their individual setting and a child's specific procedure (Thompson & Stanford, 1981). Using specific books designed for a given hospital or clinic can help to minimize the discrepancy between what a child anticipates and the actual experience (Thompson & Stanford, 1981).

The availability of a variety of media to provide information seems to be important, and evidence from research suggests that knowledge, which implies predictability and feelings of control, can decrease negative effects of hospitalization (Sutherland, 2003).

Medical play is the symbolic representation of medical procedures implemented to acquaint children with materials and equipment that are potentially stress-inducing. Medical play is a "hands on" technique generally recommended as a way to prepare children for threatening

situations (Wilma, 1986). The role of the facilitator, e.g., a child life specialist, is to supervise and support the child throughout the play session, correcting misconceptions the child may have about their medical condition or medical procedures, teaching the child about the hospital and medical procedures, and allowing them the opportunity to make choices.

Generally, medical play is used for all ages; however, pre-procedural preparation is usually provided (most often in conjunction with medical play) to children ages 4 and older. Some child life professionals have routinely prepared children for medical procedures under the age of two, but their interventions have been limited to allowing children to handle medical equipment, e.g., medical play, and showing children the appearance of persons in surgical garb (Thompson & Stanford, 1981).

Medical play, along with or independent of pre-procedural/psychological preparation, adds value by reducing anxiety and increasing satisfaction (Havata, Olsson, & Lagerkranser, 2000). Several studies have supported the use of this non-pharmacologic pain intervention. In a study by Havata, Olsson, and Lagerkranser (2000), two methods of psychological preparation were studied for children undergoing an ENT

surgery: the control group had a tour only, while the experimental group experienced medical play. It was found that children in the experimental group who received medical play as a preparation intervention were less anxious than the control group, and that patients and parents were more satisfied with their care.

This form of preparation helps to reduce children's anxiety, as well as helping them to master their feelings (Wilma, 1986). According to Clatworthy (1981) play allows children to communicate their feelings, fears, misunderstandings, and concerns in their own language. Play, utilized as the language of children, can be incorporated into a therapeutic mental health model when accompanied by a supportive adult knowledgeable in the language of play and mental health treatments (Clatworthy, 1981). Through medical play the child can benefit from receiving individual support in a time of potentially stressful medical experiences, in addition to having fun (McCaffery, 1977). Children can express their fears or anxieties and help to reduce them by gaining accurate information, being able to touch and handle equipment involved in the procedure, meet the physicians and nurses, and have an opportunity to play with dolls and other representations of the event. These are some of the most

valuable methods of assisting the child with pain (McCaffery, 1977). All of the above help to lessen the child's anxiety about the procedure, therefore reducing the child's pain perception.

The ability of a child to undergo multiple painful procedures can be enhanced by pre-procedural/psychological preparation, including familiarization with or touring the clinic or hospital environment (rehearsal and modeling), education by a child life specialist and psychologist, and the teaching of other specific anxiety reduction strategies (Yaster, Krane, Kaplan, Cot'e, & Lappe, 1997).

While research supports that giving information is helpful to reduce pain perception, when to give the information is age-dependent (Rusy & Weisman, 2000). Children should receive explanations of future events, although the time between the explanation and event should generally decrease with younger aged children (Thompson & Stanford, 1981). Children aged 7 years or younger do not retain information provided earlier than 1 hour before surgery; however, older children benefit from psychological preparation even if it is completed at an earlier time (Rusy & Weisman, 2000).

Research also suggests that it is best when non-pharmacologic pain interventions are provided before

the child is in severe pain (Yaster, Krane, Kaplan, Cot'e, & Lappe, 1997). Trying to implement non-pharmacologic methods of pain reduction once terror, anxiety, and helplessness of procedure pain are established is almost impossible (Yaster, Krane, Kaplan, Cot'e, & Lappe, 1997). For instance, children who are experiencing significant pain may not be able to expend the concentration and effort necessary to learn the intervention, and once children learn the negative expectations of the procedure, their own anticipatory distress will affect their ability to cope with future procedures (Yaster, Krane, Kaplan, Cot'e, & Lappe, 1997).

In a study with children undergoing an endoscopy procedure, it was found that the experimental group who received psychological preparation was less anxious, required less sedation, was more cooperative, had less autonomic nervous system stimulation, and had less change in blood pressure (Mahanjan, Wylel, Steffen Kay, Kitaoka, Dettorre, Samara, & McCue, 1998).

Moreover, in a study by Claar, Walker, and Barnard (2002) with children who were provided with procedural preparation material about their upcoming EDG procedure, those with more knowledge of their procedure experienced less anticipatory anxiety, less procedural distress, and

they were more positive of future EDG procedures (Claar, Walker, & Barnard, 2002).

Hence, studies have shown that pre-procedural/psychological preparation is effective in reducing anxiety, increasing cooperation, decreasing the amount of sedation medicine needed, and improving parental/patient satisfaction (Mahanjan, Wylel, Steffen, Kay, Kitaoka, Dettorre, Samara, & McCue, 1998). The benefits of this include the child being prepared for the procedure and knowing what to expect in a predictable sequence of events, but it also can help them to better cope with pain.

Cognitive-behavioral Therapies

There are several types of cognitive-behavioral therapies, distraction/diversion therapy, guided imagery, and breathing exercises. These are typically used during the medical procedure to help the child cope and provide distraction away from the procedure itself.

Distraction/Diversion Therapy. Distraction refers to a coping strategy that most often focuses on the senses, and is typically used to divert attention away from a painful stimulus (Schneider & Workman, 2000). It is often used as a sensory shield, or a type of protection from

pain sensation, whereby a patient focuses on sensations unrelated to the pain.

Distraction/diversion techniques mainly consist of objects or stimuli that engage all or some of the five senses, and they can often overlap one another, i.e., one technique designed to achieve relaxation might actually act as a diversion for a child. Techniques often used by child life specialists include the use of a visual and/or sensory toy that can help relax and calm pediatric patients during and after medical procedures. Hence, the use of the child's imagination not only distracts the pediatric patient but can also help focus their attention away from the painful event and therefore enhance relaxation (Rusy & Weisman, 2000). Distraction tends to be more effective when major senses such as vision, hearing, touch, and kinesthesia are involved (Wilma, 1986). Some examples are bubble blowing, kaleidoscopes, pictures, drip toys, pinwheels, squeeze balls, play-doh, video games and pop-up books (McGrath, Ritchie, & Finley, 1994).

Distraction for younger children should be simple and less complex than for older children in order to prevent over-stimulation (Wilma, 1986). It should also be noted that the ability to choose the type of distraction method offers the child at least some control over one aspect of

the hospital experience (Tanabe, Ferket, Thomas, Paice, & Marcantonio, 2002). In addition, it is also important to utilize distraction items that are appropriate to the developmental level of each child (Dahlquist, Busby, Slifer, Tucker, Eischen, Hilley, & Sule, 2002). When the developmental level of the child is not taken into consideration when choosing distraction items for non-pharmacologic pain interventions, this can lead to confounded results in research studies on the effectiveness of such interventions. For example, a study by Carlson, Broome, and Vessey (2000) showed that a distraction intervention used in this multi-site study did not make significant difference in ameliorating children's rating of pain associated with needle sticks. However, only one method of distraction was used (i.e., kaleidoscope), which did not allow for the difference in the participant's age/developmental level, and children were not provided with choices (which has been previously noted to be an important factor in the success of non-pharmacologic interventions).

Distraction is a technique that is easily taught to children because they are highly responsive to pain-controlling strategies that involve their imagination and sense of play (Rusy & Weisman, 2000). Children often

use these techniques in their daily lives on their own, but when they are in a stressful or pain-inducing situation even they may need the help of a trained professional to aid them in using distraction techniques. In addition, when the intensity of pain or distress increases, the child's involvement in distraction needs to increase (Carpenito, 1983; McCaffery, 1971).

Documented physiologic responses to relaxation prompted by distraction include decreased oxygen consumption, blood pressure, heart rate, serum lactic acid levels, and tonic muscle tension (Rusy & Weisman, 2000). Empirical evidence has shown that preschoolers, school-age children, and adolescents in a variety of health states are capable of and often use distraction as a coping strategy (Carlson, Broome, & Vessey, 2000).

Furthermore, support for distraction as a coping mechanism has been shown in studies utilized by children with cancer and children being immunized (Schneider & Workman, 2000). In addition, in a study conducted by French, Painter, and Coury (1994), the effects of using a bubble blowing technique on pain levels during immunization indicated significantly fewer pain behaviors observed in the research group as compared to the control group.

