

## Medical Play on Children's Anxiety and Pain during Peripheral Intravenous Cannulation

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### Abstract

**Background:** Insertion of peripheral intravenous cannulation during hospitalization can cause anxiety and pain in preschool children. Anxiety in children due to the installation of peripheral intravenous cannulation can result in fear, discomfort, and non-cooperation, which can have a bad impact on the child's psychological and physiological condition. Unresolved pain can result in traumatic experiences for children. One distraction technique that can be applied to overcome anxiety and pain is medical play.

**Objective:** The study aimed to analyze the effect of medical play on anxiety and pain in preschool-aged children when undergoing peripheral intravenous cannulation.

**Methods:** This study used a quasi-experimental pre and post-test with a control group design involving 31 control group respondents and 31 intervention respondents. The respondent selection was carried out using consecutive sampling techniques. Univariate and bivariate data analysis used dependent and independent t-tests.

**Results:** The results of the study showed that there was a difference in the average anxiety score with a value of  $p=0.001$  in the intervention and control groups. There was no difference in mean pain scores with a  $p$ -value of 0.528 in the intervention and control groups. There was no relationship between respondent characteristics and anxiety and pain when installing peripheral intravenous cannulation.

**Conclusion:** This study recommends that medical play can reduce anxiety in preschool children when peripheral intravenous cannulation is installed.

**Keywords:** anxiety; medical play; pain; preschool

### INTRODUCTION

The hospitalization process is a crisis that occurs when a child is sick and is hospitalized. This crisis may occur in children of all ages. Preschool-age children are expected to be able to adapt to the hospital environment, which leads to stressful situations for them and their parents ([Apriani et al., 2021](#)). The process of child hospitalization is described as a negative experience that can make children experience anxiety ([Speedie et al., 2021](#)). Research conducted by [Rashid et al. \(2021\)](#) used a pre-experimental design with pre- and post-tests without control on 26 children that medical play could reduce anxiety in children undergoing hospitalization. Anxiety in children due to hospitalization, if not handled properly, can result in fear, discomfort, and non-cooperation in medical and nursing actions, which can result in poor

psychological and physiological conditions ([Nuliana, 2022](#)). When a child undergoes the hospitalization process, the child will experience acute pain and anxiety due to the invasive procedure of installing peripheral intravenous cannulation. If this is not resolved, it can cause trauma to the child ([Godino-láñez et al., 2020](#)).

Efforts that can be made to reduce anxiety are carrying out play activities for children before installing peripheral intravenous cannulation. Types of games that can be played include playing with dolls, telling stories, playing using medical equipment, listening to music, and so on. This play activity is known as therapeutic play. Therapeutic play is an effective non-directive modality that is

useful for helping children control worries and fears ([Speedie et al., 2021](#)).

[Tambunan et al. \(2024\)](#) mentions four types of games for preschool children, namely preparation play, medical play, distraction play, and developmental play. Medical play is a type of play therapy that can be given to children where children are given the opportunity to explore existing medical equipment. Playing with toys made from medical materials can reduce the pain that occurs during invasive procedures in children with cancer ([Aslan & Erci, 2022](#)). This type of medical play can use gloves, syringes without needles, masks, nurse hats, tongue spatula, thermometers, and cotton wool ([Kyriakidis et al., 2021](#); [Jones et al., 2021](#)).

Research conducted stated that the anxiety level of preschool-aged children being treated showed a severe level of anxiety (61.1%), which could affect children's sleep patterns. Meanwhile, research conducted by [Sari & Widianingrum \(2024\)](#) states that there is a significant between inpatient support and anxiety in preschool children. The better the inpatient treatment, the lower the anxiety level of preschool children.

