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The Effect of Finger Puppet Show on the Level of Children's Pain and Fear During the Incision Suturation in Paediatric Emergency Service: A Randomized Controlled Trial

Çocuk Acil Servisinde Kesi Sütürasyonu Sırasında Uygulanan Parmak Kukla Gösterisinin Çocukların Ağrı ve Korku Düzeyine Etkisi: Randomize Kontrollü Çalışma

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Abstract

Introduction: This study evaluated the effect of finger puppet applied during incision saturation, to mitigate the level of pain and fear of children in the emergency department. Children with incisional sutures were recruited by convenience sampling from the pediatric emergency department of a university hospital in a city in Turkey.

Methods: This study used a random controlled experimental design and had a calculated sample size of 65. There were consisted of 33 children in the study group and 32 children in the control group. A puppet show was performed on the children in the experimental group during the incision suturation while no procedure was applied to the children in the control group. The pain and anxiety levels of the children in the control and experimental groups were measured during the incision suturation. The "personal information form", "Wong-Baker faces pain rating scale" and "children's fear scale'' were used to collect data. The chi-square test, Mann-Whitney U test, Wilcoxon test, and Fridman test were used to analyse the data.

Results: A statistically significant difference was found between the children in the control and experimental groups in terms of the levels of pain and fear ($p<0.05$). The pain and fear levels of children in the experimental group were lower than the control group.

Conclusion: It was concluded in the study that the puppet show performed during the incision suturation influenced the reduction of the pain and fear associated with the procedure.

Keywords: Incision suturation, pain, fear, child, puppet, nurse

Öz

Giriş: Kesi sütürasyonu nedeniyle acil servise gelen çocuklarda sütür esnasında uygulanan parmak kuklanın işleme bağlı gelişen ağrı ve korku düzeyine etkisini değerlendirmek amacıyla yapılmıştır. Kesi sütürasyonu ile gelen çocuklar, Türkiye'de bir şehirdeki üniversite hastanesinin çocuk acil servisinden kolayda örnekleme yoluyla alınmıştır.

Yöntemler: Bu çalışmada randomize kontrollü deneysel desen kullanılmış ve örneklem büyüklüğü 65 olarak hesaplanmıştır. Araştırmada deney grubunda 33 ve kontrol grubunda 32 çocuk araştırma grubunu oluşturmuştur. Araştırmanın uygulanmasında deney grubunda yer alan çocuklara kesi sütürasyonu sırasında kukla gösterisi yapıldı, kontrol grubundaki çocuklara ise kesi sütürasyonu sırasında herhangi girişim yapılmamıştır. Deney ve kontrol grubunu oluşturan çocukların kesi sütürasyonu sırasında ağrı ve anksiyete düzeyleri değerlendirildi. Verilerin toplanmasında "kişisel bilgi formu", "Wong-Baker yüzler ağrı değerlendirme ölçeği" ve "çocuk korku ölçeği" kullanılmıştır. Verilerin analizinde; ki-kare testi, Mann-Whitney U testi, Wilcoxon testi ve Fridman testi kullanılmıştır.

Bulgular: Deney ve kontrol grubundaki çocuklar ağrı ve korku düzeyleri açısından karşılaştırıldığında istatistiksel olarak aralarında anlamlı bir farklılık saptanmıştır ($p<0,05$). Deney grubundaki çocukların ağrı ve korku düzeyleri kontrol grubundakilere göre daha düşük olduğu belirlenmiştir.

Sonuç: Çalışmada kesi sütürasyonu sırasında yapılan kukla gösterisinin işleme bağlı gelişen ağrı ve korkuyu azaltmada etkili olduğu sonucuna varılmıştır.