In a similar study by Bowen and Dammeyer (1999), party blowers and pinwheels were used for distraction with a sample study of 80 children aged three to six who were experiencing routine immunizations and reported decreased anxiety levels when such a simple distraction intervention was implemented.

Moreover, in a study done by Tanabe, Ferket, Thomas, Paice, and Marcantonio (2002), it was found that distraction techniques are an effective adjunct to analgesia and the authors recommend that distraction opportunities should be made available. In addition, parents who were educated by emergency department staff to support their child who is in pain by participating in distraction activities may experience increased satisfaction with pain management in an emergency room setting (Tanabe, Ferket, Thomas, Paice, & Marcantonio, 2002). As such, distraction techniques, ice, and stronger analgesics may be the combination needed to achieve the most effective pain relief in children (Tanabe, Ferket, Thomas, Paice, & Marcantonio, 2002).

In sum, many studies have researched the benefits of using distraction to reduce pain perception in hospitalized children and have found that the use of distraction was effective in reducing child and parent

anxiety during procedures (Dahlquist, Busby, Slifer, Tucker, Eischen, Hilley, & Sule, 2002; Enscar, Carlsson, Golsater, & Hamrin, 1997; Schneider & Workman, 2000; Weekes & Kagan, 1994). In addition, distraction during painful procedures has been demonstrated to be efficacious in primarily well adults, school-age children, and preschool-aged children seen in ambulatory care (Carlson, Broome, & Vessey, 2000).

Guided Imagery. Guided imagery refers to a relaxation technique that involves concentrated focusing on images formed in the mind (Kwekkeboom, Maddox, & West, 2000). Guided imagery is an example of a holistic intervention because it draws on psychophysiological perceptions influenced by the psychosocial environment of the person (Giedt, 2001). For example, while telling a story, detailed descriptions involving all senses of the body would be provided in order to draw the child into the story such that the child (in their mind) is transferred to this place that is being described, away from the place they are in at the present time. Examples of guided imagery techniques may include reading books, describing the child's favorite place, or having them describe it to you while walking them through a story visually making sure to describe all the aspects of the story (what the

place looks like, feels like, tastes like, sounds like, etc.).

Imagery used during relaxation-imagery exercises may be visual, auditory, tactile, or olfactory (Pederson, 1995). Studies often use these terms (i.e., relaxation-imagery or guided imagery) rather than hypnosis because clinical hypnosis involves relaxation and imagery (Pederson, 1995). Both strategies focus on the person relaxing and concentrating on an idea or image (Pederson, 1995). For these purposes, studies that support both hypnosis and guided/relaxation imagery will be presented.

According to Giedt (2001), guided imagery can have a measurable effect on the psycho-neuroimmunological systems of the body including decreasing pain, anxiety, blood pressure, and heart rate, as well as possibly affecting changes in cortisol levels and immune function (Giedt, 2001). Through the process of guided imagery, the patient is helped to relax, focus, and develop mental images that result in an alteration of perceived pain or distress (Kwekkeboom, Maddox, & West, 2000).

Consequently, through imagery, the child can change the painful or distressing symptom into a more manageable, enjoyable experience in his or her imagination by removing themselves mentally from a distressing and/or painful

situation to a place that is more pleasing and/or peaceful to them (Kwekkeboom, Maddox, & West, 2000). Hence, many studies have supported the use of guided imagery to lower pain responses during medical procedures.

According to Syrjala, Donaldson, Davis, Kippes, and Carr(1995), teaching children to become more aware of their bodies so that they can relax when undergoing uncomfortable procedures is another intervention that has been successful, especially when combining imagery to create a mind-body context for relief of pain (Syrjala et al., 1995). A person's state of mind during imagery is similar to focused concentration used when absorbed in a book or music and is then oblivious to the environmental stimuli (Kwekkeboom, Maddox, & West, 2000).

In addition, a study by Zeltzer, Kellerman, Ellenberg, and Dash (1983) evaluated the effectiveness of hypnosis in reducing the vomiting associated with chemotherapy and disease in 12 adolescents with cancer and found that patients had significant reductions in the frequency and intensity of emesis.

Similarly, Zeltzer and LeBaron (1982) compared hypnotic versus non-hypnotic behavioral techniques (visual distraction, deep breathing, practice sessions to control fear) on pain and anxiety in 45 children 6-to 17-years

during bone marrow aspirations/lumbar punctures and found that during bone marrow aspiration, both hypnosis and non-hypnotic techniques reduced pain.

Wall and Womack (1989) compared the efficacy of standardized instruction in hypnosis or active cognitive strategy for providing relief from pain and anxiety induced from bone marrow aspiration and lumbar puncture in 20 children who ranged in age from 5-18 years. Results indicate that both strategies were effective in reducing pain.

In addition, in a study by Broome, Lillis, McGahee, and Bates (1992) of the effects of a distraction and imagery program on pain in 14 children with cancer during lumbar punctures, it was found that a child's self-report of pain decreased significantly over time from baseline levels (Broome, Lillis, McGahee & Bates, 1992).

Furthermore, Smart (1997) evaluated the efficacy of music and guided imagery in relaxing children undergoing an MRI, which was enough to eliminate the need for routine sedation. It was found that the experimental group was calmer, more alert, less agitated, and less distressed than the control group (Smart, 1997). Therefore, it appears that music and guided imagery are effective in

reducing the number of children requiring sedation for an MRI test (Smart, 1997).

According to Olness (1989), therapeutic application of the relaxation-imagery process leads to deliberate control of certain physiological responses such as increasing comfort in the presence of painful stimuli or eliminating an undesirable habit (Olness, 1989). Research has also shown that children who use guided imagery gain a sense of control, especially when they are encouraged to create their own images (Yaster, Krane, Kaplan, Cot'e, & Lappe, 1997).

In sum, through the use of guided imagery, pediatric patients are able to remove themselves from a painful situation to another place or time that was more peaceful (Rhiner, Ferrell, Shapiro, & Dierkes, 1994). One mother referred to this technique as her child's "escape" (Rhiner, Ferrell, Shapiro, & Dierkes, 1994). These studies indicate that imagery ameliorated pain, fear, anxiety, and vomiting in oncology patients (Pederson, 1995).

Breathing Exercises

Breathing exercises refer to an intervention technique where children are encouraged to breathe slowly and deeply in a pattern that is similar to "Lamaze." This

can help children to focus, concentrate, and be distracted from pain (Rusy & Weisman, 2000).

Two types of breathing can be used: rhythmic, deep-chest breathing which is performed by taking in slow breaths through the nose and exhaling through the mouth, and patterned- shallow breathing which consists of shallow breaths in through the nose and out through the mouth (Rusy & Weisman, 2000). Younger children can benefit from patterned-shallow breathing while thinking about images such as a train, while older children may like to use rhythmic deep-chest breathing as they are reminded to relax and "push the tenseness out" (Rusy & Weisman, 2000).

Rusy and Weisman (2000) stated that teaching simple breathing methods gives children a tool to manage distress as well as a sense of mastery that seems to replace the sense of helplessness hospital procedures might produce (Rusy & Weisman, 2000). In addition, a study by Rusy and Weisman (2000) showed that significantly lower pain behaviors were observed in children with ages ranging from 4 to 7 years old who were taught simple breathing techniques to "blow the shot pain away" (Rusy & Weisman, 2000).

French, Painter and Coury (1994) credit the use of breathing exercises (i.e., blowing air out during their

shots) with having fewer pain behaviors and a trend toward lower subjectively reported pain. In addition, children who are taught a specific breathing technique believed that they have more control over a painful situation and this generally results in a higher pain threshold and tolerance (Schiff, Holtz, Peterson, & Rakusan, 2001).

In sum, children who are taught a simple breathing technique during a painful and/or anxiety-inducing situation (such as a medical procedure) show a reduction in pain perception and a sense of mastery.

Implementation of Non-pharmacologic Pain Interventions

To provide the most effective implementation of non-pharmacologic pain interventions there are three important factors that must be taken into consideration: 1) the implementation of the non-pharmacologic pain intervention by a Child Life professional, 2) the developmental appropriateness of the non-pharmacologic pain intervention, and 3) the use of a proper pain scale. Compromising in any of these domains, as shown below, may confound both the effectiveness of the intervention as well as the validity of the research documenting its effectiveness.

Administration of the Intervention

Past research has been shown that nurses, parents, and volunteers have been used to administer non-pharmacologic pain interventions, which has likely led to confounding results. Ideally there are four characteristics that the individual administering the non-pharmacologic pain intervention should have: 1) they should be a "safe person", 2) they should be a professional with specific training in child development, 3) they should be knowledgeable about age-appropriate interventions, and 4) they should be trained on implementing non-pharmacologic pain interventions.

