



Effect of an Active Distraction Method for Pediatric Venipuncture-Related Pain and Anxiety

Emel İsiyel¹ , Melahat Yurttaş² , Ezgi Perktas³ , Elif Nursel Özmert¹ , Özlem Tekşam¹ 

ABSTRACT

Objective: Children can experience less pain and anxiety by being informed and distracted. Our goal was to assess the effectiveness of providing information and using an active distraction technique to treat pediatric venipuncture-related pain and anxiety in children.

Materials and Methods: One hundred forty-two children between the ages of 3 and 8 years were randomized into three groups: the informed, the informed and distracted, and the control. In the informed group, information was provided to the parents and children in written and verbal forms; in the informed and distracted group, information was also provided to the parents and children while allowing the children to play a puzzle game on the tablet; and in the control group, the routine injection procedure was performed. Parents and an independent observer completed two separate forms to rate the pain and terror of the children.

Results: According to the parents/caregivers, fear and pain experience were found to be significantly lower in the informed and distracted group ($p=0.001$ for pain; $p=0.005$ for fear) than in the control and the informed groups. Moreover, according to the independent observer, fear and pain experience were similarly found to be significantly lower in the informed and distracted group ($p=0.002$ for pain; $p<0.001$ for fear) than in the other two groups. According to the independent observer, the anxiety of the parents was significantly found to be lower in the informed and distracted group ($p=0.007$) than in the other two groups.

Conclusion: Children and their families experience stress as a result of painful procedures. It may be possible to lessen the pain and anxiety that children experience during invasive operations by informing, preparing, and distracting them.

Keywords: Active distraction, anxiety, information, pain, venipuncture

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¹Department of Pediatrics, Hacettepe University İhsan Doğramacı Children's Hospital, Ankara, Türkiye
²Department of Pediatric Nursing, Hacettepe University İhsan Doğramacı Children's Hospital, Ankara, Türkiye
³Department of Child Development and Education, Hacettepe University İhsan Doğramacı Children's Hospital, Ankara, Türkiye

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Correspondence
Emel İsiyel,
Hacettepe University,
İhsan Doğramacı Children's
Hospital, Department of
Pediatrics, Ankara, Türkiye
Phone: +90 312 305 11 30
e-mail: eisiyel@gmail.com

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INTRODUCTION

Painful procedures like blood drawing, vaccinations, and injections that are provided as part of medical services can cause stress to children and their families. Despite that topical and systemic analgesics are easily accessible and commonly used, children nevertheless have a great deal of anxiety about these invasive procedures.

Some children and young people consider the process very painful and troubling. As a result, needle-associated pain, and fear may have health-threatening consequences such as hiding pain, living with pain, and receiving fewer injections and thus benefiting less from treatment (1–3).

There have been an increasing number of new techniques recently that aim to reduce the fear and anxiety brought on by invasive treatments. These methods include informing the family and the child, training the personnel performing an invasive procedure, employing different coping mechanisms, situating the child in a safe atmosphere, and bringing in play specialists (4). These techniques seek to lessen the pain and anxiety experienced by children undergoing invasive intervention, assist them in learning coping skills for their long-term physical and mental health, improve the skill of medical personnel performing invasive procedures that cause pain and anxiety, and identify when other supplementary factors may be activated (1, 4, 5).

Distraction is a simple and effective technique that can divert children from stressful interventions, which is also recommended to reduce the effect of pain and behavioral disturbances. There are two basic distraction methods, namely, active, and passive. In the active distraction method, children are encouraged to engage in another activity; in the passive distraction technique, children usually remain silent during the procedure. Hence, passive distraction techniques involve watching a stimulant instead of the active participation of children. Several studies on the effects of different distraction techniques in coping with pain, anxiety, and distress during pediatric procedures exist (6–8).

Informing the family and child properly before invasive procedures like blood drawing is important for them to understand the procedure and so that a trustful relationship between the individuals can be established (1, 4, 7, 8).