Based on a preliminary study through observations made at the research site, while children were being treated, therapeutic play was rarely carried out due to the limited time that nurses had and play therapy not yet becoming a routine program. In other words, there are no play activities for children to reduce anxiety before the invasive procedure of installing peripheral intravenous cannulation is carried out. The results of research conducted by [Tambunan et al. \(2024\)](#) have proven that the effects of play during hospitalization can minimize children's levels of anxiety and negative emotions. In light of this, researchers conducted research on the effect of medical play on anxiety and pain levels in children during peripheral intravenous insertion.

## **METHOD**

This research used a quasi-experimental pre and post-test design with the control group, which was conducted from May to July 2023. The total research sample consisted of 62 people, 31 of whom were in the intervention group who were given medical play treatment and 31 of whom were in the control

group who were given standard treatment. Inclusion criteria were children aged 3-6 years who were able to communicate well and children who had peripheral intravenous cannulation installed and were accompanied by parents or caregivers. Exclusion criteria were children who were uncooperative and experienced decreased awareness. The sampling technique used consecutive sampling. Anxiety measurement uses the Children's Fear Scale (CFS), which has been tested for interrater reliability, resulting in a correlation coefficient ( $r = 0.60$ ) and significance ( $p < 0.001$ ), so this instrument is reliable for assessing anxiety in children.

The pain measurement instrument uses Face, Leg, Activity, Cry, Consolability (FLACC), which is an international standard instrument for assessing pain used at ages two months to seven years ([Peng et al., 2023](#); [Crellin et al., 2021](#)). The procedure for recruiting respondents was carried out by researchers coordinating with specialist doctors or attending physicians to identify the need for peripheral intravenous cannulation in preschool children. Then, explain the purpose and procedures and fill out informed consent if the family is willing to have their child become a respondent. The child is taken to the action room and given the opportunity to adapt for five minutes, and an anxiety assessment is carried out. Next, insertion was carried out in the control group. Pain assessment was carried out immediately after insertion. After insertion and fixation of the insertion area, post-action anxiety assessment was continued, whereas in the intervention group, before the insertion procedure, the next step was for the child to be given medical play until the procedure was completed. After insertion, a pain assessment is carried out, followed by a post-action anxiety assessment.

Data processing in research includes editing, coding, processing, and cleaning ([Kusumawaty et al., 2022](#)). Data analysis uses univariate and bivariate analysis. Univariate data analysis included gender, experience with peripheral intravenous cannulation, accompanying person, other pain felt, anxiety, and pain. Univariate data types consist of numerical data (presented in the form of mean, median, standard deviation, and minimum-

maximum) and categorical data presented in the form of frequency distributions and percentages. Bivariate data analysis is a dependent variable consisting of anxiety and pain. The data type is numeric. The statistical tests used are dependent and independent t-tests and one-way ANOVA ([Kusumawaty et al., 2022](#)).

Anxiety measurement uses the Children's Fear Scale (CFS), which has been tested for interrater reliability with correlation coefficient results ( $r = 0.60$ ) and significance ( $p < 0.001$ ) so that the instrument is reliable for assessing anxiety in children. Meanwhile, measuring pain using face, leg, activity,

cry, and controllability (FLACC) is an international standard instrument used in children aged two months to seven years. The administrative procedure begins with carrying out an ethical test issued by St. Carolus Salemba with number 012/SB/KEP-RSSC/PASS ETHICS TEST/V/202. Respondents' rights consist of informed consent, anonymity, confidentiality, respect for persons, perfection from discomfort and harm, respect for justice, and inclusiveness.