First, a "safe person" is a person who is not directly involved with the administration of the medical procedure itself. Their sole purpose is to provide non-pharmacologic pain interventions to the child during the medical procedure. McCaffrey (1971) states that at the beginning of hospitalization, establishing a trusting relationship with this "safe person" through simple play may be a more important factor in behavioral change than giving information. In a study by Sutherland (2003) that compared hospital and home-based preparation for cardiac surgery by a senior play therapist, results suggested that the most important form of preparation was the opportunity

to talk to someone who was knowledgeable, prepared to listen, and able to sensitively provide information. This is consistent with outcome research which has shown that establishment of trust and a therapeutic relationship is vital in preparation for major surgery, where the outcome is less predictable and often anxiety-provoking (Sutherland, 2003). The child needs to see the individual who is implementing the non-pharmacologic pain intervention as a safe person, someone who is there to comfort them and offer them some refuge from an often painful and uncomfortable procedure.

The person administering the non-pharmacologic intervention should also be 1) a professional with specific training in child development, 2) knowledgeable about developmentally appropriate interventions, and 3) trained in providing non-pharmacologic pain interventions. Certified Child Life Specialists have an extensive knowledge of child development, having at least a bachelor's degree, although many have a master's degree, in the area of child development, developmental psychology, family studies or a related field. Certified Child Life Specialists are also required to complete a 480-hour internship within a children's hospital under the supervision of an already Certified Child Life Specialist

learning both developmentally-appropriate interventions, as well as training in providing non-pharmacologic pain interventions. Rusy and Weisman (2000) state that trained individuals such as massage therapists, biofeedback technicians, physician acupuncturists, child life specialists, psychologists, and physical or occupational therapists can all be used to implement non-pharmacologic pain controlling techniques to battle acute pain in children. In many hospitals and clinics nationwide that serve pediatric patients, when a Certified Child Life Specialist is not employed, nurses, volunteers, and parents often step in to administer non-pharmacologic interventions. There are several problems with this. First, nurses often run into such problems as lack of time, lack of training, heavy workload, or discomfort with the non-pharmacologic technique, which may interfere with nurses using these interventions with their pediatric patients (Kwekkeboom, Maddox & West, 2000).

Unfortunately, most nurses and physicians receive minimal training regarding child and adolescent psychological development. Consequently, they often do not have the knowledge, skills, or time to address the special needs of the pediatric patient (Christian & Thomas, 1998; Korycka, 2002; Schechter et al., 1997). Clarke, French,

Bilodeau, Capasso, and Empoliti (1996) examined the knowledge, attitudes, and clinical practices of registered nurses regarding pain management. Demographic information was collected to explore the relationship between nurses' characteristics (e.g., previous pain education, clinical experience, area of clinical practice, and other variables such as their knowledge and/or attitudes). It was found that education about pain was most inadequate in the following areas: non-pharmacological interventions to relieve pain, the difference between acute and chronic pain, and the anatomy and physiology of pain. In addition, ninety percent of the children's charts had no documentation of the use of non-pharmacological interventions to relieve pain.

Other important factors in choosing an appropriate approach to children's pain management include nurses' attitudes toward pain, and whether or not they are skilled in teaching the pain management interventions (Olness, 1989). In regard to background factors related to nurses' use of non-pharmacologic methods, education correlated significantly with the information about anesthesia, sensory information about procedures, and giving more accurate information to school-aged children than younger children (Polkki, Vehvilainen-Julkunen, & Pietila, 2001).

Despite the emphasis on nurses, physicians, and other healthcare workers providing behavioral interventions, the role of other professionals specializing in behavioral interventions, such as psychologists and child life specialists, remains integral for providing these interventions (Fanurik, Koh, Schmitz, & Brown, 1997).

When used to administer non-pharmacologic pain interventions, volunteers present similar concerns as nurses because of their lack of specific training in child development and age-appropriate interventions. In a study examining the effects on children's pain and anxiety during cardiac catheterization, Pederson (1995), a member of the research team, administered the non-pharmacologic intervention in the imagery group. No significant differences were found with the use of guided imagery. There was no mention of the individuals' backgrounds and knowledge in the areas of child development and the administration of non-pharmacologic interventions, hence possibly affecting the administration of the guided imagery and therefore, the outcome of this intervention.

In addition, a study by Carlson, Broome, and Vessey (2000), showed that a distraction intervention used in this multi-site study did not make significant difference in ameliorating children's rating of pain associated with

needle sticks. This study used site coordinators, whose background and knowledge in child development and implementation of age-appropriate non-pharmacologic interventions was not clear. A study by Ryan-Wenger (1996) reported that within most research articles, it is not indicated who provided the procedural interventions (e.g., parents, other adults, peers, nurses, doctors, volunteers, or trained professionals). Much more needs to be known about the persons providing these interventions in order to know how and/or why the intervention helps or does not help children cope with the stressors related to painful medical procedures.

Parents have also been used to administer non-pharmacologic pain interventions to their child. Because this tends to be very cost effective for many facilities (since they do not have not have to provide another staff member), this method is frequently used. However, there are many drawbacks: parents' knowledge in the area of child development and non-pharmacologic pain interventions is often not addressed in studies, and it has been found that their personal relationship with their child can skew how their child reacts to the intervention, as well as their self-report of pain. In a study by McCarthy, Cool, and Hanarhan (1998), the objective was to

train parents to use cognitive behavioral interventions and to function as coaches for their children during painful procedures. The subjective assessment of staff indicated that the parents in the experimental parent group coached their children fairly well, although after the tapes were reviewed, researchers found that often parents displayed some ineffective behavioral responses to their child's distress. It was noted that most children learn if they cry and are distressed, their mothers will try to alleviate the source of the distress. Therefore, during painful medical procedures maternal presence may be a trigger for distress behavior in children with the hope that their mother will "save them." Higher distress in children arises from parent distress and from behavioral and verbal responses the parents often use, such as criticism, apologies, extreme empathy, and reassurance.

Parents tend to cry themselves, or because of the stressful situation forget to administer the procedure and focus solely on their child's distress. This often can increase the child's pain reactions instead of distracting their child from them, which can lead to an ineffective non-pharmacologic pain intervention. Extreme anxiety can often interfere with the parents' ability to cope with the child's pain and distress during the procedure. Further,

they may have concerns about their child's illness or hospitalization, or they may have inadequate knowledge about the purpose of the procedure (Lutz, 1986). Thus, getting an accurate assessment of the effectiveness of the non-pharmacologic intervention is difficult, if not impossible.

In sum, using nurses, parents, and/or volunteers to administer non-pharmacologic interventions presents a problem with determining the effectiveness of these non-pharmacologic interventions. Due to not addressing the variables of having a "safe person" administer the intervention and not having a professional with specific training in developmentally appropriate interventions and training in non-pharmacologic pain interventions, results may be skewed and the effectiveness of these interventions is unclear.

Age-appropriateness of the Intervention

A child's age will often determine the most effective non-pharmacologic pain intervention (Kachoyeanos & Friedhoff, 1993). As a child develops cognitively, different approaches to pain management may be more effective than others and therefore interventions should be based on the child's developmental level and their abilities at that particular stage in their life. In

addition, if developmentally inappropriate interventions are chosen, this can induce frustration for the child, hence negating the effects of the non-pharmacologic pain intervention (personal observation). In addition, the first choice of an intervention provided may not work and the person administering the non-pharmacologic intervention must be ready to change gears often and quickly, especially with younger children (their attention span is usually shorter than that of an older child). What are age-appropriate interventions? Examples below were collected from personal experience as a Certified Child Life Specialist and from a gathering of information from other Certified Child Life Specialists currently working in the field.

Newborns tend to benefit from swaddling or cuddling, non-nutritive sucking (especially with pacifiers dipped in sucrose or sugar water), infant massage, and contralateral stimulation or "counter irritation" (Yaster, Krane, Kaplan, Cot'e, & Lappe, 1997). According to Wong (1995), cutaneous stimulation, which includes simple rhythmic rubbing and/or use of pressure, is also beneficial. In other similar studies, tactile soothing and music (especially of the souffle sound of the fetal heart beat)

calms newborns and appears to have pain-reducing benefits (Kachoyeanos & Friedoff, 1993).

