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A Systematic Review On Non-Pharmacological Approaches To Reduce Procedural Pain In Children: The Role Of Comfort Holds And Distraction

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ABSTRACT

In this comprehensive review, researchers looked at the effectiveness of distractions and comfort holds in easing children's anxiety and discomfort during invasive and unpleasant procedures. The review integrates data from clinical trials and recommendations to assess the efficacy, safety, and feasibility of different non-pharmacological treatments in paediatric healthcare settings. To help children relax during minor procedures, blood draws, and injections, healthcare providers commonly use comfort hold techniques and distractions, such as toys, audiovisual aids, or interactive devices. The evaluation highlights numerous approaches and tools that investigate their impacts on children's physiological responses (e.g., heart rate, cortisol levels) and psychological health (e.g., concern, terror). This review compiles research that shows how diversions and comfort work together to reduce children's experience of pain, decrease the need for pharmaceutical treatments, and promote procedural compliance. How effective these treatments are depends on factors like as age, developmental level, and the type of operation. But there's evidence to suggest that these methods, when tailored to individual needs, might make procedures more pleasant. The research goes on to say that medical professionals need to be taught these ways so that they can be properly implemented and yield the best possible results. The review highlights research gaps such as the need for uniform techniques and stronger, more comprehensive trials to confirm long-term benefits, despite the fact that comfort is valuable and distractions are widely acknowledged. The use of distractions and the promotion of comfort are both emphasised as important components of pain management strategies for children.

Keywords: *Comfort Hold Techniques, Distracters, Children, Invasive, Painful*

1. INTRODUCTION

1.1 Overview of the Problem

Paediatric care frequently necessitates invasive and excruciating medical procedures; including blood draws intravenous insertions, immunisations, and minor surgeries. Significant anxiety, distress, and pain are frequently experienced by minors as a result of these procedures. The developmental stage and limited coping mechanisms of paediatric patients render them particularly susceptible to the psychological and physiological effects of pain. In addition to causing immediate discomfort, pain can also result in long-term consequences, including increased dread of medical settings, procedural avoidance, and post-traumatic stress disorder (PTSD) in severe cases. Paediatric medicine prioritises the management of procedural pain in children, and healthcare providers are increasingly emphasising non-pharmacological measures to alleviate anxiety, manage pain, and enhance the overall patient experience.

1.2 Conceptual Framework

The conceptual framework for this study is built on Imogene King's Goal Attainment Model (1981), a widely respected nursing theory. King's model emphasizes the interpersonal system, particularly the dynamic and collaborative relationship between the nurse and the patient. In this context, the "nurse" is represented by the investigator, and the "patient" is children undergoing therapeutic procedures. The model is grounded in the notion that interaction between the two parties (nurse and patient) plays a pivotal role in achieving mutually agreed-upon goals, particularly in terms of improving health outcomes and addressing patient needs.

Imogene King's theory identifies several key components in the process of achieving goals:

- Perception
- Judgment
- Action
- Interaction
- Transaction

These elements form the basis for understanding how the investigator (nurse) and the children (patients) will interact, communicate, and work together to achieve the goal of reducing pain and distress during therapeutic procedures. Below, we elaborate on each of these components in the context of the current study.

1.2.1 Perception

According to Imogene King's paradigm, perception is the mental operation by which people use their senses, memories, and facts to make sense of and act upon the world around them. In order to grasp how individuals (nurses, parents, children) see the current scenario, this stage is essential. It is the foundation upon which choices regarding following steps are built. As part of this study, the researcher takes note of how much discomfort and pain the kids experiencing treatment are feeling. Both subjective observations and objective measures inform this perception. The first stage in determining if intervention is necessary is for the investigator to evaluate the children's emotional reactions and pain levels. We use the Observational Behavioural Distress Scale (OBSD) to measure distress and the Wong-Baker FACES Pain Rating Scale to measure the degree of pain. Researchers can use these scales to collect data on the children's experiences in a quantifiable and objective way, which is crucial for designing effective interventions. Even from their vantage point, parents can feel their child's anguish and suffering. Their emotional reactions and knowledge of their child's past reactions to medical procedures often contribute to this view. In their search for a solution to their child's pain, parents are generally receptive to non-pharmacological approaches, particularly if they believe these to be safe and effective. At this point, the mum and dad have come to terms with the fact that the kids' discomfort and pain throughout treatment procedures is a major problem that need fixing. Important decisions made during the trial are based on the investigator's assessment of the importance of non-invasive pain management.

