

**EFFECTIVE NON-PHARMACOLOGICAL PAIN RELIEF
INTERVENTIONS FOR PEDIATRIC PATIENTS: A
SYSTEMATIC REVIEW OF THE LITERATURE**

Honors Thesis

**Presented in Partial Fulfillment of the Requirements
For the Degree of Bachelor of Science in Nursing**

In the School of Nursing
at Salem State University

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Commonwealth Honors Program
Salem State University
2019

Abstract

Managing pediatric pain is an important role of the registered nurse. This can be a challenge, as pediatric patients often do not have the ability or the vocabulary to verbalize that they are in pain. Non-pharmacological interventions are important to use as an alternative to pharmacological pain relief because it is safer, cost-effective, and kid-friendly. Non-pharmacological interventions can create a positive hospital experience for both the pediatric patient and the family. The family and patient can carry on this positive experience with and seek medical care in the future with no hesitation.

A systematic review of the literature was done using CINAHL to identify effective non-pharmacological pain relief interventions for pediatrics. Criteria for inclusion in this study were: peer reviewed articles, full text, English, and the journal subsets: nursing/core nursing. The results of the studies demonstrated that distraction interventions which stimulated the auditory and visual sense were the most effective in relieving pediatric pain. These included play, dancing, music, animated cartoons, and blowing bubbles. Parental involvement in these non-pharmacological interventions was also effective. Ineffective non-pharmacological interventions were those that stimulated the olfactory sense. Studies that compared non-pharmacological interventions to pharmacological pain management determined that they were equally as effective.

Non-pharmacological pain relief interventions for pediatric patients can provide both short-term and long-term benefits. Providing education to registered nurses on what non-pharmacological pain relief intervention are effective can decrease the use of drugs for pain management.

Keywords: [Non-pharmacological, pain relief, nursing, pediatric, interventions]

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Acknowledgements

First and foremost, I would like to thank my thesis advisor, Dr. Nancy Ebersole, for helping me with the process of writing this thesis. I am appreciative of her guidance, advice, and patience with me.

I would also like to thank Professor Scott Nowka for guiding me with the thesis process from the very start of my journey at Salem State University. I am grateful for Professor Nowka's words of encouragement and for always believing in me.

Finally, I would like to thank my friends and family for supporting me throughout this journey. Thank you all for helping me whenever I needed!

Introduction

Pain is often described as an unpleasant sensory and emotional state (Aydin, 2016). The feeling of pain can originate from anywhere in the body and is completely subjective. Pain can be experienced in a variety of ways. It has the ability to cause long-term negative effects if it is not properly treated.

The role of the Registered Nurse is to assess a patient's pain and to implement measures that will alleviate the pain. The pediatric population is vulnerable to not receiving optimal pain management because children might be unable to express that they are in pain. Failure to appropriately manage pain can have a negative impact on the physiological and emotional development of children (Dowler, 2015). Children may develop a traumatic memory of the hospital experience when they perceive that the Registered Nurse did not implement any efforts to reduce pain (Redfern, 2017). For these reasons, the Registered Nurse must use the proper pain assessment tools to provide pain management for the child.

There are two main categories of pain relief interventions. These are pharmacological, which involve the use of drugs as pain management, and non-pharmacological. Non-pharmacological pain interventions include, but are not limited to, distraction techniques, music therapy, dancing, and playing. Non-pharmacological interventions are simple to implement for repeat procedures, safe, and cost effective (Bergomi, 2018). These interventions can also be implemented by family members, allowing them to be actively involved in the pain management of their hospitalized child. Finally, these interventions are kid-friendly and promote a positive hospital experience.

Determining what non-pharmacological interventions are effective in relieving pediatric pain is important information that can be used by Registered Nurses and caregivers. With this knowledge, those providing care for pediatric patients can relieve their pain in a safe, efficient, kid-friendly, and cost-effective manner.

Background

Pediatric Pain Management & Assessment

Managing and assessing a patient's pain level is one of the many important roles of a Registered Nurse. Communicating with the patient and asking them to verbalize the type of pain they are experiencing is helpful in the nurse's pain assessment. Based on the assessment, the nurse identifies what the most adequate pain relief intervention would be.