Toddlers tend to prefer many non-pharmacological interventions similar to newborns such as rocking, singing, repositioning, decreasing stimulation, and providing pacifiers (especially when dipped in sucrose or sugar water). Toddlers are also engaged by bubbles floating in the air above them and enjoy the involvement of blowing them and reaching for them with a free hand. However, this intervention would not be appropriate for an infant. Due to the bubbles often being high enough above them that they are not able to see them, in addition, infants do not have the head control that a toddler does and are often unable to move their face away from the bubbles, which can present a risk of getting soapy bubbles in their eyes. There are often exceptions with toddlers with preferences in regards to parental presence during the medical procedure. Due to the beginning stages of stranger anxiety evolving at this age, it most often calms the child if the parental/guardian figure is present.

Additionally, tactile stimulation such as play-doh or the touch of their favorite blanket or stuffed animal also proves to be beneficial in decreasing pain perception (Wong, 1995). Distraction items such as toys that light up

or play music, movies, kaleidoscopes, bubbles, or pop-up toys are also favorite non-pharmacologic pain interventions for this age group (Rusy & Weisman, 2000).

Preschool-aged children, like toddlers, favor parental presence, but can also benefit from such non-pharmacologic pain interventions as medical play, singing, story-books, music, and watching movies (Wong, 1995). The use of rewards after a medical procedure and teaching rhythmic and/or patterned breathing can also help to alleviate pain perception in this age group. The magical thinking and use of imagination in preschool-aged children makes techniques like storytelling, using the magic glove, the magic blanket, and pain switch techniques very effective as well (Kachoyeanos & Friedhoff, 1993).

School-aged children, however, are aided in pain control when choices are offered, e.g., where or how to sit, which hand they would like to use for the "poke", as well as by providing guided imagery, and distraction devices such as bubbles and pinwheels, medical play, and pre-procedural preparation (Wong, 1995).

In addition, teaching rhythmic breathing, providing music, video games, and watching movies are good examples of non-pharmacologic pain interventions for this age group (Rusy & Weisman, 2000). The school-aged child tends to

engage in emotive therapy and may also enjoy calling upon their favorite hero to come and take the pain away (Kachoyeanos & Friedhoff, 1993).

Adolescents tend to benefit from non-pharmacologic pain interventions such as relaxation and distraction techniques, pre-procedural preparation, and guided imagery (Wong, 1995). Rhythmic breathing, video games, and counting have also been shown to be effective interventions with this age group (Rusy & Weisman, 2000; Wilma, 1986). In addition, adolescents' reliance on peers makes them especially receptive to modeling, and their need for control makes them especially open to behavioral rehearsal prior to and during intrusive procedures (Kachoyeanos & Friedhoff, 1993).

It is important however, rather than having his or her pain disbelieved when playing or being distracted, a child should be praised for the ability to play or be distracted from their pain (i.e., his or her efforts to cope with the pain) (Jakubik & Thompson, 2000). It is important to remember that because of this ability to be distracted from pain, non-pharmacologic strategies can also produce a cooperative child who may continue to suffer "in silence" (Wong, 1995). Because a non-pharmacologic pain intervention "works" it does not

mean that the pain "was all in the child's head" (Yaster, Krane, Kaplan, Cot'e, & Lappe, 1997).

In sum, because a Certified Child Life Specialist encompasses the characteristics mentioned above, i.e., a professional with specific training in child development, knowledge of developmentally-appropriate interventions, and training in providing non-pharmacologic pain interventions, having this professional on staff to provide developmentally-appropriate non-pharmacologic pain interventions to help reduce children's pain and anxiety is important. Without the individual having the proper background and training, the non-pharmacologic pain intervention can be ineffective (as well as a potentially dangerous) and lead to confounded results in research studies on the effectiveness of such interventions.

Pain Assessment

Pain assessment of the pediatric patient is a vital component to the pain management intervention. In past research, many different pain assessment tools have been used, potentially leading to confounding results in studies. Mayer, Torma, Byock, and Norris (2001) found that a variety of pain assessment scales have been used in research regarding children and pain which has led to

inconsistencies in assessment as well as communication problems among providers, patients, and families. In order for the child's level of pain and the effects of the intervention to be accurately assessed, two concerns must be addressed: 1) a proper pain scale specifically developed for children should be used, 2) an individual trained in child development should be used to assess the child's pain according to their age/developmental level. When done properly, a thorough and accurate pain assessment can guide both pharmacological and non-pharmacological pain management (Jakubik & Thompson, 2000).

First, an appropriate way to measure pain in a child over the age of three is to ask them how much he or she hurts. Accordingly, the components of a pain assessment should include self-report (Jakubik & Thompson, 2000). Schecher, Blankson, Pachter, Sullivan, and Costa (1997) found that the child's self-report of his or her own discomfort was the most appropriate way to assess pain. In phone interviews, it has been found that children's hospitals such as Loma Linda University Children's Hospital, CHOC (Children's Hospital of Orange County) and CHOC at Mission use the Wong-Baker FACES pain scale (1988) to assess pain in children ages three and up. Because pain

is a subjective experience, individual self-report is often favored (American Academy of Pediatrics, 2001).

Secondly, the assessment a child's pain should be completed by an individual who is trained in child development, in order to interpret the child's pain while taking into consideration their age and developmental level. A young child may not know what the word "pain" means and may need help by trained individuals to describe it using a familiar language (McGrath, Ritchie, & Finley, 1994; Wong, 1995). An individual trained in child development, such as a Certified Child Life Specialist, who possesses an extensive background in child development and the implementation of non-pharmacologic pain interventions, can utilize their education and experience to accurately assess a child's pain according to their age/developmental level. For example, using a variety of words to describe pain, such as "owie", "boo-boo", "feel funny", or "hurt" (Wong, 1995). Furthermore, children's behavioral responses to pain change with age (Wong, 1995). Children often show their pain by crying, making a "pain face", or by holding or rubbing the area where it hurts (McGrath, Ritchie, & Finley, 1994).

Confounds in Current Research Re: Effectiveness of Non-pharmacologic Pain Interventions

In summary, there are two shortcomings in current research in this field that contributes to confounding results from these studies: who administers the non-pharmacologic interventions, and how pain is assessed.

First, in studies to date individuals such as nurses or other healthcare workers, parents, and volunteers have been used to administer non-pharmacologic interventions. As discussed above, there are concerns with this because of their knowledge in the area of child development, their training in administering non-pharmacologic pain interventions, and the lack of distinction between administering the intervention and other duties have led to confounding results. The nurse or healthcare worker is trained and has background in the area of administering medical procedures, but often has little or no background/training in the area of child development or non-pharmacologic pain interventions. Therefore, using an individual without the background and training in child development and non-pharmacologic pain interventions can likely interfere with the effectiveness of the non-pharmacologic pain intervention as well as presenting a potential risk to the child's safety. As described

above, this confound could be cleared up by introducing an individual who is a "safe person", a professional with specific training in child development, age-appropriate interventions, and knowledge of how to implement non-pharmacologic pain interventions.

Second, in past research the measures used to assess pediatric pain have not utilized the self-report method recommended. Many other pain scales have been used which have confounded the results of non-pharmacologic pain interventions because they are not using a uniformed assessment. Measures used in other studies, for instance the KIAQ (Kids Imaging Ability Questionnaire) have shown it to be acceptable in research but not clinically useful in all situations (Kwekkeboom, Maddox, & West, 2000). In addition, Pederson (1995) reported in a study on children's pain and anxiety during cardiac catheterization that children reported significantly higher levels of pain than nurses perceived. This is congruent with other studies, thus nurses need to ask for and respect children's reports of pain (Pederson, 1995).

Therefore, in order to correlate children's pain perception and easily identify the effectiveness of the pain intervention used, a universal tool that is approved and recommended for the pediatric population such as the

FACES Pain Scale should be used. To address this confound, the Wong-Baker FACES Pain Scale, which has been approved for use in the pediatric population and follows the recommended protocol of self-report for pain assessment, will be used in this current study.

CHAPTER THREE

SUMMARY AND PURPOSE

In summary, studies on non-pharmacologic pain interventions have shown them to be overall beneficial, although the results have been inconsistent. Studies in this field have been somewhat confounded, which may be due, at least in part, to not addressing the variables of having a "safe person" (i.e., a professionally trained individual) administering the intervention, and/or using a self-report pain assessment tool.

The current study will address these shortcomings by utilizing a Certified Child Life Specialist as the sole provider of the non-pharmacologic pain interventions to pediatric patients ranging in age from 4 to 16 years old. A certified child life specialist fills both requirements that were presented as possible confounds above. A child life specialist is a "safe person" who is present only for the purpose of providing non-pharmacologic pain interventions during a medical procedure. They also have extensive training in the area of child development and the implementation of non-pharmacologic pain interventions.

