The Effect of Parental Presence on Pain and Anxiety Levels During Invasive Procedures in the Pediatric Emergency Department

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Contribution to Emergency Nursing Practice

- The current state of scientific knowledge on family participation in pediatric care indicates that parental involvement has a positive effect on the psychological, physical, and social well being of the child and strengthens the sense of control by the family in the care of the child.
- The main findings of this research are that during invasive procedures performed in pediatric-care centers, pain and anxiety levels are reduced by involving parents, thereby supporting children between the ages 9 and 12. If emergency nurses can reduce parents' anxiety by informing them of what will happen before invasive procedures, parents may reduce the level of pain and anxiety in their children.
- Key implications for emergency nursing practice from this research are as follows: A family–centered-care approach improves the well being of parents and children; enhances communication and cooperation between parents and health care workers; accelerates the recovery process; and reduces the level of stress, pain, anxiety, and hospital length of stay.

Introduction: Parental presence during invasive procedures is important in family–centered-care. Family–centered-care is a basic principle of pediatric nursing.

Methods: This randomized controlled trial included data from 111 cases in the Pediatric Emergency Department of Istanbul University, Istanbul Medical Faculty, during October 2016–January 2017 (parental involvement group, n = 40; parental presence group, n = 40; parental absence group, n = 31). Information form, State-Trait Anxiety Inventory, State-Trait Anxiety Inventory for Children and Visual Analogue Scale were used to collect data.

Results: When children's pain levels before invasive procedures were compared, there was no significant difference between the groups ($P > 0.05$). Significant difference was found between pain levels of the groups during the process ($P < 0.001$). It was found that the pain levels of the children in the parental absence group (6.00 ± 2.88) were significantly higher than those in the parental involvement group (3.15 ± 2.79) and the parental presence group (3.70 ± 2.92) ($P < 0.05$). There was a weak, positive, and significant relationship between parents' trait anxiety levels and the preprocedural pain and trait anxiety levels of children in all groups ($P < 0.05$).

Discussion: Parental involvement is effective in reducing the pain felt during invasive procedures. Moreover, anxiety levels of children during the procedure were not affected in all groups; however, the children of parents with high trait anxiety levels had higher preprocedural pain and trait anxiety levels.

Keywords: Emergency nursing; Family–centered-care; Invasive procedures; Parental presence; Pediatric Emergency Department

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Introduction

Invasive procedures and being in a hospital can be painful and frightening experiences for children and their parents. Accordingly, there has been growing interest in allowing parents to be present when procedures are performed on their children in emergency departments.[1,2] Previous studies revealed inadequate and inappropriate communication with health care personnel, child care being provided by health care personnel more than that provided by the family, and the feeling of losing control increase anxiety.[3,4]

TABLE 1
Descriptive characteristics of children (N = 111)

Characteristics	Parental involvement group (n = 40)		Parental presence group (n = 40)		Parental absence group (n = 31)		Total		χ^2; *P*
	n	%	n	%	n	%	N	%	
Gender									
Girl	20	50.0	28	70.0	14	45.2	62	56	5.240; 0.073
Boy	20	50.0	12	30.0	17	54.8	49	44	
Age (years)*									
9	12	30.0	15	37.5	6	19.4	33	30	
10	11	27.5	8	20.0	9	29.0	28	25	6.901; 0.330
11	11	27.5	8	20.0	5	16.1	24	22	
12	6	15.0	9	22.5	11	35.5	26	23	
$\bar{X} \pm SS$	10.28 ± 1.06		10.28 ± 1.20		10.68 ± 1.17		10.37 ± 1.15		1.388; 0.254

χ^2, Pearson Chi-square analysis, gender/age df: 2/6.
* In all groups the smallest and largest value of the age variable is between 9 and 12.

Moreover, anxiety in the family is known to affect the level of anxiety in children.[5]

Several decades of scientific evidence revealed the importance of parental presence during invasive procedures with pediatric patients in reducing anxiety levels of family members, anxiety and pain in children undergoing procedures, and accelerating the recovery process.[6-10] The Emergency Nurses Association, the Royal College of Nursing, the British Association for Accident and Emergency Medicine, the Ambulatory Paediatrics Association, and the American Academy of Pediatrics have all endorsed recommendations or resolutions allowing family presence during invasive procedures and resuscitation in the hospital.[9] Earlier studies revealed that parental support was effective in reducing pain during blood withdrawal in children aged 6 to 10[11] and establishing vascular access in children 4 to 9 years of age.[12] Parental support during invasive procedures also reduced pain, stress, and adverse behavior in children ages

TABLE 2
Descriptive characteristics of parents (N = 111)