Anahtar Kelimeler: Kesi sütürasyonu, ağrı, korku, çocuk, kukla, hemşire

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Introduction

When a patient has an unexpected trauma or disease, emergency care entails quick interventions by skilled medical teams to prevent more harm or patient death.[1] Emergency departments are fast-paced environments of chaotic trauma, where decisions need to be made quickly.[2] There are many reasons why children of various ages come to the emergency department, and because of their unique needs -distinct from those of adults- they require special treatment.[3]

In their daily routines, children may unexpectedly experience illness, potentially leading them to a hospital where unexpected and discomforting medical treatments may be administered.[4] Specifically, natural disasters, serious illnesses or accidents, diseases that threaten their lives or their caregivers, and migration include a traumatic experience for children. It is known that a significant number of children exposed to traumatic events develop maladaptive emotional and behavioral responses, and their development and adaptation mechanisms are impaired.[5] In addition, children experience a traumatic process if cuts occur in any part of their body after accidents. It has been reported that nursing interventions applied during incision suturation relieve the child's worries and fears.[6]

Treating children for trauma involves multiple stages that can elicit various emotional reactions, such as distress, unease, fear, and anxiety. Both the American Academy of Pediatrics and the American Pain Society (APS) highlight the significance of reducing stress and pain, even during routine medical procedures. It is critical to ensure prompt and effective pain management during procedures that may cause discomfort. By doing so, children's ability to endure pain in subsequent procedures can be improved.[7] Nurses play a vital and central role in evaluating and addressing pain.[8] They differentiate themselves from the rest of the healthcare community in pain management by understanding the patient's situation and communicating directly with the patient to understand past experiences and coping mechanisms related to pain.[9]

The APS highlighted that just evaluating and easing pain is not enough for young patients (APS). At the diagnostic stage, factors such as the location, type, intensity, expression, presence of factors associated with the pain, and pain scale scores[10] are essential to evaluate.

Managing pain, fear, and anxiety in pediatric care often hinges on the power of distraction.[11] This diversion should captivate the child's attention across multiple senses, engaging sight, sound, and touch to be more effective. Proven techniques range from the familiar -vibrant cartoons, playful balloon creations, or calming music- to the innovative- immersive virtual reality experiences, mesmerizing kaleidoscopes, or interactive distraction cards. These versatile methods can be implemented in brief bursts for acute pain or sustained durations for chronic cases.[12-14]

This study examined the impact on pain and anxiety levels in 4 to 10 years children presenting to a university pediatric emergency department of a finger puppet show performed during incisional suturing. In this study, one hypothesis was suggested: Puppet show has an effect on pain and fear during incision suturing.

The current study put forward two hypotheses:

Hypothesis 0: The finger puppet show has no effect on pain and fear during incision suturing.

Hypothesis 1: The finger puppet show has an effect on pain and fear during incision suturing.

Materials and Methods

Design

The purpose of this randomized controlled trial was to assess the effectiveness of multiple methods for incisional suturing in pediatric patients at a university hospital's pediatric emergency department. From March to October 2021, we enrolled children requiring suture procedures following minor injuries. This non-blinded design allowed for close monitoring and intervention throughout the study period.

Sample

The study recruited children with incisional sutures through convenience sampling from a university hospital pediatric emergency department in a town in Turkey.

Sample selection criteria include:

1. The child is being between the ages of 4-10,

2. Children with Turkish-speaking parents.

3. The child is having a cut in any part of his/her body that requires suturation.

4. The parent and child agree to participate in the study and provide written consent.

The sample size was calculated using G-Power 3.1, which required a minimum sample size of 65 participants. Power analyses were performed with a power of 95%, a type 1% error probability of 5%, and an effect size of 0.8. Seventy-three children presented to the emergency department for incisional suturing during the study period. The study selected a sample of 65 children for participation, adhering to strict inclusion criteria. Random assignment to the experimental or control group was made for those who underwent incision suturing. Numbers 1 to 65 were allocated to the two groups without duplication during randomization using a computer program. The CONSORT flowchart is illustrated in Figure 1.[15]