In addition, the Wong-Baker FACES Pain Scale, a self-report pain scale approved for ages 3 and up, will be used by the Certified Emergency Department Child Life Specialist in this current study to assess the participant's pain rating with the recommended method of pain assessment.

The hypotheses, then, are as follows:

Hypothesis 1

It is expected that participants receiving non-pharmacologic pain intervention will report lower pain during the medical procedure compared to prior to the medical procedure.

Hypothesis 2

It is expected that participants receiving non-pharmacologic pain intervention will report significantly less pain after the medical procedure is completed compared to during the medical procedure.

This study is important because non-pharmacologic pain interventions generally appear to be very beneficial for controlling pain perception and anxiety in pediatric patients. However, research has not been able to denote without a doubt that these interventions are valuable because of the lack of controlled empirical work in this

area. The fact that non-pharmacologic pain interventions appear to be underused in the pediatric population may be a result of the lack of solid empirical evidence. Thus, a more controlled study (such as the one proposed here) demonstrating the expected outcomes will hopefully lead to a greater acceptance of the use of non-pharmacologic pain interventions by child life specialists.

CHAPTER FOUR

METHODS

Participants

One-hundred children who were patients in the emergency room department at CHOC at Mission receiving a medical procedure such as an IV/phlebotomy, catheter, lumbar puncture/spinal tap, orthopedic procedure, wound treatment/management, etc. were assessed and received the non-pharmacologic pain intervention by the Emergency Department Certified Child Life Specialist. Participants ranged in age from 4 to 16 (M = 9.6 years). Fifty-four percent were male; forty-six were female. All participants were treated in accordance with standards applied by the California State University, San Bernardino and Children's Hospital of Orange County Institutional Review Boards.

Measures

Child Life Intervention Record

The Child Life Intervention Record, created for use in the current study (Appendix A), assesses the following: age of the child, sex of the child, status of the child's hospital experience, medical procedure administered, medication given, and the type of non-pharmacologic pain intervention administered.

Pain Assessment

The Wong-Baker FACES Pain Scale was used to assess pain before, during, and after the non-pharmacologic pain intervention (Appendix B). The tool consists of six black and white stylized cartoon faces representing various degrees of pain. The cartoons represent actual drawings rendered by children who were asked to draw what they would look like if they had each level of pain (Wong, 1995). Children are asked to either point to or identify by number the face that best represents how much they hurt. This makes it easy for the child to indicate pain intensity and also easy for the child life specialist to score. The FACES Scale has received psychometric support for discriminant and concurrent validity (.71 -.75), and test-retest reliability (.83 -.96) (Keck, Gerkensmeyer, Joyce, Schade, 1996). The findings suggest that the instrument is a valid and reliable tool when used to assess procedural pain among verbal children aged 4- to 18-years and among 3-year-olds who can count and understand the instrument. In addition, all children, including adolescents, have been found to prefer the FACES Scale to other measures of pain assessment (Keck, Gerkensmeyer, Joyce, & Schade, 1996).

Procedure

Since it is unethical to withhold this intervention from a child being treated in the emergency room, all children seen by the Certified Emergency Department Child Life Specialist (who is a separate individual other than the current researcher) were offered this intervention.

When children were admitted to the Emergency Department at CHOC at Mission they were met by the Certified Emergency Department Child Life Specialist to assess their needs for non-pharmacologic pain interventions. Since these interventions are standard care provided by the Certified Emergency Department Child Life Specialist, and information for this research project is already recorded in the daily charting of the Certified Emergency Department Child Life Specialist, no individual consent for participating in this research was obtained by patients or their families. According to Broome, Rehwalt and Fogg (1998) no parental permission or physician's orders are required to teach non-pharmacologic pain interventions to children/adolescents.

When the pediatric patient was determined by medical staff to be in need of a medical procedure, the Certified Emergency Department Child Life Specialist consulted with the patient and family. In conjunction with current

research, assent for the non-pharmacologic pain intervention by the child, and parent/guardian if present, was obtained before implementing the non-pharmacologic pain intervention (the child and/or his/her parent/guardian always had the right to decline these services). This consultation time was used to determine the need and the appropriateness of the non-pharmacologic pain intervention to be administered during the patient's medical procedure, as well recording the pain perception of the patient prior to the medical procedure (using the Wong-Baker FACES Pain Rating Scale).

The Certified Emergency Department Child Life Specialist was present during the entire medical procedure and provided the non-pharmacologic pain intervention to the pediatric patient. During the medical procedure, the child's pain perception was again assessed (using the Wong-Baker FACES Pain Rating Scale). The pictures of the faces on the pain scale were shown to the patient (without the corresponding numbers) and children were told to "point to the picture of how you feel now."

After the completion of the medical procedure the Certified Emergency Department Child Life Specialist once again assessed the patient's pain perception using the

Wong-Baker FACES Pain Rating Scale and then completed the Child Life Intervention Record.

CHAPTER FIVE

RESULTS

The means and standard deviations for the variables used in this study (i.e., child's age, sex, prior hospital experience, medical procedure, medication given, non-pharmacologic intervention used, and pain rating before, during, and after the medical procedure) are shown in Table 1.

Hypothesis 1

The first hypothesis stated that participants would report lower pain during the medical procedure than prior to the medical procedure as a result of the non-pharmacologic pain intervention.

A paired-samples t-test was performed on the overall mean ratings of Pain Before and Pain During the medical procedure. Results are shown in Table 2.

Contrary to the hypothesis, there was no significant decrease in children's pain report during the medical procedure compared to prior to the medical procedure. In fact, the means were actually in the opposite anticipated direction (i.e., mean pain ratings during the procedure were slightly higher than mean pain ratings prior to the medical procedure).

Table 1. Demographic, Hospital, and Pain Assessment Variables

Variables (N = 100)	
Age:	4-16 years (M = 9.6 years)
Sex:	Males 54%; Females 46%
Prior hospital experience:	None 74%; one or more 26%
Medical Procedure:	1) I.V/phlebotomy 21% 2) Catheter 2% 3) L.P/spinal tap 1% 4) Wound treatment 28% 5) Orthopedic procedure 45%
Medication given:	0) None 16% 1) Pain control 77% 2) Anxiety reducer 0% 3) Moderate sedation 7%
Non-pharmacologic Pain Intervention:	1) Breathing 3% 2) Distraction 1% 3) Pre-procedural Preparation 12% 4) Breathing & Distraction 3% 5) Breathing & Pre-procedural Preparation 23% 6) Guided Imagery, Breathing & Pre-procedural Preparation 1% 7) Breathing, Distraction & Pre-procedural Preparation 39% 8) Distraction & Pre-procedural Preparation 18%
Pain before med procedure: M = 4.6 (sd = 3.1)	
Pain during med procedure: M = 5.2 (sd = 3.2)	
Pain after med procedure: M = 1.8 (sd = 2.0)	

[1] A content-analysis of the non-pharmacologic pain interventions administered to the children in this study showed that they were administered one, two, or three interventions. The resulting combinations are shown.

Table 2. Paired Samples t-Test for Pain Before and Pain During the Medical Procedure

Pain Before (N = 100)		Pain During				
M	(sd)	M	(sd)	df	t	sig.
4.62	(3.2)	5.22	(3.2)	99	-.161	.111

Next, participants were categorized into the following groups: 1) orthopedic procedures and wound treatments, and 2) I.V/phlebotomy, catheter, L.P/spinal tap, and other procedures. This was because orthopedic procedures and wound treatments typically present higher pain prior to the medical procedure, and I.V/phlebotomy, catheter, L.P/spinal tap, and other medical procedures usually do not present pain until during the medical procedure (a personal observation. Results showed that I.V/phlebotomy, catheter, and L.P/spinal tap patients did show significantly higher pain during than before the medical procedure (Table 3), but the wound treatment/orthopedic procedure patients did not present higher pain before compared to during the medical procedure (Table 4).

Table 3. Paired Samples t-Test for Pain Before and Pain During the Medical Procedure for the I.V/Phlebotomy, Catheter, and L.P/Spinal Tap Patients

Pain Before (N = 24)		Pain During				
M	(sd)	M	(sd)	df	t	sig.
4.50		6.33		23	-2.61	.016

Table 4. Paired Samples t-Test for Pain Before and Pain During the Medical Procedure for the Wound Treatment/Orthopedic Procedure Patients

Pain Before (N = 73)		Pain During				
M	(sd)	M	(sd)	df	t	sig.
4.66		4.79		72	-.32	.749

Hypothesis 2

The second hypothesis stated that participants would report pain to be lowered even further after the medical procedure is completed compared to during the medical procedure as a result of the non-pharmacologic pain intervention. A paired-samples t-test was performed on the overall means for Pain During and Pain After the medical

procedure. Results showed that pain after the medical procedure was significantly less than pain during the medical procedure (Table 5).