## RESULTS

### Respondent Characteristics

**Table 1. Distribution of Respondent Characteristics in Control and Intervention Groups (n=62)**

	Variable	Control Group	Intervention Group
1	Gender		
	Boy	14 (45.2%)	17 (54.8%)
	Girl	17 (54.8%)	14 (45.2%)
2	Experience of peripheral IV cannulation		
	No	14 (45.2%)	14 (45.2%)
	Yes	17 (54.8%)	17 (54.8%)
3	Companion		
	Father	8 (25.8%)	2 (6.5%)
	Mother	22 (71%)	27 (87.1%)
	Father and mother	1 (3.2%)	0 (0%)
	Father/mother and other family member	0 (0%)	2 (6.4%)
4	Other pain		
	No	21 (67.7%)	26 (83.9%)
	Yes	10 (32.3%)	5 (16.1%)

Table 1 shows that the majority of respondents in the control group were women (54.8%), while the intervention group was men (54.8%). In both groups, the majority had had experience with

installing peripheral intravenous cannulation (54.8%), the person accompanying the respondent was the mother (87.1%) and had no other pain experienced (83.9%).

### Overview of Anxiety and Pain

**Table 2. Anxiety and Pain Score Distribution in Preschool Children in Control and Intervention Groups (n=62)**

Variable	Control Group		Intervention Group	
	Mean $\pm$ SD	Min-Max	Mean $\pm$ SD	Min-Max
Anxiety				
Pretest	1.68 $\pm$ 1.40	0–4	1.90 $\pm$ 1.38	0–4
Posttest	2.29 $\pm$ 1.32	0–4	1.00 $\pm$ 0.93	0–3
Pain				
Posttest	5.23 $\pm$ 3.07	0–10	4.74 $\pm$ 2.92	0–10

In the control group, the average pretest anxiety score was 1.68, and the posttest was 2.29. Meanwhile, the average anxiety score for the pretest intervention group was 1.90, and the post-

test was 1.00. The mean posttest pain score for the control group was 5.23, while the intervention group was 4.74.

#### Difference in mean pretest and posttest anxiety scores in the control and intervention groups

**Table 3. Comparison of Anxiety Pretest and Posttest Mean Scores in Control and Intervention Groups (n=62)**

Preschool Children Anxiety	Control Group				Intervention Group			
	Mean (SD)	Difference (SD)	p-value	CI 95%	Mean (SD)	Difference (SD)	p-value	CI 95%
Pretest	1.68 (1.40)	-0.61 (1.14)	0.006	-1.03-(-0.19)	1.90 (0.24)	0.90 (1.39)	0.001	0.39-1.41
Posttest	2.29 (1.32)				1.00 (0.16)			

Table 3 shows the mean anxiety score of the control group with p-value of 0.006, while the mean anxiety score of the intervention group has p-value of 0.001.

Based on statistical tests, it can be concluded that there is a difference in the mean anxiety scores in the intervention and control groups.

**Table 4. Comparison of Anxiety and Pain Mean Scores between Control and Intervention Group (n=62)**

Variable	Control Group Mean (SD)	Intervention Group Mean (SD)	p-value	Mean Difference (95% CI)
Anxiety	2.29 (1.31)	1.00 (0.93)	<0.001	1.29 (0.71-1.87)
Pain	5.23 (3.07)	4.74 (2.92)	0.52	0.48 (-1.04-2.01)

Table 4 shows that the mean post-test pain score for the control group was 5.23 and the intervention group was 4.74. From the statistical test, it can be

concluded that there is no difference in the pain scores of the intervention and control groups, with a p-value of 0.528.

#### Correlation between Respondent Characteristics, Anxiety, and Pain

**Table 5. Correlation between Respondent Characteristics and Pretest-Posttest Anxiety (n=62)**

Variable	Control Group			Intervention Group		
	Mean (SD)	p-value	CI 95%	Mean (SD)	p-value	CI 95%
<b>Gender</b>						
Boy	1.94 (1.38)	0.41	0.29 (-0.41-0.99)	1.71 (1.21)	0.701	0.12 (-0.54-0.79)
Girl	1.65 (1.38)			1.58 (1.40)		
<b>Experience of IV cannulation</b>						
No	1.96 (1.50)	0.37	0.31 (-0.38-1.02)	1.68 (1.27)	0.857	0.06 (-0.61-0.73)
Yes	1.65 (1.27)			1.62 (1.34)		
<b>Other pain</b>						
No	1.83 (1.40)	0.68	0.16 (-0.66-0.99)	1.49 (1.24)	0.128	-0.64 (-1.48-0.20)
Yes	1.67 (1.34)			2.13 (1.40)		

Table 5 shows that there is no relationship between gender characteristics, experience of having peripheral intravenous cannulation installed, and

other perceived pain on anxiety scores in the intervention and control groups.