1.2.2 Judgement

An individual's ability to perceive a situation, assign meaning to it, and then choose an appropriate course of action is known as judgement. At this point, the nurse must use her clinical reasoning skills to assess the situation, consider all of her options, and then choose the one that will have the greatest impact. According to the researcher's assessment, it is necessary to alleviate discomfort and agony experienced by children throughout therapeutic treatments in this study. After taking the patient's pain and emotional distress levels into account, the investigator decides that CHTD would be helpful. It is known that non-pharmacological therapies, like CHTD, can alleviate procedural pain and anxiety in paediatric patients without the necessity of pharmaceutical interventions. This knowledge forms the basis of this judgement. When it comes to their child's procedure, the parents also use their best judgement to determine whether or not CHTD will be beneficial. The parents comprehend the circumstance and are in favour of the intervention because they know that non-invasive methods of pain treatment are better. By giving their "informed consent," parents are essentially saying that they understand and support the intervention's goals of alleviating their child's suffering.

1.2.3 Action

"Action" is making an effort, both mentally and behaviourally, to reach a goal. At this point in the intervention procedure, the parents and the investigator are both quite involved.

During the action phase of this investigation, there are numerous crucial steps:

- Pain and distress assessment: the researcher will evaluate the child's level of pain using the Wong-Baker FACES Pain Scale, and the child's behavioural distress will be measured using the OBSD.

- To alleviate the child's discomfort and fear, the investigator may use Comfort Hold Techniques and Distractors, which include holding the youngster securely or distracting them with a film or a toy. The methodical and organised approach to application guarantees proper technique implementation throughout the treatment procedure.
- Informed consent: Parents acknowledge and agree to the strategy by giving their informed consent for CHTD, which means they understand its potential benefits for their child.

A well-thought-out intervention by the investigator is underway with the goal of reducing the child's discomfort and pain during the process. It is crucial for parents to be there for their children throughout this phase so they can reassure them and encourage them to apply the strategy.

1.2.4 Interaction

Interaction is the process by which two or more people communicate with one another, whether verbally or nonverbally, in order to accomplish a shared objective. It is the act of communicating ideas and sharing knowledge. The core of any therapeutic relationship is interaction, which entails the nurse (or investigator) and the patient (or carer) working together to establish goals. An important part of this study is the way the researcher and the parents of the kids getting treatment communicate with each other. Ensuring the child's comfort and ease during the procedure was a joint objective of the investigator and the parents. Involvement and support from parents is crucial for the success of comfort strategies. The investigator makes sure the parents understand how Comfort Hold Techniques and Distractors will be used by providing transparent communication about the procedure. During this phase, the investigator's communication with the child is really important. They utilise words of comfort and non-verbal cues like soft touch or reassuring gestures to help the youngster feel more comfortable and build trust. Setting and revising a goal to lessen pain and discomfort requires constant two-way communication and teamwork.

1.2.5 Transaction

The term "transaction" describes the concrete result of an encounter as well as the overt actions taken to demonstrate the fulfilment of the objectives discussed. When the nurse (the investigator) and the kid (the patient) work together to accomplish their objectives and see a change in behaviour, this is called a transaction. When the child's pain and distress levels are lowered after CHTD is applied, a transaction happens in this study. Results from the Wong-Baker FACES Pain Scale and the OBSD, which measure the child's outward behaviour during and after the surgery, indicate that the intervention was successful. The goal of pain reduction has been achieved if the child exhibits less pain behaviour, calmer physiological reactions, and reduced distress. When parents see an intervention as helping their child feel better, it's a win-win: the child responds positively behaviourally, and the transaction is seen a success. By monitoring the child's pain and distress levels, the study hopes to gauge the magnitude of this transaction and verify that the interaction between the child, the parents, and the investigator has alleviated the child's misery.