The pediatric population is challenging to assess. Children of a very young age may not have the ability to verbalize where they are feeling pain, what makes the pain worse or better, what the pain feels like, or how long the pain lasts (Johnston, 2007). The challenges in assessing pediatric pain are why it is often undertreated. Undertreated pediatric pain can cause long term effects, such as distress, fear of the healthcare environment, and can affect pain tolerance (Mohan, 2015). In order to avoid undertreating pediatric pain, there are several pediatric pain assessment scales that can be used to properly assess the child's level of pain. Pediatric pain assessment tools that can be used are the Wong-Baker Faces Pain Scale (Figure 1). This pain scale is a row of faces that range from a smiling face at 0, or "no hurt", to a crying face at 10, or "hurts worst" (Figure 1). The children have to be of the appropriate age for this pain scale, and thus be able to pick what face correlated to the pain they are feeling.

Figure 1: Wong-baker Faces Pain Scale



(2016). Wong-baker Faces Pain Scale. Retrieved from <https://wongbakerfaces.org>

Pharmacological Interventions

There are also many challenges that come with safely prescribing and administering medication for a pediatric patient. Administering a medication is more than just a “mechanical task” (Paul, 2011), but also requires “thought and judgement” (Paul, 2011). The prescriber must base the dosage of the medication from the child’s weight, body mass index, renal function, and liver maturity (Fletcher, 2008). Furthermore, the prescriber must ensure that the medication ordered does not interact with any other medications the child may be on. When given a medication, children’s bodies respond differently than adults’. For this reason the prescriber also needs to be aware of how the drug moves within the body (Paul, 2011). The absorption, distribution, metabolism, and elimination of drugs varies greatly even from child to child. Once the medication is administered, those involved in the child’s care need to be observant and report any adverse reactions (Paul, 2011). The prescriber can take all of the necessary precautions,

however, there is always a possibility that the child may experience an adverse drug reaction. This is in part “due to the lack of clinical trial data in this group” (Paul, 2011). It is the nurse’s responsibility to monitor the child for any changes in baseline behavior or changes in vital signs after the administration of the medication. Nurses spend more time at the bedside and should therefore be aware of any possible adverse reactions to medications.

Non-pharmacological Interventions

Due to the challenges surrounding pediatric prescribing, it is a much safer alternative to implement non-pharmacological pain relief. Non-pharmacological pain management is an intervention that does not involve the administration of medication for pain relief. These interventions can target one or more of the five senses. An example of a non-pharmacological intervention is distracting the patient by targeting the auditory or visual sense. The lack of clinical trial data for pediatrics also makes non-pharmacological pain relief interventions a much safer alternative. These pain interventions can also be implemented by various members involved in the child’s hospitalization as they do not require a provider’s order. They can be implemented by Certified Nursing Assistants (CNA’s), Registered Nurses, hospital volunteers, caregivers, parents, grandparents, etc.

Family Involvement

One of the many benefits of non-pharmacological pain relief interventions is that they can be implemented by family members. Including the family in the plan of care of their hospitalized child can foster a trusting relationship between them and the healthcare team. The family can also have a feeling of control while in an unfamiliar, and often

frightening environment. Including family members in pain relief interventions also gives a sense of comfort to the child. The simple presence of a parent can have a significant effect on the child's level of pain (Ullán, 2014). Educating parents about non-pharmacological pain relief and giving them the tools necessary to implement these interventions can also help decrease parental and child anxiety (Ullán, 2014). Parents know their child better than anyone else and know what makes their child feel the most comfortable. Parents can communicate with the interdisciplinary team on what non-pharmacological interventions would best help the child, as interventions need to be tailored to the interest of the child.

Kid-Friendly

Non-pharmacological interventions are also kid-friendly. Implementing efforts to allow the hospitalization to be as kid-friendly as possible promotes a positive experience. The child and the family can carry on this positive hospital experience with them and confidently seek out medical attention in the future. Otherwise, traumatic experiences as a child can result in the avoidance of treatment or care as an adult, thus impacting their long-term health and perceptions of the healthcare team (Redfern, 2017). Non-pharmacological interventions are not meant to be intimidating or frightening, but rather inviting for the child.