**Table 6. Correlation between Companion and Anxiety Pretest-Posttest Score (n=62)**

Variable	Pretest			Posttest		
	Mean (SD)	F	p-value	Mean (SD)	F	P-value
<b>Companion</b>						
Father	2.10 (1.59)			1.50 (1.179)		
Mother	1.76 (1.37)			1.96 (1.42)		
Father and mother	2.00 (-)	0.392	0.759	3.00 (-)	1.18	0.32
Father/mother & other family member	1.00 (0.00)			0.50 (0.71)		
Other family member	0 (0)			0(0)		

Table 6 shows that there is no relationship between the characteristics of the person accompanying the

child and anxiety scores in the control and intervention groups, with a value of  $p = 0.325$ .

**Table 7. Correlation between Respondent Characteristics and Pain (n=62)**

Variable	Mean (SD)	p-value	Mean Difference (CI 95%)
<b>Gender</b>			
Boy	5.45 (2.73)	0.220	0.93 (-0.57–2.44)
Girl	4.52 (3.19)		
<b>Experience of IV cannulation</b>			
No	5.36 (2.99)	0.376	0.68 (-0.61–0.73)
Yes	4.68 (2.98)		
<b>Other pain</b>			
No	4.83 (3.11)	0.434	-0.63 (-2.41–1.14)
Yes	5.47 (2.56)		

Table 7 shows that there is no significant correlation between respondent characteristics, namely

gender, experience of intravenous cannulation, other pain, and pain (posttest), indicated by  $p > 0.05$ .

**Table 8. Correlation between Companion and Pain (n=62)**

Variable	Mean (SD)	F	p-value
<b>Companion</b>			
Father	4.50 (3.78)	1.45	0.237
Mother	5.22 (2.79)		
Father and mother	6.00 (-)		
Father/mother & other family member	1.00 (1.41)		
Other family member	0 (0)		

Table 8 shows that there is no significant correlation between the person accompanying the child and pain (posttest), indicated by  $p > 0.05$ .

## DISCUSSION

The research results showed that the average anxiety score in the pretest control group was 1.68 and posttest, 2.29. It suggests that there was an increase in anxiety in the control group children before and after the installation of peripheral intravenous cannulation who were given standard care. In the intervention group, the average pretest anxiety score was 1.90 and posttest 1.00. So, in the intervention group that was given medical play intervention, there was a decrease in anxiety before and after installing peripheral intravenous cannulation.

Medical play can reduce anxiety in preschool children who are being treated in the hospital with a p-value of 0.001, with the average anxiety score of the intervention group given medical play being lower than the control group given standard care. The results of this study are in accordance with research conducted by [Höglund et al. \(2024\)](#); [Suparno et al. \(2023\)](#) that medical play can reduce anxiety during the procedure for installing peripheral intravenous cannulation, whereas in the control group, children were not given medical play as a means of distraction so the children would focus on the action of installing intravenous access so that the child becomes more anxious. In Indonesia, research conducted showed that medical play had a significant effect on reducing anxiety in children. The study revealed that there was a decrease in anxiety levels as indicated by a decrease in the verbalization of confusion, a decrease in the verbalization of children's worries, anxiety, and tension, a normal pulse frequency, and the child was not pale ([Suparno et al., 2023](#)).