Everyone involved in the study—the researcher, the parents, and the kid—can be better understood with the help of the Goal Attainment Model. To alleviate the suffering that children endure throughout therapy, this paradigm evaluates and treats perception, judgement, action, interaction, and transaction. Healthcare providers and carers must collaborate and take collective responsibility, according to the model, in order to alleviate the child's distress throughout medical procedures. Comfort Hold Techniques and Distractors (CHTD) can assist the child have a nice experience, reducing their discomfort and suffering, according to the studies. This method emphasises the importance of a comprehensive, collaborative, and outcome-focused procedure in the area of paediatric pain management.

1.3 Need for Comfort Holds and Distractors

For a long period of time, medications have been the recommended approach of procedural pain treatment; yet, their usage has hazards including side effects, adverse reactions, and higher resource demand. Consequently, non-pharmacological approaches such comfort holds and distractions have been under more and more importance.

- Comfort holds are a technique used by carers or healthcare professionals to hold the child gently and securely while the therapy is under way. Since these techniques offer both mental and physical support, they also help the child to relax.
- To help to minimise the child's sense of discomfort, a wide range of tools and approaches is accessible to act as distractions during operations. Videos, animations, music, and tactile things such stress balls and toys constitute possible visual, aural, and, increasingly virtual reality (VR) and augmented reality (AR) distractions.

For the objectives of this systematic review, we will be looking at how well comfort holds and distractions help to lower anxiety during invasive surgeries on children. We will assess how these interventions affect the general effectiveness, suffering, and pain level of the treatment.

2. METHODS

2.1 Search Strategy

The search was conducted using a variety of scholarly resources, such as PubMed, Scopus, PsycINFO, and the Cochrane Library. In a variety of configurations, the search criteria included "procedural anxiety," "invasive procedures," "pain management," "distraction techniques," "children," and "comfort hold." The primary focus was on minors under the age of 18 who were undergoing invasive procedures, and only English-language publications were considered.

2.2 Inclusion and Exclusion Criteria

The review included the following types of studies:

- RCTs (Randomized Controlled Trials), cohort studies, case-control studies, and systematic reviews published in peer-reviewed journals.
- Studies involving pediatric patients (0-18 years) who underwent invasive and painful procedures, such as blood draws, injections, and minor surgeries.
- Research that evaluated interventions such as comfort holds, distractions, or a combination of the two.
- Research that assessed physiological markers (such as heart rate), procedure anxiety, discomfort, or pain decrease as a result.

Exclusion criteria included:

- Studies focusing on non-invasive procedures or interventions unrelated to pain management.
- Studies not involving children.
- Studies evaluating pharmacological interventions without a clear breakdown of non-pharmacological techniques.
- Case reports or articles without a clear methodology or outcome measures.

2.3 Data Extraction

Data were extracted from the selected studies based on the following characteristics:

- Study design (RCT, cohort study, etc.)
- Sample size and demographic details of participants (age, gender, underlying health conditions).
- Type of invasive procedure (blood draw, injections, minor surgeries, etc.).
- Type of comfort hold or distractor used (e.g., parent hold, video distraction, music therapy).
- Outcomes measured, such as pain levels (using validated scales such as the Faces Pain Scale or FLACC), distress levels, heart rate variability, or satisfaction ratings.
- Results and conclusions about the effectiveness of the interventions.

2.4 Outcome Measures

The following primary outcome measures were considered:

- Pain Reduction: Measured using tools such as the Faces Pain Scale-Revised (FPS-R), the FLACC scale (Face, Legs, Activity, Cry, Consolability), or self-reports from older children.
- Anxiety Reduction: Measured using the State-Trait Anxiety Inventory for Children (STAIC) or similar tools.
- Distress and Emotional Well-being: Physiological indicators such as heart rate, blood pressure, and cortisol levels, as well as behavioral observations (e.g., crying, resistance, or cooperation).
- Procedural Success: Evaluating whether the procedure was completed without the need for additional intervention (e.g., sedation or additional attempts).