Table 5. Paired Samples t-Test for Pain During and Pain After the Medical Procedure

Pain During (N = 100)		Pain After				
M	(sd)	M	(sd)	df	t	sig.
5.22	(3.2)	1.80	(2.1)	99	11.5	.000

Participants were then combined into the following groups as described above: 1) I.V/phlebotomy, catheter, L.P/spinal tap, and 2) wound treatment/orthopedic procedures. Paired samples t-tests were computed for each of these two groups comparing their means for Pain During and Pain After. Results were virtually identical to those reported above in Table 5.

Additional Analyses

Pain Ratings Excluding Patients Receiving No Medication

Mean pain ratings by medical procedure were also computed for those receiving medication (Table 6). Results showed that I.V/phlebotomy, catheter, and orthopedic procedure patients had the highest levels of pain before and during the medical procedure, with all groups showing

a dramatic decline in pain at the completion of the medical procedure.

Table 6. Mean Pain Ratings by Medical Procedure for Patients Receiving Medication

Medical Procedure (n = 82)	Pain Before M (sd)	Pain During M (sd)	Pain After M (sd)
1) I.V/phlebotomy (n = 10)	6.8 (3.0)	7.2 (2.5)	2.4 (2.17)
2) Catheter (n = 2)	6.5 (0.71)	4.5 (0.71)	2.0 (1.41)
3) L.P/Spinal Tap (n = 0)			
4) Wound treatment (n = 27)	2.9 (1.87)	3.2 (2.79)	.63(1.74)
5) Orthopedic Procedures (n = 43)	5.7 (3.07)	5.7 (3.15)	2.2 (2.16)

Pain Ratings by Age

Mean pain ratings by age were also examined. Participants were divided into the following three age groups: 4-6 years, 7-11 years, and 12-16 years. Mean pain ratings were then tabulated (Table 7). Next, one-way between-groups ANOVAs were computed separately for Age x Pain Before, Age x Pain During, and Age x Pain After. Results showed no significant differences among age groups for Pain Before and Pain During, but there was a significant difference for Pain After, $F(2.97) = 3.77$, $t = .027$. Post-hoc tests (Tukey) showed that the oldest group (12-16 yrs) had significantly more pain than the youngest group (4-6 yrs) after the medical procedure.

Table 7. Mean Pain Ratings by Age

Age Groups (n = 100)	Pain Before M (sd)	Pain During M (sd)	Pain After M (sd)
4-6 Years (n = 22)	4.5 (3.3)	5.8 (3.5)	1.0 (1.3)
7-11 Years (n = 50)	4.4 (3.1)	5.0 (3.3)	1.7 (1.8)
12-16 Years (n = 28)	5.1 (3.0)	5.3 (2.7)	2.6 (2.7)

Age Differences in Medical Procedures, Medication, and Non-pharmacologic Pain Interventions

To examine why there were higher levels of pain among adolescents after the medical procedure, the distribution of medical procedure, medication administered, and non-pharmacologic pain intervention x age was examined (Table 8). Results showed that the highest percentage (54%) of orthopedic procedures (perceived to be one of the most painful procedures *during* the actual medical procedure itself) was performed on adolescents.

Type of Non-pharmacologic Pain Intervention Administered by Age

Finally, the types of non-pharmacologic pain interventions listed in Table 8 were grouped into two categories: Distraction vs. No Distraction. Results are below in Table 9 and show that younger children received far more distraction interventions than older children and adolescents.

Table 8. Distribution of Medical Procedures, Medication Administered, and Non-pharmacologic Pain Intervention Across Age Groups

		4-6 Yrs	7-11 Yrs	12-16 Yrs
Medical Procedure:	1) I.V/phlebotomy:	27%	26%	7%
	2) Catheter:	0%	2%	4%
	3) L.P/spinal tap:	0%	0%	4%
	4) Wound treat:	36%	24%	29%
	5) Orthopedic:	32%	46%	54%
	6) Other:	5%	2%	4%
Medication Given:	0) None:	18%	16%	14%
	1) Pain control:	77%	78%	75%
	2) Anxiety reducer:	0%	0%	0%
	3) Moderate sedate:	4%	6%	11%
	4) Sedation:	0%	0%	0%
Non-Pharmacologic Pain Intervention:	1) Breathing:	4%	2%	3%
	2) Distraction:	0%	2%	0%
	3) Preparation:	4%	18%	7%
	4) Breathing& Distraction:	9%	2%	0%
	5) Breathing & Pre-procedural Preparation:	4%	20%	43%
	6) Guided imagery, Breathing & Pre-procedural Preparation:	0%	0%	3%
	7) Breathing, Pre-procedural Preparation & Distraction:	50%	40%	28%
	8) Distraction Pre-procedural Preparation:	27%	16%	14%

Table 9. Use of Distraction as a Non-pharmacologic Pain Intervention by Age

	4-6 Yrs	7-11 Yrs	12-16 Yrs
No distraction	6%	40%	59%
Distraction	94%	60%	41%

CHAPTER SIX

DISCUSSION

The purpose of the present study was to examine the impact of non-pharmacologic pain intervention on pediatric patients' pain perception in the emergency department by improving upon previous research in the following two ways: having a Certified Child Life Specialist as the sole provider of non-pharmacologic pain interventions, and utilizing a better measure to assess pain. In general, findings provided support for one of the two hypotheses.

The lack of support for the first hypothesis (i.e., that participants would report lower pain during the medical procedure compared to prior to the medical procedure) was somewhat surprising. Results showed that reported pain levels actually rose for all but one type of procedure during the actual medical procedure. There are two possible explanations for these findings. First, it may be that the highest level of pain tends to be experienced by the child during the actual medical procedure. For example, a child who comes to the emergency room for dehydration may not present a high level of pain at that time; however, when an I.V is started in order to re-hydrate the child with fluids (which is the actual

medical procedure) pain is experienced. This was clearly shown to be the case for such medical procedures as phlebotomy (i.e., blood test), catheter, and/or L.P/spinal tap.

Second, whether children receive pain medication before or after the initial pain assessment could influence the child's initial report of pain. For example, if a child reports their pain to be a "6" (out of a 10) on their initial pain assessment (i.e., before the medical procedure), it is unclear whether the child's pain report was skewed by pain medication since the "timing" of the administration of pain medication relative to the initial pain report was not indicated on the Child Life Intervention Record. Therefore, a child could in fact have been experiencing a higher level of pain prior to the medical procedure than was actually reported, therefore skewing the pain reports prior to the medical procedure and making it appear that pain levels rose during the medical procedure.

The results for the second hypothesis showed, as expected, that participants would report pain to be lowered even further *after* the medical procedure is completed compared to *during* the medical procedure. It is unclear, though, whether this was due to the

administration of the non-pharmacologic pain intervention or the fact that the majority of pain being experienced was over after the medical procedure had ceased. It is reasonable to assume that pain would in fact be lowered after the medical procedure was completed particularly given the administration of both pharmacologic and non-pharmacologic pain interventions that presumably kept pain within a tolerable range. During the medical procedure, when the most pain is being experienced, the non-pharmacologic pain intervention may keep pain from getting out of control. It may be that while pain is being experienced (compared to before the medical procedure) it is actually less than it would have been without the non-pharmacologic pain intervention. These interventions perhaps allow the child to take a more active role in their treatment of pain, and therefore aim to not allow the child's pain to reach an intolerable level. In turn, non-pharmacologic pain interventions help children cope with pain and anxiety during the procedure, although some amount of pain should still be expected, especially in extreme medical procedures (e.g., orthopedic procedures and wound treatments) that typically present a higher level of pain. A study by Schiff, Holtz, Peterson, and Rakusan (2001), for example, showed that children who are

taught a specific technique such as breathing exercises believe that they have more control over a painful situation, which generally results in a higher pain threshold and tolerance. By contrast, pain that gets out of control and rises drastically is harder to get under control (personal observation). This is supported by Carlson, Broome, and Vessey (2000), who demonstrated that when pain intensifies and continues in children, their emotional distress intensifies, thus creating an increasing pain-emotional distress cycle. Therefore, if children's pain and distress are not managed effectively and therefore allowed to get out of control, the child's pain perception may continue to be at a high level after the medical procedure. Participants in this current study did not, on the whole, reach an extreme high in their pain reports during the medical procedure. Perhaps not allowing the child to reach an extremely high pain report during the medical procedure might have allowed for the child to recover more quickly from the pain after the medical procedure, hence reporting an even lowered pain perception after the medical procedure was completed.