Our study aimed to evaluate the effects of giving information and an active distraction method for pediatric venipuncture-related pain and anxiety in children aged between 3 and 8 years.

MATERIALS and METHODS

Study Design

The current study was carried out in a room of the General Pediatrics Outpatient Clinic of Hacettepe University, İhsan Doğramacı Children's Hospital, involving a single nurse, an independent observer, a child development and education specialist, and a general pediatrician. It was designed as a randomized prospective study.

Ethical Considerations

The Ethics Committee of Hacettepe University Medical Faculty approved the study (GO 18/1185). The aim and method of the study were explained to the children and their parents/caregivers, and they were informed that they could stop participating in the study at any time without giving a reason.

Setting and Samples

The present randomized clinical trial has been carried out between November 2019 and March 2020. All children aged between 3 and 8 years without any neurodevelopmental disorder or chronic disease were included in the study. They were randomized into three groups: 1) the group in which no information was provided and no distraction techniques were used during blood drawing, whose blood was drawn using the current method (the control group); 2) the group in which the child and the family were informed before the procedure by a definite physician (the informed group); and 3) the group in which children were guided to play games in a tablet by a child development specialist during the procedure after being informed about the procedure with their parents (the informed and distracted group). Only one kind of puzzle game was provided to all children in the informed and distracted group.

The study sample size was determined via a power analysis using G Power version 3.1.9.2 and was based on previous research. Regarding the mean values of Wong-Baker FACES (WB-FACES) pain score assuming an alpha level of 5% and a power of 90% (with medium effect size of $\eta^2=0.071$ reference value), a statistically meaningful difference was found when a set of at least 43 samples are selected for each group.

Two separate forms designed for families and independent observers were used. The parents were requested to fill out the parts of the form including the questions on age, gender, accompanying people, education levels of the parents, and whether there was a previous presentation of a hospital or invasive procedure. Furthermore, they were asked to evaluate the fear and pain of the child before and during the procedure. An independent observer enriched the form with the number of interventions during the blood drawing procedure, the duration of the successfully completed procedure, the evaluation of the fear of children before the procedure, and the pain of the children during the procedure. Children's Fear Scale (CFS) was used to evaluate the children's level of anxiety before blood drawing by parents and independent observer. CFS is a 0–4 scale, showing five cartoon faces that range from a neutral expression (0: no anxiety) to a frightened face (4: severe anxiety) (9). The level of pain resulting from the procedure in each child was assessed by the parent and observer reports, using the WB-FACES pain rating scale. The WB-FACES scale is a 0–5 scale, showing six cartoon faces that range from a neutral expression (0: no hurt) to a crying face (5: hurts as much as you can imagine) (10).

Parents were informed with a written text advising them to tell their children the necessity of the procedure honestly and the possibility of a little pain during the procedure. They were also told not to use statements such as “You will not feel pain,” “No need to be anxious,” “Blood will not be drawn,” “Do not cry,” “No gift to you if you cry,” “I will leave you if you cry,” “Keep quiet! Nurse/physician will make an injection,” and “Do not worry, I will beat, and punish them.” The physician offered verbal information to the children regarding the procedure by explaining that the procedure is necessary and pain is inevitable but if he/she cooperates, the procedure will be shorter and less painful.

The procedure of drawing venous blood was performed by a specified and experienced pediatric nurse. During the procedure, families were allowed to stay with their children, hold their hands, and also keep them in their laps.

Data Analysis

Collected data were recorded in SPSS version 23.0 (IBM Corp, Armonk, NY). Descriptive data were calculated as frequency and percentage for categorical variables while for continuous variables mean and standard deviation or median, first, and third quartiles for normal and nonnormal distribution, respectively. The normality distribution of the quantitative data was evaluated with a histogram and Kolmogorov–Smirnov test. The Kruskal–Wallis variance analysis was used to compare three groups since the normality assumption failed. The pairwise comparisons were observed with the Dunn–Bonferroni test. The chi-squared test was used to compare categorical variables and the pairwise comparisons were reviewed with Bonferroni adjustment. The Wilcoxon test was used to compare dependent groups. In all tests, a p-value of less than 0.05 was considered significant.