The results of the study showed that the mean pain score in the control group was 5.23, and in the intervention group was 4.74. Thus, pain can

decrease in the intervention group, which is given medical play. In the control group, they did not feel pain because the respondents had previous experience of installing peripheral intravenous cannulation, so this was not their first experience. It is in accordance with the opinion of [Kyle & Carman \(2024\)](#), who stated that inappropriate pain experiences and management can influence children's perceptions of pain.

In the intervention group, there were still those who felt pain due to cognitive factors and age, as well as their first experience of having peripheral intravenous cannulation installed. It is in accordance with the opinion of [Kyle & Carman \(2024\)](#) who stated that the higher the child's cognitive level, the better their understanding of pain and coping strategies.

Statistical results show that the p-value based on the relationship between respondent characteristics and anxiety is gender (pretest 0.412 and posttest 0.701), the experience of installing peripheral intravenous cannulation (pretest 0.372 and posttest 0.857), the presence of other pain (pretest 0.689 and posttest 0.128) and the presence of a companion (pretest 0.759 and posttest 0.325). Meanwhile, the statistical results show the p-value based on the relationship between respondent characteristics and pain, namely gender, experience of installing peripheral intravenous cannulation, accompanying people, and other pain felt. Based on this p-value, it shows that the characteristics of the respondents do not have a significant effect on anxiety and pain in preschool children when peripheral intravenous cannulation is installed. It shows that the characteristics of the respondents do not have a significant effect on anxiety and pain in preschool children when peripheral intravenous cannulation is installed.

The results of this study are in line with the results of research conducted by [Cho et al. \(2022\)](#) that gender, the experience of having peripheral intravenous cannulation installed, accompanying

person, and other perceived pain do not have a significant effect. In contrast to previous research, research conducted by [Tahir & Arniyanti \(2023\)](#) showed that previous experience of being treated can influence children's anxiety levels compared to the first time they were treated, although the results were not very significant. Children's perception of hospitalization as an experience that increases stress and limited coping in dealing with this can cause increased anxiety in children who have already been treated. Thus, previous treatment experience can reduce anxiety if the child has a pleasant experience so that in the next treatment, when the child experiences the same thing, the child is no longer so anxious and in pain.

The results of research conducted by [Seniwati et al. \(2023\)](#) showed that children who were accompanied by their parents when installing an IV had a significant relationship with reducing anxiety with a p-value of 0.001. In this study, it was said that 66.75 children refused to take action when their parents did not accompany them, and 33.3% of them were willing to take action without parental assistance.

## CONCLUSION

Medical play is significantly effective in reducing anxiety in preschool children during PIVC, but it is not significantly effective in reducing pain in preschool children during PIVC. Regular play activities can be implemented in child health services to reduce trauma from the hospitalization process. It is expected that pediatric nurses will be able to apply this concept in providing nursing care for children so that the quality of care improves and families are satisfied with the services, leading to an increase in patient visits to hospitals. Future studies may investigate how effective therapeutic play, for example, using medical play, is in reducing children's anxiety in the emergency unit or intensive care unit.

The implications of the results of this research prove that medical play can significantly reduce anxiety. Medical play can reduce pain insignificantly in

preschool children when peripheral intravenous cannulation is installed. The application of Kolcaba's theory in this research was carried out by applying medical play as a distraction technique to reduce anxiety and pain when installing peripheral intravenous cannulation. Anxiety is a form of discomfort from a psychospiritual perspective, while pain is discomfort from a physiological perspective. Therefore, this discomfort must be intervened to produce an increased sense of comfort. In this condition, the role of the nurse is needed in an effort to increase the feeling of comfort by inviting the child to play medical play so that an overall feeling of comfort is created ([Purwaningsih & Rahmatiah, 2024](#)).

The limitation of the research is that preschool-aged children who will be treated have already had intravenous access installed in the Emergency Room (IGD), thereby reducing the number of respondents because the respondents who will be selected are children who will have peripheral intravenous cannulation installed in the inpatient room. In this study, some variables were not homogeneous, so if the respondent felt other types of pain, it would be difficult to assess the pain.

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