Several non-pharmacological pain relief interventions include music therapy, distraction cards, animated cartoons, playing with plush toys, and improvised somatic dancing. Vibration with a topical anesthetic can also be used, although it is a pharmacological intervention, its topical application does not require specific dosing which in turn does not have any side effects. These non-pharmacological interventions

help decrease the anxiety and fear the child may be feeling while in the hospital. Addressing anxiety and fear early on can help with future hospitalizations or procedures that may need to be done (Aydin, 2016). Including plush toys, animated cartoons, music, and dancing takes the child's mind off of being in the hospital and the pain they are experiencing (Ullán, 2014). It is important to implement interventions that actively engage a child and take their attention away from their pain (Wente, 2013). Non-pharmacological pain relief efforts can also give the child a sense of control. To give the child a choice in what stickers they want, how many pillows they want, what movie they want to watch, etc., can make a drastic difference in the way they feel and how they perceive the hospital and the health care team. Giving them these choices, no matter how insignificant they may seem can mean so much to a hospitalized child (Gourde, 2012).

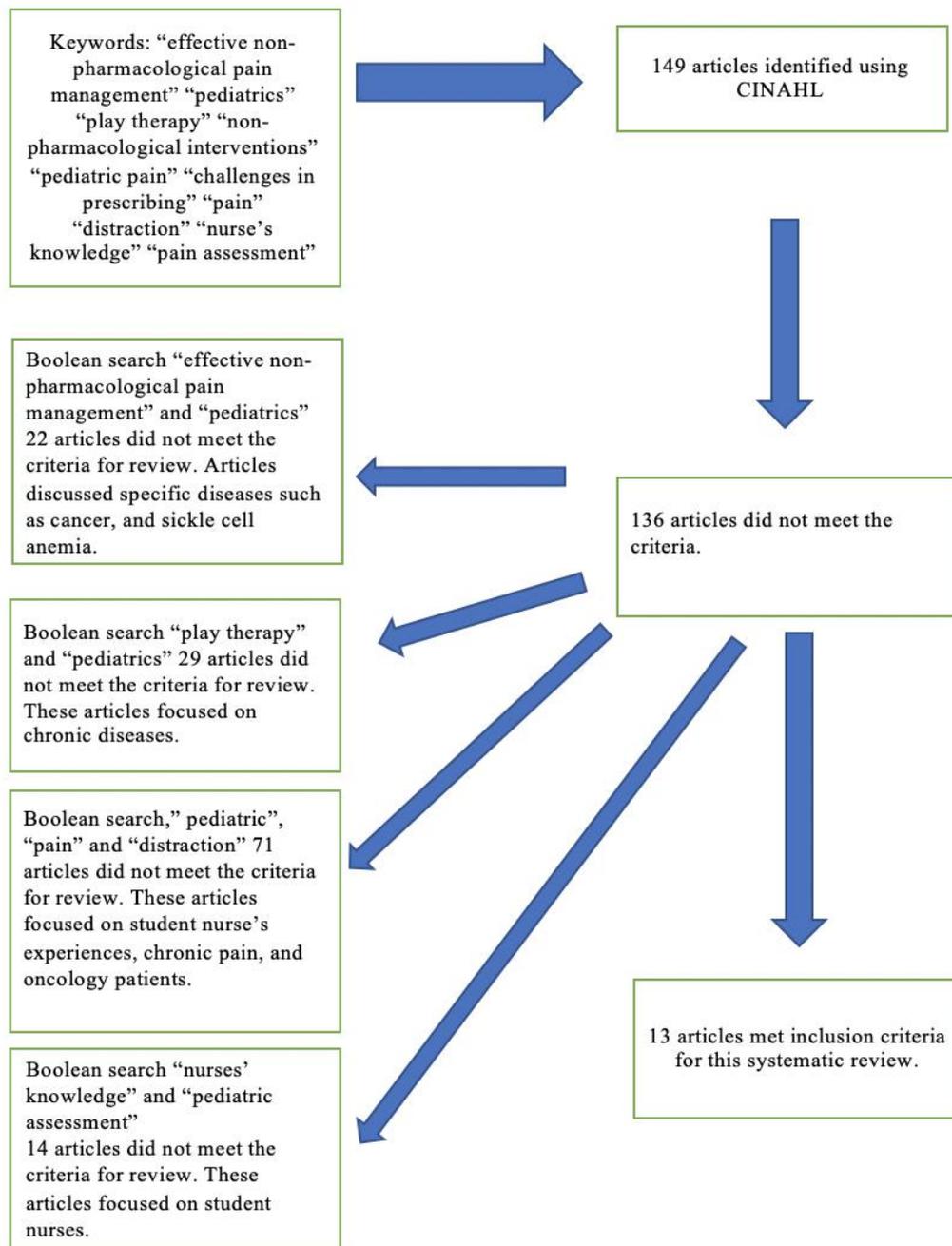
Long Term Implications

Non-pharmacological interventions not only provide immediate pain relief, but also long-term benefits. They can provide a positive hospital experience for the child and clear any negative thoughts about being in the hospital. A positive hospital experience can also be carried through with the child into adulthood. This can subsequently lead the adult to seek out treatment and preventative care in the future.

Methods

A systematic review of the literature was done to determine effective non-pharmacological pain interventions for pediatric patients. The database Cumulative Index of Nursing and Allied Health Literature (CINAHL) plus with full text was used to find articles for review. In order to find the appropriate articles an advanced search was done. Several searches were conducted with various phrases and keywords used. However, the

same limiters were used for all searches. The search mode for all searches was “Boolean/Phrase”. A Boolean search using the following keywords was completed: non-pharmacological interventions, pain management, pediatric pain, pain assessment, pediatric distraction, pediatric nursing, pain perception and acute pain. All articles had to be full text, peer reviewed, and in English. Limiting the search to only peer reviewed articles was important to this systematic review. Peer reviewed articles are articles that have been evaluated and validated by experts in the same field. In this case, all of the peer reviewed