RESULTS

One hundred forty-two patients were included in the study (46 control, 48 informed, and 48 informed, and distracted). Seventy-four (52%) patients were girls, whereas 68 (48%) were boys. The mean age of the patients was 5.4 ± 1.48 . The age and gender distribution in all groups were statistically similar ($p < 0.96$ for age; $p < 0.78$ for gender). Table 1 summarizes the information regarding the person attending the child to the hospital, whether the child had experienced any previous invasive procedure, the number of occurrences, and whether the procedure was successful at the first attempt.

The expediency of giving information before the procedure was asked the families in two groups (the informed group and the informed and distracted group). Giving information was significantly found to be more beneficial in the informed and distracted group than in the only informed group ($p < 0.000$). Twenty (41.6%) families in the informed and distracted group considered information absolutely beneficial, 23 (47.9%) considered it very beneficial, and five (10.5%) considered it not or a little beneficial. In the informed group, 22 (45.8%) families considered information very beneficial, 26 (54.2%) considered it not or a little beneficial, and none considered it absolutely beneficial.

In the informed and distracted group, of the 48 parents, 40 (83.3%) considered distraction absolutely beneficial, five (3.5%) considered it very beneficial, one (2.1%) considered it a little ben-

Table 1. Factors of the effects of coping with fear and pain

	Informed and distracted		Informed		Control		p
	n	%	n	%	n	%	
Person attending to the child at the hospital							<0.34
Both parents	23	47.9	25	52	22	47.8	
Mother	16	33.3	15	31.2	19	41.3	
Father	2	4.1	2	4.1	3	6.5	
Mother and caregiver	6	12.5	6	12.5	2	4.3	
A caregiver other than the parents	1	2	0	0	0	0	
Number of previous invasive procedures							<0.68
0	3	6.25	3	6.25	6	13	
1–5	24	50	23	47.9	12	26	
6–10	13	27	18	37.5	14	30	
>11	8	16.6	4	8.3	14	30	
Duration of the previous procedure							<0.56
<10 days	6	12.5	10	20.8	3	6.5	
11–20 days	2	4.1	5	10.4	1	2.1	
21–30 days	11	22.9	3	6.25	7	14.5	
31 days to 3 months	6	12.5	12	25	8	17.3	
4–6 months	3	6.25	3	6.25	9	19.5	
7–12 months	10	20.8	8	16.4	8	17.3	
>1 year	8	16.6	3	6.25	4	8.4	
Procedure at first attempt							<0.87
Successful	46	95.8	46	95.8	44	95.6	
Not successful	2	4.2	2	4.2	2	4.4	

eficial, and two (4.2%) considered it useless. It was found that 74 (52.1%) patients who had blood drawing experience in the past were worried during the procedure. Nineteen (13.4%) of the parents of these children experienced fear and anxiety during the previous procedure, whereas 111 (78.2%) did not have such feelings. Furthermore, passive distraction methods were applied to 16 of the patients with previous experience (12.3%).

Table 2 illustrates the median and 25th and 75th quartile values of pain and fear for each group, according to the parents/caregivers and independent observer. Fear and pain experience were found to be significantly lower in the informed and distracted group than in the control and the informed groups according to the families ($p=0.001$ for pain; $p=0.005$ for fear). In evaluating pain, 47.9% of parents in the informed and distracted group, 22.9% in the informed group, and 19.6% in the control group preferred to give zero points. Moreover, in evaluating fear, 31.3% of parents in the informed and distracted group, 12.5% in the informed group, and 8.7% in the control group decided to give zero points.

According to the independent observer, fear and pain experience were similarly found to be significantly lower in the informed and distracted group ($p=0.002$ for pain, $p<0.001$ for fear) than in the other two groups. The independent observer gave zero points for pain in 64.5%, 35.4%, and 28.2% of the informed and distracted, informed, and control groups, respectively. Moreover, for

fear, the independent observer gave zero points in 43.8%, 37.5%, and 19.6% of the informed and distracted, informed, and control groups, respectively.