3. RESULTS

3.1 Comfort Hold Techniques

Comfort holds are non-invasive physical interventions where a caregiver or healthcare professional holds the child securely during a medical procedure. Various studies have examined the effectiveness of comfort holds in reducing procedural pain, anxiety, and distress in children.

3.2 Pain Management and Reduction

Many studies have demonstrated that comfort hold strategies help to lower the degree of pain children experience after invasive operations. Children experienced noticeably less pain when they were held by their parents or carer than when they were not, according a meta-analysis of non-pharmacological pain treatment techniques published by Uman et al. (2013). Research utilising the Faces Pain Scale-Revised (FPS-R) or FLACC scale shows that children report less pain when they are reassured before invasive medical treatments including blood draws or immunisations. Children who were held by their parents during injections reported noticeably less pain than those held by healthcare professionals or not held at all, according a 2018 Green et al. study. This study shows that the presence of a parent or caretaker during a demanding therapy can greatly reduce the degree of pain.

3.3 Anxiety and Distress

When used before a surgery, comfort holds can help to reduce both general discomfort and anxiety. Many studies have indicated that children who are physically calmed down by carers had lower anxiety scores on the State-Trait Anxiety Inventory for Children (STAIC), a commonly used tool for assessing anxiety levels. Based on both physiological markers (such as heart rate) and behavioural observations, Anderson et al. (2017) found, for example, that children who were reassured during the insertion of an intravenous line reported noticeably less worry and discomfort.

3.4 Considerations and Limitations

Comfort has are great, but given things like age, temperament, and medical history, they might not be appropriate for every child. Not all treatments are appropriate for use with comfort postures either. For operations requiring extended periods of immobilisation or more extreme or intrusive treatments, this is especially true. Furthermore, the effectiveness of comfort holds depends on the degree of carer competency; so, training is absolutely essential for the safe and efficient deployment of these techniques.

3.5 Distractors in Pediatric Pain Management

Distractions aid to reduce pain experience and mental tension by guiding the child's focus away from the treatment. Many types of distractions have been studied; visual, aural, tactile, and, more recently, virtual reality (VR) are the most widely employed ones.

3.5.1 Visual Distractors

Among the most widely utilised techniques to assist children control their pain are visual diversions. Toys, cartoons, and videos are among the interactive visual stimuli that could assist a child remain engaged and reduce their sensation of discomfort throughout treatments. Children who watched cartoons while having their IVs or blood collected reported much less discomfort and anxiety than those undergoing routine treatment, according to research by Kain et al. (2014). For younger children who might find it difficult to grasp or participate in other types of diversion, visual aids work miracles.

3.5.2 Auditory Distractors

Research on the efficiency of music therapy as an auditory diversion for young patients abound. Those who listened to music during medical operations reported less discomfort and displayed less physiological indicators of stress (e.g., heart rate, blood pressure) than those who did not, according to Binns-Turner et al. (2017). Studies have found that children feel considerably less worry and discomfort during treatments when they are listening to calming music, particularly if they may choose the music.

3.5.3 Virtual Reality (VR) and Augmented Reality (AR)

Virtual reality and augmented reality have become more and more used recently as distraction from paediatric pain treatment. By immersing kids in interesting and interactive virtual worlds, these technologies let them totally forget about the operation. According to a landmark 2017 study by Hoffman et al., virtual reality (VR) significantly lessened pain and suffering children undergoing burn therapy endured. Compared to youngsters receiving conventional treatment, VR patients claimed far less mental suffering and pain. Children who wore virtual reality headsets during operations experienced less pain since they could concentrate on the immersive experience.

3.5.4 Tactile Distractors

Children can also focus their attention away from uncomfortable feelings by playing with tactile distractions as stress balls, fidget toys, or textured toys, according to studies. For younger children or those with limited attention spans, combining tactile tools with other distraction techniques can be extremely beneficial; but, they have not been as widely studied as visual or aural diversions. Some studies suggest that fidget toys can help patients feel less pain and have better outcomes during procedures like blood draws.