articles have been evaluated by experts in nursing. The journal subset for all searches were core nursing and nursing. With the various searches that were conducted there were a plethora of articles that were not used. Articles that did not meet the criteria for review were articles that focused on student nurses’ experiences, chronic pain, and articles that focused on managing pain for specific diseases such as cancer and sickle-cell anemia.



Results

Non-pharmacological pain relief interventions are essential to implement when caring for a pediatric patient. The pediatric population is a unique population of patients because of the range of developmental stages and the challenges that come with assessing their pain. As reported before, assessing pediatric pain is challenging due to the inability of some pediatric patients to communicate and verbalize their pain effectively. Non-pharmacological pain relief interventions can target one or more of the human senses. The human senses include the auditory, visual, sensory, olfactory, and gustatory senses. These non-pharmacological pain interventions are distraction techniques through music therapy, playing with a stuffed animal, watching animated cartoons, blowing bubbles, etc. In addition to health care professionals implementing non-pharmacological interventions, the parents can be involved and implement them as well.

Throughout the articles, all the researchers conducted randomized control trials. All trials had a control group, and an experimental group. The control groups received pharmaceutical interventions, such as pain medications. The experimental group received non-pharmacological pain interventions. The experimental studies all focused on children ranging from 14 months to 18 years old. The pain levels of the children were evaluated using the Wong-Baker Faces pain scale (Figure 1). This pain scale was used for all of the research studies done. Distraction techniques were the most widely used non-pharmacological interventions. These distraction techniques included animated cartoons, bubble-blowing, music, playing with a stuffed animal, aromatherapy, and somatic

dancing. Multiple distraction techniques can stimulate various human senses and thus provide effective pain relief.

Auditory Sense

Most distraction techniques that were implemented stimulated the auditory sense. Through the implementation of music during a blood draw procedure it was found that music reduced self-reported pain levels in the child (Aydin, 2017). Another trial that used an intervention that targeted the auditory sense were the implementation of animated cartoons. Allowing the child to watch their favorite animated cartoon during a venipuncture procedure also resulted in the child reporting less pain (Bergomi, 2015). Those in the control group who did not watch an animated cartoon reported feeling more pain.