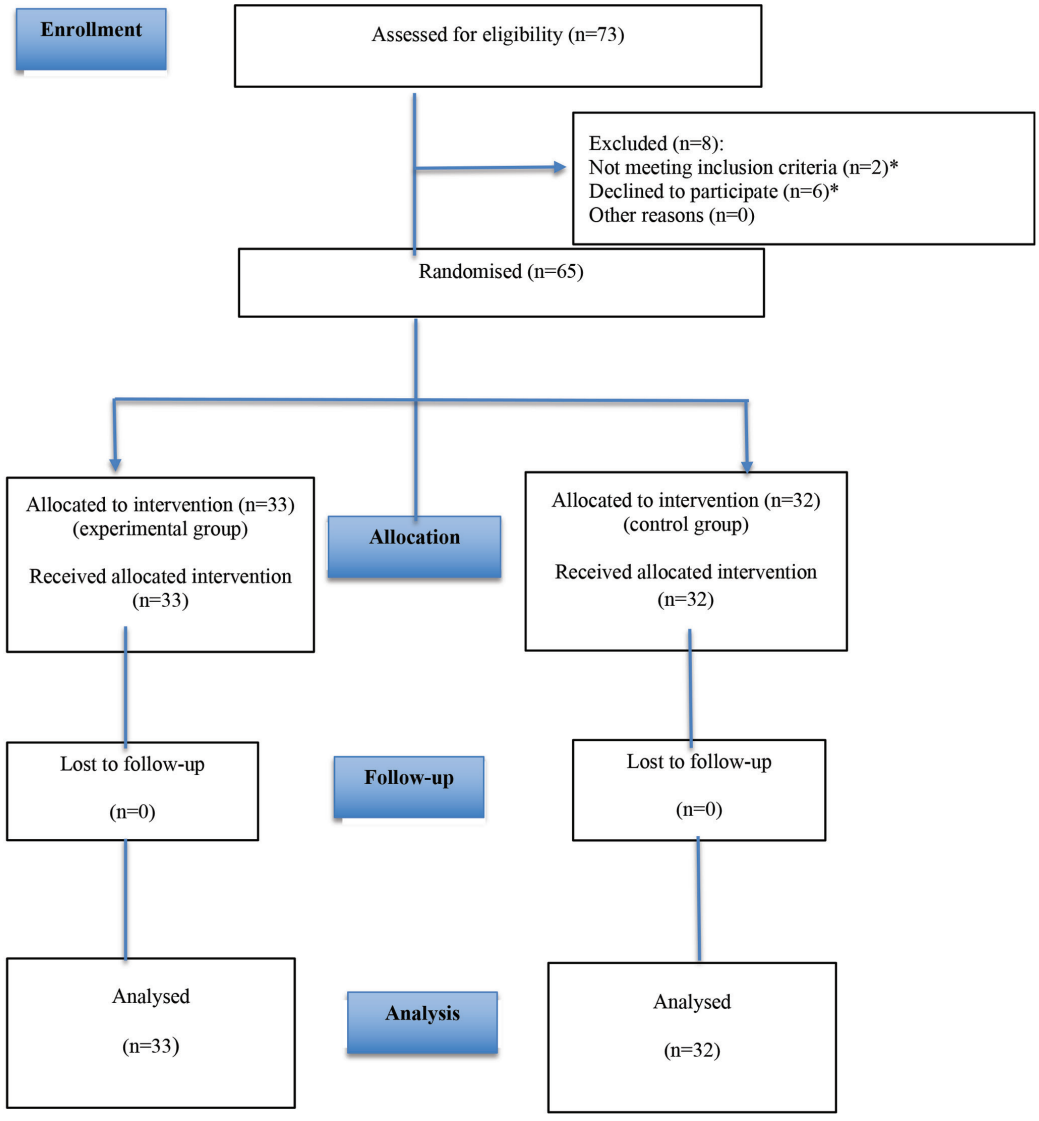

Figure 1. CONSORT diagram

Instruments

Personal information: The personal information form used in the evaluation of socio-demographic features of the parents and children was prepared by the researcher in line with the literature.[3,7,12,16-19]

Wong-Baker faces pain rating scale (WBS): For effectively measuring pain in children aged 3-18, the WBF, developed by Wong and Baker[20], employs a combination of facial expressions and a 0-to-10 numeric scale. This widely used tool enables accurate and straightforward pain assessment in pediatric settings. The degrees of facial expression correspond to increasing levels of pain, as described in our study, with a Cronbach's Alpha of 0.809.