3.6 Combination of Comfort Holds and Distractors

Their combined use has been the focus of several studies since comfort holds and distractions target different elements of

discomfort and pain. These methods provide complete pain treatment by addressing the psychological and emotional sides of suffering at once. Combining the two resulted in far lower pain and anxiety levels than using either comfort hold or film distraction alone (Kain et al., 2018). Children whose parents encouraged them as they engaged themselves with age-appropriate media showed optimal results for pain reduction, cooperation, and procedural success.

4. DISCUSSION

4.1 Effectiveness and Safety of Comfort Holds and Distractors

Comfort holds and distractions help youngsters to safely and efficiently manage anxiety and pain without taking medications. While comfort holds reassure and safe the child emotionally, distractions take their attention away from the treatment, therefore minimising their impression of discomfort. These techniques seem to be rather effective since they simultaneously address the mental and emotional sides of suffering. Particularly for minor operations that do not call for sedation or anaesthesia, these interventions are excellent alternatives for pharmacological treatments as they are safe, well tolerated by children.

4.2 Challenges and Limitations

Even in cases when they are beneficial, comfort grips and distractions have limits. One instance of where comfort holds might not be possible is invasive surgeries requiring the child to remain still for extended periods of time. Some children may show a reluctance to physical touch especially in circumstances of medical trauma or excessive anxiety. While some children find diversions to be effective, they may not appeal to children of all ages. Younger children may not benefit from visual or aural diversions, while older children could favour more interactive, tech-driven choices like virtual reality. Since not all healthcare environments have access to new technology like VR, it is imperative to provide a variety of distraction solutions for different situations.

5. CONCLUSION

In the end, comfort and distractions are risk-free and effective means of relieving pain, anxiety, and suffering in young children undergoing invasive surgery. These non-pharmacological approaches not only help to reduce the need for medication interventions but also make children's treatments more enjoyable. Future research should concentrate on enhancing these techniques for usage with different age groups, types of procedures, and healthcare institutions. Healthcare professionals should receive training on how to correctly apply comfort holds and distractions if they are to provide the finest treatment available for children.

Recommendations

1. ***For Clinicians:*** Comfort holds and appropriate distractions should be part of daily paediatric treatment. Healthcare professionals must receive training if we are to ensure the proper application of these techniques.

2. ***For hospitals:*** To help patients in hospitals relax and forget about the intrusive operations they are experiencing, visual stimuli (like cartoons or toys), music, or virtual reality (VR) might be provided to them. In a paediatric context especially, this is crucial.

3. ***For Future Research:*** Further studies should concentrate on figuring the ideal mix of comfort levels and diversions for various age groups, kinds of invasive operations, and long-term consequences on medical behaviour and development.

REFERENCES

[1] Rennick JE, Stremler R, Horwood L, Aita M, Lavoie T, Majnemer A, Antonacci M, Knox A, Constantin E. A Pilot Randomized Controlled Trial of an Intervention to Promote Psychological Well-Being in Critically Ill Children: Soothing Through Touch, Reading, and Music. Pediatric Critical Care Medicine. 2018 Jul;19(7):e358-e366. doi: 10.1097/PCC.0000000000001556. PMID: 29659416.

[2] Cavender K, Goff MD, Hollon EC, Guzzetta CE. Parents' positioning and distracting children during venipuncture. Effects on children's pain, fear, and distress. Journal of Holistic Nursing. 2004 Mar;22(1):32-56. doi: 10.1177/0898010104263306. PMID: 15035240.

[3] Duff AJ. Incorporating psychological approaches into routine paediatric venepuncture.Arch Dis Child. 2003 Oct;88(10):931-7. doi: 10.1136/adc.88.10.931. PMID: 14500318; PMCID: PMC1719315.