Additional analyses examined whether age, medication given, or medical procedure performed might have impacted the pain reports. When reviewing the results, the oldest

children had the highest level of reported pain after the medical procedure. Pain in older children is often underestimated by physicians and/or nurses, and therefore receives less pain management (Carlson, Broome, & Vessey, 2000). This may in part be due to older children who are typically more stoic than preschool or school-aged children; the older child is often expected by healthcare workers to handle pain without pain-controlling interventions (personal observation). A study by Carlson, Broome, and Vessey (2000) supports this observation, stating that age is a significant predictor of observed distress and self report of pain.

Another explanation for this result could be that the youngest age group might be more highly distractible because of their active imagination. A study by McCarthy, Cool, and Hanrahan (1998) supports the notion that children ages 3 to 6 years old had some of their pain alleviated by distraction due to their imaginative involvement (e.g., "let's pretend we're blowing out our birthday candles"). Analyses, did in fact, show that older children and adolescents received less distraction than younger children. Perhaps we need to rethink the types of non-pharmacologic pain interventions administered with the two older age groups.

Another possible explanation might be that the oldest children received the largest percentage of orthopedic procedures (perceived to be one of the most painful medical procedures). In summary, participants did not report a lowered pain level during the medical procedure in comparison with pain reports prior to the medical procedure. However, they did seem to fall into a tolerable range (with reports of pain during the medical procedure rising slightly from the base pain report prior to the medical procedure), not allowing pain perception to get out of control and become unmanageable. It is unclear, though, whether the lowered level of pain reported after the medical procedure was due to pharmacologic use, non-pharmacologic pain interventions, a combination of the two, or the fact that the medical procedure has ended.

Limitations and Future Research

There were two major limitations to this study: 1) there was not a control group of children who did not receive any non-pharmacologic pain interventions, and 2) there was a lack of control for medication administered before or after the initial pain assessment.

The lack of a control group presents a large missing piece to this study. Without being able to determine the

pain reports for children who do not receive non-pharmacologic pain interventions it is difficult to know whether the degree in pain reported was from the effects of the non-pharmacologic pain intervention, the fact that the most painful part of the medical procedure has ceased, or from the pain medication alone. Because it would be unethical to withhold this intervention from participants, it remains unclear until future studies address this issue.

Secondly, the interaction between when the pain medication was administered and the timing of the initial pain assessment were not controlled for. Thus, it is unclear whether the pain reports prior to the medical procedure were accurate due to the lack of control for medication administered before or after the initial pain assessment. Again, future studies will hopefully address this.

Implications and Conclusions

This present study has improved on previous research by providing a "safe person" (i.e., an a Certified Child Life Specialist) as the sole provider of non-pharmacologic pain interventions. In addition, a self-report pain scale

was used to measure pain, which is the recommended type of pain scale for use with pediatric patients.

The findings in this study showed that there was a significant lowering in pain reports after the medical procedure was completed. However, because of the lack of a control group it is unclear whether the effects of lowered pain are directly linked to the non-pharmacologic interventions.

Since non-pharmacologic pain interventions have been shown in many studies to be effective for use in the pediatric population, the continued use of these interventions in hospitals that serve the pediatric population is supported. It may be that non-pharmacologic pain interventions are effective for controlling an excessive rise in pain during the medical procedure, allowing the child to better cope with the procedure, therefore recovering more quickly at the completion of the painful medical procedure. Future studies will hopefully clarify this.

This study has supported the importance of using a Certified Child Life Specialist as the sole provider of non-pharmacologic pain interventions. It is advisable for hospitals that serve the pediatric population to utilize one of these trained individuals for pediatric patients

undergoing painful procedures. These individuals are "safe persons" not administering any part of the medical procedure, and have an extensive knowledge of child development and training in regards to providing non-pharmacologic pain interventions. With this knowledge of child development comes the extensive knowledge of developmentally appropriate practice, and knowing the correct match between a child's cognitive development and a particular non-pharmacologic pain intervention. Without a trained individual providing the non-pharmacologic pain interventions, the interventions may yeild ineffective results, become a safety concern, or further frustrate the child causing more stress-inducing behaviors than currently presented from the medical procedure.

In addition, distraction as a non-pharmacologic pain intervention needs to be addressed further for the two age groups; 7-11 and 12-16 year olds. The pain results for younger children, who received far more distraction than older children and adolescents, were significantly decreased within this study. Perhaps, older children and adolescents would be more receptive to distraction as a non-pharmacologic pain intervention than previously believed. Future studies should address the possibility of

distraction as a possible effective non-pharmacologic pain intervention in older aged children.

APPENDIX A

CHILD LIFE INTERVENTION RECORD

CHILD LIFE INTERVENTION RECORD

1. Age of child (4 to 18 years): years_____ months____

2. _____ Male _____ Female

3. _____ Previous hospital experience ____1st Visit

4. Medical Procedure:

   _____ (1) IV / Phlebotomy
   _____ (2) LP/Spinal Tap
   _____ (3) Wound treatment
   _____ (4) Catheter
   _____ (6) Orthopedic Procedure
   _____ (6) Other_____

5. Medication given prior to / during procedure:

   _____ (1) Pain Control (local or central)
   _____ (2) ↓ Anxiety
   _____ (3) Sedation
   _____ (4) Moderate Sedation (Pain Control & ↓ Anxiety)
   _____ (5) Other: _____

Pain Rating Scale: (0-10; 0 = none; 1 = low; 10 = high)

6. _____Pain rating prior to medical procedure

7. _____Pain rating during the medical procedure

8. _____Pain rating after the medical procedure

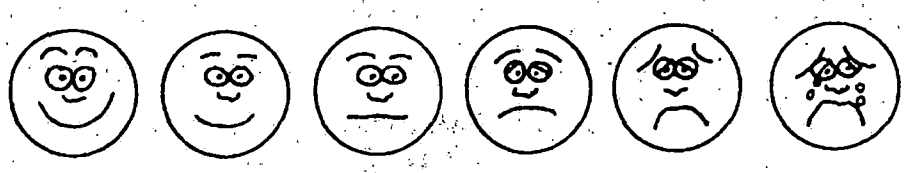
9. Non-pharmacologic pain intervention used by CCLS:

   _____ Guided imagery _____ Breathing exercises
   _____ Distraction/diversion therapy ___ Other _____
   _____ Pre-procedural preparation and / or medical play

APPENDIX B

WONG-BAKER FACES PAIN RATING SCALE

Wong-Baker FACES Pain Rating Scale©



0	1–2	3–4	5–6	7–8	9–10
No Hurt	Hurts Little Bit	Hurts Little More	Hurts Even More	Hurts Whole Lot	Hurts Worst Possible

From Wong, D., L., Hockenberry-Eaton, M., Wilson, D., Winkelstein, M., L., Schwartz, P. Wong's Essentials of Pediatric Nursing, Ed. 6, St. Louis, 2001, p. 1301. Copyrighted by Mosby, Inc. Reprinted with permission

REFERENCES

American Academy of Pediatrics. (2001). The assessment and management of acute pain in infants, children, and adolescents. September 20, 2001 from, http://www.aap.org/policy/9933.html

Barrett, J. (2003). Pain management. January 20, 2003 from, http://www.principalhealthnews.com/topic/topic100587249?_requestid=76362

Bowen, A. M., & Dammeyer, M. M. (1999). Reducing children's immunization distress in a primary care setting. Journal of Pediatric Nursing, 14, 296-303.

Broome, M. E., Lillis, P., McGahee, T., & Bates, T. (1992). The use of distraction and imagery with children during painful procedures. Oncology Nursing Forum, 19, 499-502.

Broome, M. E., Rehwaldt, M., & Fogg, L. (1998). Relationships between cognitive behavioral techniques, temperament, observed distress, and pain reports in children and adolescents during lumbar puncture. Journal of Pediatric Nursing, 13, 48-54.

Carlson, K. L., Broome, M., & Vessey, J. A. (2000). Using distraction to reduce reported pain, fear, and behavioral distress in children and adolescents: A multi-site study. JSPN, 5(2), 75-85.