Children's fear scale (CFS): McMurtry et al.'s[21] CFS, a validated tool for assessing fear in children, was employed in this study to evaluate pre- and post-intervention anxiety levels. Adapted from the faces anxiety scale used for adults in intensive care units, the CFS employs five pictures with lines and faces to rate fear from "0" to "4". The score directly correlates with fear levels, starting from "No fear felt" (score of "0") to "Most severe fear" (score of "4"). The scale's Turkish validity and reliability were established by Gerçeker et al.[16], with a Cronbach's Alpha of 0.798 in our study.

Data Collection

The researcher received "play therapy practitioner training" from the continuing education application and research center of a university before starting the study.

Prior to the procedure, both the experimental and control groups of children underwent the administration of the "personal information form", the "WBS", and the "CFS". The researcher, after gathering essential information about the child from their parents via the "introductory characteristics form for parents and children", assessed the child's facial expressions using the "WBS" and the "CFS".

A minute after the suturation process began, the children in the experimental group performed a finger puppet show by the researcher that lasted an average of 10 minutes. During the show, children were queried about various aspects, including their family members' names, the school they attended, their daily activities, preferred toys, the future profession they envisioned, and the hero of their dreams. Then, they were told tales appropriate for their age group. While the control group received the standard suturing procedure without any additional intervention, children in the experimental group participated in a pre-suturing puppet show. Subsequently, both groups participated in pain and fear assessments. For the control group, these assessments were conducted 11 minutes after the start of the suturing process, while the experimental group completed them immediately following the puppet show.

Adhering to the study protocol, all participants -regardless of group allocation- engaged in the assessment process precisely 15 minutes after the conclusion of their incision suturing procedure. This standardized assessment, encompassing the WBS and the CFS, aimed to ensure consistent data collection across experimental and control groups.

Ethical Considerations

Prior to commencing data collection, the study meticulously adhered to ethical guidelines by securing both informed consent from parents and verbal assent from their children. Further safeguarding participants' well-being, the study protocol received prior approval (2020/18) from a Zonguldak Bülent Ecevit University's Non-Interventional Clinical Research Ethics Committee. Moreover, the research-conducting institution granted all necessary approvals (16734702/903.99).

Statistical Analysis

In the study, frequency and percentage were used to analyze categorical variables. Minimum and maximum scores, arithmetic mean scores, and standard deviation scores were calculated in descriptive statistics. When the distribution of the scores of the groups was examined, it was accepted that the scores were not normally distributed since the Kolmogorov-Smirnov test scores were below 0.05 and the skewness and kurtosis coefficients were out of the specified ranges; therefore, non-parametric statistics were used. The Mann-Whitney U test compared the scores of the two independent groups to analyze group scores. Scores across stages (pre-procedure, during the procedure, post-procedure) were compared using the Friedman test, with the Wilcoxon test identifying groups with significant differences in repeated measurements. The study employed the Pearson chi-squared test for categorical variables and the independent samples t-test for continuous variables to analyze the distribution of participants across various characteristics within the sample. All data analyses were conducted using the SPSS 22.0 statistical software package. The significance level for testing hypotheses was set at 0.05, and a 95% confidence interval was used for interpreting the results.

Results

The results of the descriptive features of the children in the experimental (n=33) and control (n=32) groups are given in Table 1.

There was no notable distinction in the distribution of children between the experimental group (n=33) and the control group (n=32) concerning descriptive features like age, location, and cause of incision suturing ($p>0.05$); however, a difference was detected in the distribution of prior hospital experience for the incision suturation ($p<0.05$) (Table 1).

When comparing the pain scores of children in both the experimental and control groups across the pre-procedure, during-procedure, and post-procedure stages, no statistically significant difference was observed in the pre-procedure pain scores between the two groups ($U=497.500$; $p>0.05$). These results suggest that the groups were comparable regarding pre-procedure pain scores.

However, a distinction in pain scores between the experimental and control groups emerged during the procedure and post-procedure stages ($U_{\text{during the procedure}}=91.500$; $p<0.05$ and $U_{\text{post-procedure}}=154.500$; $p<0.05$). Examination of median values revealed that the pain median scores for the control group during the procedure and post-procedure were statistically higher than those for the experimental group (Table 2).