When the assessment of the children's fear was compared by the independent observer and the parents/caregiver, no significant difference was found between the informed and distracted group ($p=0.154$); however, a significant difference was found between the control and informed groups ($p=0.000$; $p<0.001$). In the control and informed groups, the fear scores of the families were found to be higher than the independent observer. When the assessment of the children's pain was compared by the independent observer and the parents/caregiver, a significant difference was found in all three groups (informed and distracted group, $p=0.004$; informed, $p<0.001$; and control, $p<0.001$). In all three groups, the pain scores of the families were found to be higher than those of the independent observer.

The anxiety of the parents was significantly found to be lower in the informed and distracted group according to the independent observer ($p=0.007$).

A significant difference was found when the duration of the procedure in the three groups was evaluated by an independent observer ($p=0.01$). It was stated that the duration of the procedure was shorter than the other two groups in the informed group. Table 3 illustrates the median and 25th and 75th quartile values of the procedure duration in each group.

Table 2. Median and 25th and 75th quartile values of the pain and fear in each group according to the parents/caregivers and independent observer

	Informed and distracted median (25th–75th quartiles)	Informed median (25th–75th quartiles)	Control median (25th–75th quartiles)	Test statics	p
Pain according to a relative of the patient	1 (0–3.75) ^a	3 (1–5) ^b	4.5 (1–5) ^b	17.891	0.001
Fear according to a relative of the patient	1 (0–2) ^a	2 (1–3.75) ^b	3 (1–4) ^b	14.540	0.005
Pain according to the independent observer	1 (0–3.75) ^a	1 (0–5) ^b	4 (1–5) ^b	12.087	0.002
Fear according to the independent observer	0 (0–1) ^a	1 (0–4) ^b	3.5 (0–5) ^b	18.779	<0.005
Anxiety of parents according to the independent observer	0 (0–0) ^a	0 (0–2) ^b	0 (0–2) ^b	10.316	0.007

Letters a and b depict a difference of $p < 0.05$ between groups

Table 3. Median and 25th and 75th quartile values of the procedure duration in each group

	Informed and distracted median (25th–75th quartiles)	Informed median median (25th–75th quartiles)	Control median median (25th–75th quartiles)	p
Duration of procedure (min)	1.5 ^a (1–3)	1 ^b (1–2)	2 ^a (1–3)	0.001

Letters a and b indicate a difference of $p < 0.05$ between groups

DISCUSSION

Painful medical procedures such as phlebotomy and injection may lead children to experience fear and anxiety. American Society for Pain Management Nursing emphasized that coping strategies for pain and anxiety before and during painful procedures in children are important for pain and anxiety control in their adulthood. Therefore, they recommend pharmacological and nonpharmacological approaches for controlling pain (11). Various methods are used to decrease the perception of pain during medical procedures recently, and distraction is one of the most commonly used nonpharmacological methods. Distraction methods are used in different forms to divert the attention of the patient from the painful stimulus (12–16). In our study, a method of letting the patients play games on a tablet was selected as an active distraction method in one of the groups. Preparing children for upcoming painful procedures is also considered to be another intervention method in recent reports. Strong and consistent evidence indicates that proper preparation before any invasive procedure is very beneficial for children (1). In our study, parents/caregivers in two groups were informed via a form so that they can prepare the children accordingly before the procedure, and children were informed verbally by a special physician as well.

A significant difference was found between the three groups in terms of fear and pain levels of patients, where it was found to be lower in the distracted and informed group than in the other two groups, based on the evaluations performed by parents/caregivers and an independent observer.

For pediatric acute pain management, several distraction methods such as watching cartoons, blowing balloons, playing with an interactive robot, looking into virtual reality gadgets, reading books, listening to music, and interacting with clowns were evaluated by investigators. A meta-analysis of 19 pediatric pain management studies evaluating distraction efficiency revealed that distraction has a reasonable effect in decreasing distress behavior. In these studies, distraction was found to be very effective, especially in children younger than 7 years (8).