Further distraction methods that also targeted the auditory sense was playing with a stuffed animal. This stimulates the auditory sense through toys that may make noise, talking to another person while playing, or caregivers giving the toys a “voice” and pretending the toys are engaging with the child. Playing with a stuffed animal, or toys that symbolize the hospital setting can also reduce anxiety levels in children (Ullán, 2014). Incorporating play resulted in lower reported pain levels than those in the control group who received standard pain management (Ullán, 2014). The auditory sense was also stimulated through a distraction technique known as improvised somatic dancing (Dowler, 2016). Somatic dancing is an individual expression of dance and movement (Dowler, 2016). Listening to the music encourages the patients to dance. There is no direction or traditional approach to somatic dancing, its movements are an expression of the patient’s specific experiences and feelings of pain (Dowler, 2016). The patients move

to whatever rhythm they want and allow their feelings and the music they hear to guide them.

Visual Sense

Distraction techniques that were also effective were those that stimulated the visual sense. The visual sense was stimulated through distraction cards, animated cartoons, playing with a stuffed animal, and blowing bubbles. The researchers who implemented distraction cards during a venipuncture procedure found that the reported pain levels of the children were low (Aydin, 2017). Another study that targeted the visual sense was one that showed the children animated cartoons. The children were able to choose what animated cartoon they wanted to watch while they were undergoing a venipuncture procedure. The results demonstrated that the children's perception of pain decreased when watching an animated cartoon (Bergomi, 2018). It was found that those children who were able to watch animated cartoons showed less pain than the control group. Allowing the children to choose their favorite cartoon and focus their attention on that rather than the procedure reduced their pain and anxiety levels (Bergomi, 2018). The children were able to use both their visual and auditory senses and distract themselves from what was happening in their surroundings. In addition to distraction cards and animated cartoons, playing is also a distraction that targets the visual sense (Ullán, 2014). The children can focus their visual attention to the game that is being played.

Bubble-blowing is a distraction technique that stimulates the visual sense (Küçük, 2018). The children were given a toy to blow bubbles with during a phlebotomy procedure. The children undergoing this procedure were able to distract themselves because they had to focus on taking a big breath in, and blowing out in order to create the

bubbles. It was found that bubble-blowing resulted in the children reporting feeling less pain (Küçük, 2018). They were also observed to be calmer than the control group who did not receive non-pharmacological pain interventions (Küçük, 2018). The visual sense is targeted in bubble-blowing because the children are able to see all of the bubbles they create. They can effectively distract themselves and divert their attention from the potentially painful procedure.

Sense of Touch

Alternative distraction techniques also target the sense of touch. These distraction techniques use a device known as Buzzy, improvised somatic dancing, and the use of topical lidocaine. Buzzy is a reusable 8 X 5 X 2.5 cm device that is designed to look like a bumblebee. The wings of the bumblebee are ice packs, while the body of the bumblebee is a vibrating monitor. Therefore, the Buzzy device provides cold analgesia, tactile stimulation, and distraction (Küçük, 2018; Redfern, 2017). The Buzzy device was placed on the site of injection or blood draw of the children following the manufacturer's instructions. The results of this study showed that the children who received non-pharmacological pain management with Buzzy reported significantly less pain than those in the control group (Redfern, 2017). The parents of the children in the experimental group also noted a decreased level of anxiety in the child. An additional research experiment that used Buzzy also had similar results (Küçük, 2018). This study used Buzzy during a phlebotomy procedure. The children's reported pain levels were significantly less than those who did not receive Buzzy for pain management (Küçük, 2018; Redfern, 2017).

Not all of the studies that used Buzzy has the same results. These results indicated that the use of Buzzy was effective only in younger children (Bergomi, 2018). This research experiment also combined Buzzy with animated cartoons. Through the combination of these two non-pharmacological interventions they found that animated cartoons were more effective in managing a child's pain (Bergomi, 2018). The type of non-pharmacological intervention that would be effective depends on the age of the child. For a younger child, Buzzy would be the best option. On the other hand, a child of any age would benefit best from distraction with animated cartoons.

Another study that stimulated the sense of touch was through somatic dancing. As reported before, improvised somatic dancing is a form of free expression through the thoughts and emotions that one is experiencing. There is no right or wrong way to participate in somatic dancing. Somatic dancing incorporates touch through the movements that one makes. It also incorporates touch as a form of communication for patients (Dowler, 2016). This particular research experiment implemented improvised somatic dancing for a group of children who were hospitalized. The results of this experiment indicated that 92% of the children who participated in improvised somatic dancing experienced a decrease in pain (Dowler, 2016).