When the results of the differentiation between the pain scores of the groups within the stages (pre-procedure, during the procedure, and post-procedure) were examined, a statistically significant difference was found between the pre-procedure, during the procedure, and post-procedure scores in the experimental group ($\chi^2=61.107$; $p<0.05$). In the analysis, the pain scores of the experimental group during the procedure were found to be significantly lower than the pre-procedure ($Z=-4.613$; $p=0.000$), the post-procedure pain scores to be significantly lower than the pre-procedure ($Z=-5.182$; $p=0.000$), and the post-procedure pain scores to be

significantly lower than the pain scores during the procedure (Z=-5.097; p=0.000) (Table 2).

In the control group, a statistically significant difference was found between the pre-procedure and the post-procedure pain scores (χ^2=41.570; p<0.05). There was a significant increase in the pain scores of the control group during the procedure compared to the pre-procedure (Z=-2.285; p=0.022). The post-procedure pain scores were found to be significantly lower than the pre-procedure (Z=-4.139; p=0.000) and the post-procedure pain scores to be significantly lower than the pain scores during the procedure (Z=-4.996; p=0.000) (Table 2).

In the conducted study, no statistically significant distinction surfaced in the pre-procedure fear scores between the experimental and control groups (U=417.500; p>0.05). These results imply that, concerning pre-procedure fear scores, the groups were essentially equivalent. However, a notable variance emerged between the fear scores of the experimental and control groups during the procedure and the post-procedure ($U_{\text{during the procedure}}$=217.500; p<0.05 and $U_{\text{post-procedure}}$=195.500; p<0.05). Upon scrutinizing the mean values, it became evident that the fear scores of the control group during the procedure and post-procedure were statistically higher than those of the experimental group (Table 3).

When the results of the differentiation between the fear scores of the groups within the stages (pre-procedure, during-procedure, and post-procedure) were examined, a statistically significant difference was found between the pre-procedure, during-procedure, and post-procedure scores of the experimental group (χ^2=55.412; p<0.05). In the analysis, the fear scores during the procedure were found

Table 1. Descriptive features of the children

		Experimental group (n=33)		Control group (n=32)		Test ve p-value
		Mean ± SD	Min-max. (median)	Mean ± SD	Min-max. (median)	
Age		±6.97	4-10 (7)	6.38±1.82	4-10 (6)	t=1.264; p=0.211[a]
		n	%	n	%	
The site of incision suturation	Head	26	48.1	28	51.9	χ^2=0.877 p=0.0349[b]
	Hand-arm-leg	7	63.6	4	36.4	
The cause of incision suturation	Fall-	20	52.6	18	47.4	χ^2=0.127 p=0.722[b]
	Crash-cuts with a sharp object	13	48.1	14	51.9	
Prior hospital experience for incision suturation	Yes	9	81.8	2	5.4	χ^2=5.107 p=0.024
	No	24	44.4	30	55.6	

SD: Standard deviation, [a]: Independent samples t-test, [b]: Pearson chi-square test

Table 2. Comparison of the pre-procedure, during the procedure and post-procedure pain scores of the experimental and control groups

	The pre-procedure (1)		During the procedure (2)		The post- procedure (3)			
	Median	Min-max.	Median	Min-max.	Median	Min-max.	Friedman test**	Difference***
Experimental group (n=33)	2.00	1-3	1.00	1-2	0	0-1	χ^2=61.107; p=0.000	2,3<1 2<3
Control group (n=32)	2.00	0-5	3	1-5	1	0-3	χ^2=41.570; p=0.000	2>1; 3<1 3<2
Mann-Whitney*	U=497.500; p=0.663		U=91.500; p=0.000		U=154.500; p=0.000			

*: Mann-Whitney U test, **: Friedman test, ***: Wilcoxon test

Table 3. Comparison of the pre-procedure, during the procedure and post-procedure fear scores of the experimental and control groups

	The pre-procedure (1)		During the procedure (2)		The post-procedure (3)			
	Median	Min-max.	Median	Min-max.	Median	Min-max.	Friedman test**	Difference
Experimental group (n=33)	2.00	1-3	1.00	1-3	0	0-2	χ^2=55.412; p=0.000	2,3<1; 2<3
Control group (n=32)	2.00	0-4	2.00	1-4	1	0-3	χ^2=37.196; p=0.000	2>1; 3<1; 3<2
Mann-Whitney*	U=417.500; p=0.121		U=217.500; p=0.000		U=195.500; p=0.000			

*: Mann-Whitney U test, **: Friedman test

to be significantly lower than the pre-procedure (Z=-4.315; p=0.000), the post-procedure fear scores to be significantly lower than pre-procedure (Z=-5.182; p=0.000), and the post-procedure fear scores to be significantly lower than the fear scores during the procedure (Z=-5.048; p=0.000) (Table 3).