Carpenito, L. J. (1983). Nursing diagnosis: Application to clinical practice. Philadelphia: J.B. Lippincott. Child Life Council. Child life council position statement. Rockville, MD: CLC, 1982.

Christian, B., & Thomas, D. O. (1998). A child life program in one pediatric emergency department. Journal of Emergency Nursing, 24(4), 359-261.

Claar, R. L., Walker, L. S., & Barnard, J. A. (2002). Children's knowledge, anticipatory anxiety, procedural distress, and recall of esophagogatroduodenoscopy. Journal of Pediatric Gastroenterology and Nutrition, 34, 68-72.

Clarke, E. B, French, B., Bilodeau, M. L, Capasso V. C., Edwards, A., & Empoliti, J. (1996). Pain management knowledge, attitudes and clinical practice: The impact of nurses' characteristics and education. Journal of Pain Symptom Manage, 1, 18-31.

Clatworthy, S. (1981). Therapeutic play: Effects on hospitalized children. Children's Health Care, 9(4), 108-113.

Dahlquist, L. M., Busby, S. M., Slifer, K. J., Tucker, C. L., Eischen, S., Hilley, L., & Sule, W. (2002). Distraction for children of different ages who undergo repeated needle sticks. Journal of Pediatric Oncology Nursing, 19, 22-34.

Fanurik, D. Koh, J., Schmitz, M., & Brown, R. (1997). Pharmacobehavioral intervention: Integrating pharmacologic and behavioral techniques for pediatric medical procedures. Children's Health Care, 26(1), 31-46.

French, G. M., Painter, E. C., & Coury, D. L. (1994). Blowing away shot pain: A technique for pain management during immunization. Pediatrics, 93(3), 384-395.

Giedt, J. F. (2001). A psychoneuroimmunological intervention in holistic nursing practice. Journal of Holistic Nursing, 15(2), 112-124.

Hatava, P., Olsson, G. L., & Lagerkranser, M. (2000). Preoperative psychological preparation for children undergoing ENT operations: a comparison of two methods. Pediatric Anesthesia, 10, 477-486.

Jacob, E., & Puntillo, K. A. (1999). Pain in hospitalized children: Pediatric nurses' beliefs and practices. Journal of Pediatric Nursing, 14(6), 379-389.

Jakubik, L. D., & Thompson, M. (2000). Care of the child with sickle cell disease: Acute complications. Pediatric Nursing, 26(4), 373-379.

Kachoyeanos, M. K., & Friedhoff, M. (1993). Cognitive and behavioral strategies to reduce children's pain. MCN, 18, 14-19.

Keck, F. J., Gerkensmeyer, E. J., Joyce, A. B., & Schade, G. J. (1996). Reliability and validity of the faces and word descriptor scales to measure procedural pain. Journal of Pediatric nursing, 11(6), 368-374.

Korycka, E. (2002). Spinning pinwheels offer stress relief to children. February 18, 2003 from, http://www.community.nursingspectrum.com/MagazineArticles/article.cfm?AID=1401

Kwekkeboom, K. L., Maddox, M. A., & West, T. (2000). Measuring imaging ability in children. Pediatric Health Care, 14(14), 297-303.

Lutz, W. J. (1986). Helping hospitalized children and their parents cope with painful procedures. Journal of Pediatric Nursing, 1(1), 24-32.

Mahanjan, L., Wylel, R., Steffen, R., Kay, M., Kitaoka, G., Dettorre, J., Samara, S., & McCue, K. (1998). The effects of a psychological preparation program on anxiety in children and adolescents undergoing gastrointestinal endoscopy. Journal of Pediatric Gastroenterology and Nutrition, 21, 161-165.

Mayer, D. M., Torma, L., Byock, I., & Norris, K. (2001). Speaking the language of pain. American Journal of Nursing, 101(2), 44-49.

McCaffery, M. (1971). Children's response to rectal temperatures: An exploratory study. Nursing Research, 20(1), 32-45.

McCaffery, M. (1977). Pain relief for the child: Problem areas and selected nonpharmacological methods. Pediatric Nursing, July/August, 11-17.

McCarthy, A. M., Cool, V. A., & Hanrahan, K. (1998). Cognitive behavioral interventions for children during painful procedures: Research challenges and program development. Journal of Pediatric Nursing, 13(1), 55-63.

McGrath, P. J., Ritchie, J., & Finley, A. G. (1994). Pain, pain, go away: Helping children with pain. Association for the Care of Children's Health and Patrick McGrath. April 28, 2004 from, http://www.childlife.org

Mitchell, P. (1999, November 13). Understanding a young child's pain. The Lancet, 354, 1708.

Moody, L. E., & Fraser, M. (1993). Effects of guided imagery in patient's with chronic bronchitis and emphysema. Clinical Nursing Research, 2(1), 478-487.

Olness, K., (1989). Hypnotherapy: A cyberphysiologic strategy in pain management. Pediatric Clinics of North America, 36, 873-884.

Pederson, C. (1995). Effect of imagery on children's pain and anxiety during cardiac catheterization. Journal of Pediatric Nursing, 10(6), 365-374.

Polkki, T., Vehvilainen-Julkunen, K., & Pietila, A. (2001). Nonpharmacological methods in relieving children's postoperative pain: A survey on hospital nurses in Finland. Journal of Advanced Nursing, 34(4), 483-492.

Rhiner, M., Ferrell, B. R., Shapiro, B., & Dierkes, M. (1994). The experience of pediatric cancer pain, Part II: Management of pain. Journal of Pediatric Nursing, 9(6), 365-374.

Rusy, L. M., & Weisman, S. J. (2000). Complementary therapies for acute pediatric pain management. Pediatric Clinic of North America, 47(3), 589-599.

Ryan-Wenger, M. A. (1996). Children, coping, and the stress of illness: A synthesis of the research. JSPN, 1(3), 126-138.

Schecher, N. L., Blankson, V., Pachter, L. M., Sullivan, C. M., & Costa, L. (1997). The ouchless place: No pain, children's gain. Pediatrics, 99(6), 890-894.

Schiff, W. B., Holtz, K. D., Peterson, N., & Rakusan, T. (2001). Effect of an intervention to reduce procedural pain and distress for children with HIV infection. Journal of Pediatric Psychology, 26(7), 417-427.

Schneider, S. M., & Workman, M. L. (2000). Virtual reality as a distraction intervention for older children receiving chemotherapy. Pediatric Nursing, 26(6), 593-597.

Smart, G. (1997). Helping children relax during magnetic resonance imaging. The American Journal of Maternal Child Nursing, 22, 237-241.

Sutherland, T. (2003). Comparison of hospital and home base preparation for cardiac surgery. Pediatric Nursing, 15(5), 13-16.

Syrjala, K., Donaldson, G. W., Davis, M. W., Kippes, M. E., & Carr, J. E. (1995). Relaxation and imagery and cognitive-behavioral training reduce pain during cancer treatment: A controlled clinical trial. Pain, 63, 189.

Tanabe, P., Ferket, K., Thomas, R., Paice, J., & Marcantonio, R. (2002). The effect of standard care, ibuprofen, and distraction on pain relief and patient satisfaction in children with musculoskeletal trauma. Journal of Emergency Nursing, 28(2), 118-125.

Thompson, R. H., & Stanford, G. (1981). Child life in hospitals: Theory and practice. Illinois: Charles C. Thomas.

Wall, V., & Womack, W. (1989). Hypnotic versus active cognitive strategies for alleviation of procedural distress in pediatric oncology patients. American Journal of Clinical Hypnosis, 31, 181-190.

Weekes, D. P., & Kagan, S. H. (1994). Adolescents completing cancer therapy: Meaning, perception, and coping. Oncology Nursing Forum, 21(4), 663-670.

Wilma, J. L. (1986). Helping hospitalized children and their parents cope with painful procedures. Journal of Pediatric Nursing, 1(1), 24-32.

Wong, D. L. (1995). Nursing care of infants and children. Missouri: Mosby-Year Book, Inc.

Yaster, M., Krane, E. J., Kaplan, R. F., Cot'e, C. J., & Lappe, D. G. (1997). Pediatric pan management and sedation handbook. Missouri: Mosby-Year Book, Inc.

Zeltzer, L., Kellerman, J., Ellenberg, L., & Dash, J. (1983). Hypnosis for reduction of vomiting associated with cancer. Journal of Adolescent Health Care, 4(2), 77-84.

Zeltzer, L., & LeBaron, S. (1982). Hypnosis and non-hypnotic techniques for reduction of pain and anxiety during painful procedures in children and adolescents with cancer. Journal of Pediatrics, 101, 1032-1035.