Topical lidocaine was also used as a pain relief method to decrease pain during a phlebotomy procedure. Topical lidocaine is a cream that is applied to the area where blood is being drawn from. The lidocaine then numbs the area of the skin and should decrease any pain, therefore, targeting the sense of touch. In this particular research experiment, topical lidocaine was applied on the area where the child was going to have

blood drawn from. The results from this study found that the lidocaine was the least effective in relieving pain during a blood draw (Küçük, 2018).

Olfactory Sense

Non-pharmacological pain relief interventions, which utilize aromatherapy, target the olfactory sense and function by distracting the individual from their pain.

Aromatherapy was used during a phlebotomy procedure to determine its effectiveness in reducing pediatric pain. Lavender essence was placed close to the child during the phlebotomy procedure. It was found that aromatherapy was the least effective in distracting the child and thus was not effective in providing pain relief (Küçük, 2018).

Additional research experiments that implemented interventions to stimulate the olfactory sense were those that used the drug Entonox. Entonox, also known as nitrous oxide, is a sweet-smelling gas that has pain relief properties (Pickup, 2001). Researchers conducted a study where children were given Entonox, toys, and a combination of both to evaluate its effectiveness in pain relief. The results of this study determined that Entonox was not any more effective in relieving pediatric pain than playing with a stuffed animal because they had the same effect on relieving pediatric pain. (Mohan, 2015).

Parental Involvement in Reducing Pediatric Pain

Parental involvement during a child's hospitalization promotes a positive experience. Providing education for the parents, giving them the right tools, such as toys, and allowing them to be involved can also make the hospital experience less intimidating. A research study that aimed to determine the effectiveness of parental play with children hospitalized determined that it does in fact reduce pain in the child. Parents were given

toys and instructions in order to play with their hospitalized child. This non-pharmacological intervention did have an effect on the reported pain of the child. The results showed that the child seemed to be in less pain when playing with the parent (Ullán, 2014). The parents were able to distract the child from the pain by playing with them. Furthermore, researchers also argued that the children's pain was relieved due to the transmission of positive emotions between them and the parents while playing (Ullán, 2014). Not only did the toy capture the child's attention and distract them from their pain, but it also helped the parents. Parents are often afraid and overwhelmed at the hospital. Playing with a stuffed animal is a way for them to be involved in their child's pain management. The parents can be involved in this type of pain management because it is non-pharmacological. They can implement it whenever they believe it to be necessary to relieve their child's pain.

Discussion

Non-pharmacological pain management for pediatric patients is beneficial in a number of ways. It is safe, cost-effective, efficient, kid-friendly, and promotes parental involvement. Based on the results from the research articles, the most effective non-pharmacological pain relief interventions were distraction techniques that stimulated the auditory and visual sense. Parental involvement in the implementation of non-pharmacological pain relief was also effective in relieving pain. On the contrary, the least effective non-pharmacological pain relief interventions were those that stimulated the olfactory sense.

Auditory distraction techniques such as music, animated cartoons, playing with stuffed animals, and improvised somatic dancing were effective in relieving pain. These non-pharmacological interventions were non-invasive and most importantly, kid-friendly. Implementing measures in the hospital that are kid-friendly can help ease some pain, anxiety, and fear. These distraction techniques also gave the child a choice. The children had the option of what music they wanted for the venipuncture, what cartoon they wanted to watch, and what music they wanted to dance to. By giving the children a choice, as insignificant as it may seem, they feel in control during what could be such a frightening time for them (Gourde, 2012). These non-pharmacological interventions were also some of the most effective because they were fun to participate in. The children were able to sing along to the music, play, and dance. Doing these things all while they were in the hospital took their attention away from the pain they were experiencing.

Visual distractions were additional non-pharmacological pain relief interventions that proved to be effective. The visual distractions implemented were distraction cards, animated cartoons, playing, and bubble blowing. As previously mentioned, these interventions gave the children a choice and allowed them to be in control in the hospital environment. Additionally, these interventions were fun to be involved in. Specifically, play and bubble blowing. For these distraction techniques to work in the first place, the child must participate in them and have their attention focused on the game, rather than the pain or procedure being done. Based on the research it is clear why audio and visual distraction techniques worked the best in relieving pediatric pain. These interventions are fun to participate in and divert the child's attention from the pain they are experiencing.