Within the control group, a statistically notable difference emerged in the fear scores across the pre-procedure, during-procedure, and post-procedure stages (χ^2=37.196; p<0.05). Specifically, there was a noteworthy surge in the fear scores during the procedure compared to the pre-procedure (Z=-2.289; p=0.022). Additionally, the post-procedure fear scores demonstrated a significant decrease both compared to the pre-procedure (Z=-3.844; p=0.000) and during the procedure (Table 3).

Discussion

Recognizing the diverse influences of biological and psychological factors on pain perception in children, our randomized controlled trial employed rigorous baseline assessments to match the control and experimental groups on key descriptive features. This thorough approach, yielding no notable differences (p>0.059), strengthens our results' internal validity and generalizability, minimizing potential bias and increasing confidence in the observed outcomes.

Homogeneous distribution of features such as age, site and cause of incision suturation, and prior hospital experience, which were thought to affect the pain and fear levels of children, was ensured in the experimental and control groups, and the possibility of being affected by these features was eliminated while assessing the efficiency of the implementation.

Although children cannot express themselves truly and fully, they show their pain with their looks, postures, and gestures.[22] Numerous approaches, both pharmacological and non-pharmacological, exist to alleviate pain and anxiety in children during medical procedures. The utilization of non-pharmacological methods by nurses has seen an uptick in recent years.[23] Playing games is an enjoyable activity for the child and is essential in supporting the child's physical, cognitive, motor, language, social and intellectual development. In the literature, it has been reported that playing games is effective in reducing the anxiety and negative emotions of children in the hospital.[24] In the study conducted by Campbell and Brown[25], nursing students gave preschool children information about hand washing, tooth brushing, and hospital dread using a teddy bear for six weeks. They asked for feedback from their parents via e-mail. Parents stated that their children's level of knowledge increased, and their fear of the hospital decreased.[25] In our study, the effectiveness of the finger puppet shows in reducing the pain during the incision suturation was investigated, and the mean scores of the "WBS" during the procedure and the post-procedure were found to be significantly different between the groups. It was determined that the mean pain scores of the children in the experimental group who performed the puppet show during the procedure and the post-procedure were significantly lower than those of the children in the control group.

When the literature was reviewed, it was reported in the study conducted by Cohen et al.[26] that watching cartoons during the procedure was effective in reducing pain and stress in vaccinated children between the ages of 4 and 6. In the study conducted by Lemos et al.[27] with children aged 3-12, it was reported that therapeutic play had a distracting effect on the pain during the intravenous procedures. In the study by Chen et al.[28], 136 children between the ages of 7 and 12 were made to wear virtual reality glasses during the intravenous injection, and it was stated that the pain and fear of the children reduced. In the study conducted by Ballard et al.[29], the use of distracting kits (finger puppet, stress ball, musical toy) during needle procedures in children between the ages of 3 months-2 years and 3-5 years was reported to be effective in reducing their perception of pain. The study by Hartling et al.[30] reported that playing music during intravenous catheter intervention in children aged 3-11 significantly reduced pain and anxiety. In the study by Risaw et al.[31], distraction cards were used in 120 children aged 4-6 during the phlebotomy, and they were reported to be effective in reducing pain. In the study by Mutlu and Balcı[17], it was reported that making children between the ages of 9-12 inflate balloons and cough while taking blood relieved the pain. In the study conducted by Karakaya Suzan et al.[18], it was reported that the puppet show applied to circumcised children during the procedure reduced the pain and anxiety. Similar to the studies conducted on painful procedures, our study also found that the finger puppet show, a non-pharmacological distraction method, was found to be effective in reducing the pain of children caused by the procedure.