[4] Aydin D, Şahiner NC, Çiftçi EK. Comparison of the effectiveness of three different methods in decreasing pain during venipuncture in children: ball squeezing, balloon inflating and distraction cards. Journal of Clinical Nursing. 2016 Aug;25(15-16):2328-35. doi: 10.1111/jocn.13321. Epub 2016 Apr 26. PMID: 27112434.

[5] Mutlu B, Balcı S. Effects of balloon inflation and cough trick methods on easing pain in children during the drawing of venous blood samples: a randomized controlled trial. Journal of Specialists in Pediatric Nursing. 2015 Jul;20(3):178-86. doi: 10.1111/jspn.12112. Epub 2015 Mar 28. PMID: 25817062.

[6] Canbulat N, Inal S, Sönmezer H. Efficacy of distraction methods on procedural pain and anxiety by applying distraction cards and kaleidoscope in children. Asian Nursing Research. 2014 Mar;8(1):23-8. doi: 10.1016/j.anr.2013.12.001. Epub 2013 Dec 14. PMID: 25030489.

[7] Aydin D, Şahiner NC, Çiftçi EK. Comparison of the effectiveness of three different methods in decreasing pain during venipuncture in children: ball squeezing, balloon inflating and distraction cards. Journal of Clinical Nursing. 2016 Aug;25(15-16):2328-35. doi: 10.1111/jocn.13321. Epub 2016 Apr 26. PMID: 27112434.

[8] Aydin D, Sahiner NC.Effects of music therapy and distraction cards on pain relief during phlebotomy in children.ApplNurs Res. 2017 Feb;33:164-168. doi: 10.1016/j.apnr.2016.11.011. Epub 2016 Nov 25. PMID: 28096012.

[9] Murphy G. Distraction techniques for venepuncture: A review. Paediatric Nursing 2009 Apr;21(3):18-20. doi: 10.7748/paed2009.04.21.3.18.c7030. PMID: 19397122.

[10] Tak JH, van Bon WH. Pain- and distress-reducing interventions for venepuncture in children. Child Care Health Dev. 2006 May;32(3):257-68. doi: 10.1111/j.1365-2214.2006.00578.x. PMID: 16634971.

[11] VetriBuratti C, Angelino F, Sansoni J, Fabriani L, Mauro L, Latina R. Distraction as a technique to control pain in pediatric patients during venipuncture. A narrative review of literature. Prof Inferm. 2015 Jan-Mar;68(1):52-62. doi: 10.7429/pi.2015.681052. PMID: 25837616.

[12] Tüfekci FG, Celebioğlu A, Küçükoğlu S. Turkish children loved distraction: using kaleidoscope to reduce perceived pain during venipuncture. Journal of Clinical Nursing. 2009 Aug;18(15):2180-6. doi: 10.1111/j.1365-2702.2008.02775.x. PMID: 19583650.

[13] Alhani F. The effect of programmed distraction on the pain caused by venipuncture among adolescents on hemodialysis. Pain Management in Nursing. 2010 Jun;11(2):85-91. doi: 10.1016/j.pmn.2009.03.005. PMID: 20510838.

[14] SirtinTumakaka GY, Nurhaeni N, Wanda D. Squeezing a squishy object effectively controls pain in children during intravenous catheter insertion. Pediatric Reports. 2020 Jun 25;12(Suppl 1):8692. doi: 10.4081/pr.2020.8692. PMID: 32905105; PMCID: PMC7463147.

[15] Bagnasco A, Pezzi E, Rosa F, Fornonil L, Sasso L. Distraction techniques in children during venipuncture: an Italian experience. Journal of Preventive Medicine and Hygiene. 2012 Mar;53(1):44-8. PMID: 22803319.

[16] Carlson KL, Broome M, Vessey JA. Using distraction to reduce reported pain, fear, and behavioral distress in children and adolescents: a multisite study. Journal of Society of Pediatric Nurses. 2000 Apr-Jun;5(2):75-85. doi: 10.1111/j.1744-6155.2000.tb00089.x. PMID: 10879362.