The research experiments that focused their work on distraction techniques which targeted the olfactory sense were the least effective in relieving pediatric pain.

Researchers used aromatherapy as a non-pharmacological pain relief intervention for pediatric patients. It comes to no surprise that this intervention did not work, as children did not focus their attention on what they were smelling while they were in pain. Children are curious, playful, and engaging. For this reason, they are going to be much more interested in non-pharmacological interventions that are interactive and fun for them to participate in.

Further research also demonstrated that parental involvement was effective in relieving pediatric pain. The parents were given the necessary tools, such as toys, and education to implement non-pharmacological pain relief methods for their hospitalized child. Results showed that the interventions implemented by the parents helped in relieving their child's pain. This supports the fact that children feel the most comfortable and safest with a parent. Parental involvement in the hospital is important because it can foster a positive relationship between them and the healthcare team. The parents also know the child best, and know what would make their child feel the most comfortable while in the hospital setting.

The research done by Mohan compared the pain levels of children receiving pharmacological pain management with Entonox, and non-pharmacological pain management by providing toys to play with. Entonox and playing with toys was equally as effective in relieving pain (Mohan, 2015). Therefore, it would be a much safer alternative to allow the child to play. Administering pharmacological pain management did not make a difference in experienced pain levels for the child.

Non-pharmacological interventions for relieving pediatric pain should be used prior to implementing any pharmacological interventions. Non-pharmacological pain relief interventions are safer to use, as there are no risks for side effects. These interventions are also kid-friendly and can leave the child with a positive outlook of the hospital. This is important because this way the child will not be afraid to seek out medical help in the future if necessary. Implementing non-pharmacological interventions has both short term and long-term benefits. Short term benefits are those that immediately relieve pain. Whereas, long term benefits are those that invite the child and family to seek out medical help in the future without the fear of the hospital environment.

Conclusion

Implementing non-pharmacological pain relief measures should be the first intervention done to relieve pain in pediatric patients. Non-pharmacologic measures such as blowing bubbles, playing with toys, distraction cards, watching cartoons, dancing, and listening to music can be used to alleviate pediatric pain. These measures are safe, cost-effective, and can be implemented without a provider's order. Without the need for a provider's order those caring for the child can assist in alleviating their pain. Family members can implement these measures and feel part of the health care team caring for their child. Children will also be much more at ease if they are comforted by their parents. Non-pharmacological pain relief measures are also kid-friendly, which can help make the hospital experience fun and interactive. Using pharmacological interventions, such as topical lidocaine and Entonox was not any more effective in relieving pain than non-pharmacological interventions.

Nurses should be educated on what non-pharmacological measures are effective in relieving pain in order to avoid using pharmacological methods. Through education and advocating for the use of non-pharmacological pain relief interventions, the hospital experience will be a positive one for the family and the child. Non-pharmacological pain relief interventions are the foundation for a positive hospital experience for both the child and the family. This positive experience can be carried through with them and invite them to seek medical care in the future if needed.

Limitations

Determining what non-pharmacological interventions are effective in relieving pediatric pain has various limitations. The studies that were analyzed all had very small sample sizes. The participants in these research studies were not blinded. They were aware of whether they were in the control group or the experimental group. Other limitations include the short time span of this study. The researchers did not follow up with the participants to determine if there were any beneficial long-term effects with non-pharmacological pain relief interventions. Interpreting a child's pain are also limitations that these research studies have. These research studies are having adults interpret the child's response to the non-pharmacological pain relief intervention. The adult's interpretation may not accurately reflect the level of pain the child is experiencing. Further limitations to these studies are how well the child understands the Wong-Baker Faces pain scale, and how well they interpret the various facial expressions on the scale. Every child may interpret it in a different way, and thus affect the results.

There are not many research studies on evaluating pediatric patient's pain levels. It is difficult to assess a child's pain and parents may also be hesitant to include their

child in a research study. The lack of literature in this area is unfortunate, as it has the potential to make a drastic difference if applied to nursing practice. With the research that is available it should compel us to look more at the results, what is being done to relieve pain and if this is effective or not. These should build the foundation for more research to be done and evaluated.

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