Watching cartoons as a passive distraction was found to be more effective than playing with a robot as an active distraction in the study of Gezginci et al. (6). In the study of Koller et al. (17), reading books to the child by their parents was considered an active distraction, whereas watching cartoons was considered passive, and stress levels were found to be significantly lower in the reading book group. These miscellaneous results may be associated with the selection of different distraction methods, measurement methods, and design of the studies. However, it was reported in several studies that active or passive distraction reduced fear and pain before and during the procedure (6, 13, 14, 18–20). In our study, active distraction was used in only one group. No distraction methods were used in the other two groups. In this study, giving information was found significantly more beneficial in the informed and distracted group than in the only informed group, according to the parents. In the study of Wang et al. (5), therapeutic touch, encouragement, and guided imagery methods were utilized during the procedure in the intervention groups, and the pain was found significantly lower in this group than in the control group. However, in our study, no significant difference was found in the comparison of the informed and control groups in terms of pain and fear. It was also underlined in the literature that an experienced staff should give information by spending adequate time (12, 17). In the current study, information was given by a physician just before blood was drawn, which may be one of the limitations of this study. Ballard et al. (14) reported that children with negative medical experiences displayed higher levels of anxiety before an invasive procedure; moreover, they were more distressed and less cooperative during the procedure. Negative medical experiences in childhood lead to reports of pain and fear in adulthood medical events and result in refraining from medical services (20). Giving information over a longer time by a dedicated staff can be more effective. The majority of patients had blood drawing experience previously that can be considered another limitation in this study ($n=130$, 92%). In this context, even just giving accurate information may be effective in reducing pain and fear.

In this study, an independent observer found that anxieties of the parents in the informed and distracted group were significantly lower ($p=0.007$). In the study of Bijttebier et al. (15), the parents of a group were trained on distraction coaching to distract their children and compared to the control group, and it was found that the children and their parents in the trained group had less stress, which was statistically significant compared to the control group. McCarthy et al. (16) stated that if parents believe in nonpharmacological interventions and are encouraged to use their skills, they may be less stressed during the implementation of invasive procedures on their children and prepare their children better for the procedure. In our study, the stress level was lower in the informed and distracted group, which may be explained by the fact that children were prepared better for the procedure by healthcare personnel. In the control and informed groups, the fear scores of the families were found to be higher than the independent observer in our study. In the control group, families may have perceived stress more because they did not have any information about the procedure and distraction methods. In the information group, giving only information may not have been sufficient to cope with stress for families and children, which is compatible with the recommendations of the American Academy of Pediatrics that emphasizes that children and families must be informed to ensure that they know what to expect when a child is having a procedure and that they are prepared with specific strategies to minimize distress (21).

In the present study, a significant difference was found between the duration of the procedure in the three groups. It was stated that the duration of the procedure was shorter in the informed group than in the other two groups. In a study by Wang et al. (5), it was found to be longer in the control group. In this study, the duration of the procedure was found to be close to each other in the control and the informed and distracted groups.

In this study, pain and fear scores of children were found by both parents and independent observer to be lower in the informed and distracted group. Moreover, parental anxiety was found by the independent observer in this group to be lower. Some studies have demonstrated that parental anxiety affects the anxiety of the child during invasive procedures. Training parents for coping and distracting was found effective in decreasing the stress levels of children before and during the procedure (8, 11, 19). In our study, parents in the informed and distracted group were convinced that distracting and informing has a positive effect on their children in experiencing less anxiety. Jurdi et al. (22) and Wohlheiter et al. (19) stated that electronic video games are very useful in coping with anxiety, stress, and pain; however, more studies should be conducted to confirm the benefits and positive outputs on this finding.

CONCLUSION

To reduce children's pain and anxiety, informing, preparing, and distracting methods should be used before, during, and after the invasive procedures. Distraction is a simple and effective technique that can divert children from stressful interventions and is presented to minimize the effect of pain and fear.

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