The pain increases the level of anxiety in children and makes the examination difficult since it causes psychological and physiological changes in the body.[32] He et al.[33] reported that the anxiety of children and their parents who played therapeutic games for an hour decreased. In our study, while there was no significant difference between the pre-procedure fear scores of the experimental and control groups, it was found that the fear scores indicated a difference during the procedure and the post-procedure. The mean fear scores of the control group during the procedure and the post-procedure were statistically higher than the experimental group.

When the literature was reviewed, in the study conducted by Bergomi et al.[34] with 150 children during the intravenous intervention, the pain and anxiety levels of the animated cartoon group were found to be lowest in the children they divided into the control group, the buzzy device group, both the buzzy device and animated cartoon group and the animated cartoon group. According to a systematic review led by Barreiros et al.[35], the use of "audiovisual distraction methods" on children aged 4-10 was found to decrease fear and concerns related to dental treatment. A puppet show was used to reduce the anxiety of elementary school children during medical procedures in another study by Topan and Ozturk Sahin.[19] The puppet show was administered to the experimental group once a week for four weeks, resulting in a reported effectiveness in reducing children's fear of medical procedures. In the study conducted by Ghabeli et al.[36] with 60 children between the ages of 3 and 8, the children in the experimental group who were sent to the operation with the toy they preferred had less anxiety and higher satisfaction than those in the control group. In the systematic review by Eijlers et al.[37], it was reported that the virtual reality glasses that were used during tooth extraction, treatment of burns, blood collection and treatment of oncological patients reduced children's pain and anxiety. In the study conducted by Nguyen et al.[38] with 40 children with leukemia between the ages of 7 and 12, music was played during lumbar puncture, and children were reported to have lower anxiety levels afterward. Upon comparing the research findings with existing literature, this study determined the effectiveness of distraction methods, such as the finger puppet show, in alleviating children's fears during medical procedures. Similar results were noted in other studies, indicating a consistent outcome, which can be considered as a positive finding.

Study Limitations

This study acknowledges limitations inherent to its population and setting, as it was conducted within a specific province's pediatric emergency department of a state hospital. These limitations are due to defined inclusion and exclusion criteria that might limit generalizability to different settings or broader pediatric populations. In addition, the fact that the finger puppet show was not compared with another intervention and that the children in the control group did not have any interventions may explain some of the between-group variations in pain and anxiety. Therefore, in future research, we would recommend comparing the finger puppet show with another intervention (for the control group).

Implications for Emergency Nurses

Non-pharmacological methods play a crucial role in alleviating pain and fear in children. Despite their significance, the application of techniques is limited for pediatric emergency nurses. Given the urgent and meticulous nature of emergency services, the chosen method should be straightforward and swift. Hence, employing cost-effective and uncomplicated non-pharmacological techniques, such as the use of a finger puppet during invasive procedures like incision suturing, not only diminishes children's pain and fear but also facilitates a swifter and more careful execution of invasive interventions.

Conclusion

The study determined that the finger puppet show, implemented during incision suturing, effectively mitigated pain and fear in children. Given the challenging nature of incision suturing in pediatric emergency services because of pain, fear, and trauma, the use of non-pharmacological distraction methods, such as the finger puppet show, is recommended for pediatric emergency nurses in clinical settings.

Ethics

Ethics Committee Approval: Further safeguarding participants' well-being, the study protocol received prior approval (2020/18) from a Zonguldak Bülent Ecevit University's Non-Interventional Clinical Research Ethics Committee. Moreover, the research-conducting institution granted all necessary approvals (16734702/903.99).

Informed Consent: Prior to commencing data collection, the study meticulously adhered to ethical guidelines by securing both informed consent from parents and verbal assent from their children.

Authorship Contributions

Concept: G.F.E., A.T., Design: G.F.E., A.T., Data Collection or Processing: G.F.E., A.T., Analysis or Interpretation: G.F.E., A.T., Literature Search: G.F.E., A.T., Writing: G.F.E., A.T.

Conflict of Interest: No conflict of interest was declared by the authors.

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