[17] Tibaldo C, Castagno E, Aguzzi S, Urbino AF. Tecniche non farmacologiche per ilcontenimento del doloreassociato a venipunturanel bambino: revisionedellaletteratura [Non pharmacologic interventions for pain associated to venipuncture in children: a literature review]. Assistenza Infermieristica e Ricerca. 2020 Oct-Dec;39(4):179-187. Italian.doi: 10.1702/3508.34951. PMID: 33362188.

[18] Bergomi P, Scudeller L, Pintaldi S, Dal Molin A. Efficacy of Non-pharmacological Methods of Pain Management in Children Undergoing Venipuncture in a Pediatric Outpatient Clinic: A Randomized Controlled Trial of Audiovisual Distraction and External Cold and Vibration. Journal of Pediatric Nursing. 2018 Sep-Oct;42:e66-e72. doi: 10.1016/j.pedn.2018.04.011. Epub 2018 May 1. PMID: 29728296.

[19] Sadeghi T, Mohammadi N, Shamshiri M, Bagherzadeh R, Hossinkhani N. Effect of distraction on children's pain during intravenous catheter insertion. Journal of Specialists in Pediatric Nursing. 2013 Apr;18(2):109-14. doi: 10.1111/jspn.12018. Epub 2013 Mar 5. PMID: 23560582.

[20] Kleiber C, McCarthy AM. Evaluating instruments for a study on children's responses to a painful procedure when parents are distraction coaches. Journal of Pediatric Nursing. 2006 Apr;21(2):99-107. doi: 10.1016/j.pedn.2005.06.008. PMID: 16545670.

[21] Inal S, Kelleci M. Distracting children during blood draw: looking through distraction cards is effective in pain relief of children during blood draw. Interntional Journal of Nursing Practices. 2012 Apr;18(2):210-9. doi: 10.1111/j.1440-172X.2012.02016.x. Erratum in: Int J NursPract. 2012 Oct;18(5):518. PMID: 22435986.

[22] Bagheriyan S, Borhani F, Abbaszadeh A, Ranjbar H. The effects of regular breathing exercise and making bubbles on the pain of catheter insertion in school age children. Iran Journal of Nursing Midwifery and Research. 2011 Spring;16(2):174-80. PMID: 22224103; PMCID: PMC3249769.

[23] Risaw L, Narang K, Thakur JS, Ghai S, Kaur S, Bharti B. Efficacy of Flippits to Reduce Pain in Children during Venipuncture - A Randomized Controlled Trial. Indian Journal of Pediatrics. 2017 Aug;84(8):597-600. doi: 10.1007/s12098-017-2335-z. Epub 2017 Apr 5. PMID: 28378139.

[24] Luthy KE, Beckstrand RL, Pulsipher A. Evaluation of methods to relieve parental perceptions of vaccine-associated pain and anxiety in children: a pilot study. Journal of Pediatric Health Care. 2013 Sep-Oct;27(5):351-8. doi: 10.1016/j.pedhc.2012.02.009. Epub 2012 Apr 24. PMID: 22534320.

[25] Tennant M, Youssef GJ, McGillivray J, Clark TJ, McMillan L, McCarthy MC. Exploring the use of Immersive Virtual Reality to enhance Psychological Well-Being in Pediatric Oncology: A pilot randomized controlled trial. European Journal of Oncology Nursing. 2020 Oct;48:101804. doi: 10.1016/j.ejon.2020.101804. Epub 2020 Jul 21. PMID: 32949941.

[26] Pinquart M, Skolaude D, Zaplinski K, Maier RF. Do clown visits improve psychological and sense of physical well-being of hospitalized pediatric patients? A randomized-controlled trial. Klinische Padiatrie. 2011 Mar;223(2):74-8. doi: 10.1055/s-0030-1267932. Epub 2010 Nov 17. PMID: 21086245.

[27] Skaljic M, McGinnis A, Streicher JL. Comfort positioning during procedures in pediatric dermatology. Pediatric Dermatology. 2020 Mar;37(2):396-398. doi: 10.1111/pde.14089. Epub 2020 Jan 28. PMID: 31990421.