Characteristics	Parental involvement group (n = 40)		Parental presence group (n = 40)		Parental absence group (n = 31)		Total		Statistical test and *P* value
	n	%	n	%	n	%	N	%	
Parent									
Mother	32	80.0	24	60.0	24	77.4	80	72	4.586; 0.101
Father	8	20.0	16	40.0	7	22.6	31	23	
Educational status*									
Uneducated	1	2.5	2	5.0	-	-	3	3	
Primary Education	30	75.0	24	60.0	21	67.7	75	67	1.627; 0.443
High School and Above	9	22.5	14	35.0	10	32.3	33	30	
Parent Age (year)									
$\bar{X} \pm SS$	38.34 ± 0.98		38.8 ± 5.13		38.1 ± 4.38		38.31 ± 4.92		F = 0.100; *P* = 0.905

χ^2, Pearson Chi-square analysis, parent type/educational status df: 2.
F, Analysis of variance in independent groups, intergroup/intra-group/total df: 2/108/110.
* Because sample size was small (expected number <1), the groups were combined and analysed.

TABLE 3
Types of invasive procedures applied to children (N = 111)

Type of Invasive Procedure	Parental involvement group (n = 40)		Parental presence group (n = 40)		Parental absence group (n = 31)		Total		χ^2; *P*
	n	%	n	%	n	%	N	%	
Blood Withdrawal	29	72.5	26	65.0	21	67.7	76	68	
Establishing Vascular Access	1	2.5	2	5.0	2	6.5	5	4	5.889; 0.436
IM Injection	4	10.0	1	2.5	4	12.9	9	8	
IV Injection	6	15.0	11	27.5	4	12.9	21	20	

χ^2, Pearson Chi-square analysis df: 2.

7 to 10 years.[13] In other studies, investigators reported that parental support during blood withdrawal and other invasive procedures reduced anxiety[12,14,15] and physiological symptoms in children.[14] Similarly, investigators who studied 61 children aged 3 to 6 years reported that the anxiety levels of children in the parental-presence group was lower.[15]

Mothers' participation in the hospital care of children has a positive effect on the psychological, physical, and social well being of children and ensures continuation of the family's sense of being in control of their child's care. Moreover, the presence of family members during procedures provides emotional support for children; family members see that everything is being done for their child, and their anxiety levels are reduced. On the other hand, health care providers are much less willing to allow parental presence than parents would prefer. Reasons stated for the reluctance to allow parental presence include parental anxiety, escalating negative behavior of children, time required to orient parents, performance anxiety by the provider.[16,17]

The purpose of this study was to determine the effect of parental involvement, parental presence and parental absence on pain and anxiety levels of children who underwent invasive procedures upon admission to the pediatric emergency units. Herein, we tested the hypothesis that family presence and involvement during invasive procedures decreases pain levels, reduces anxiety levels of children, and decreases parental anxiety levels.

Methods

The current study is a randomized controlled trial that aimed to determine the effect of parental involvement and parental presence and absence on the pain and anxiety levels of children aged 9 to 12 years who underwent invasive procedures during pediatric ED visits.

SETTING AND SAMPLE

Our facility is a 10-bed emergency department in an urban tertiary-care center with a pediatric patient population. The pediatric emergency unit consists of 3 parts: resuscitation, outpatient clinic, and consultation. Invasive procedures are performed in the outpatient clinic where the study was conducted.

The study sample comprised children aged 9 to 12 years who were to undergo invasive procedures (blood withdrawal, vascular access, intramuscular injection, and intravenous injection) and their parents, who were Turkish speakers, had no mental and/or physical health problems that would interfere with communication, and volunteered to participate in the study. Study participants were randomized to 1 of 2 groups by a computer-based random number generator.[18] Power analysis was performed using the G*Power (v3.1.9) program to determine sample size. The approximate number of subjects was calculated as 40 for each group with a Type 1 error probability (significance level) of 0.05, 80%, or 95% power for bivariate tests (Type II error probability of 20% or 5%) and considering 4 units of change clinically significant at any examination. Children were initially divided into 2 groups: parental-involvement group with 54 subjects and parental-presence group with 57 subjects. However, during data collection, 14 parents from the parental-involvement group and 17 parents from the parental-presence group decided not to be present with their children; therefore, a third group was created as the parental-absence group (n = 31).

INSTRUMENTS

State-Trait Anxiety Inventory (STAI)

This scale used to determine anxiety levels was developed by Spielberger et al in 1964 to determine the state and trait anxiety levels of patients ≥ 14 years of age.[19] Turkish adaptation, validity, and reliability studies were performed by

TABLE 4
Anxiety levels of parents and children (N = 111)

Anxiety levels	Parental involvement group (n = 40) Mean, SD	Parental presence group (n = 40) Mean, SD	Parental absence group (n = 31) Mean, SD	F value, *P* value
Child				
State anxiety level	36.58 ± 7.30	38.38 ± 6.67	37.97 ± 6.15	0.766; 0.467
Trait anxiety level	39.13 ± 7.98	38.10 ± 7.16	36.45 ± 7.66	1.084; 0.342
Parent				
State anxiety level	44.05 ± 7.71	46.05 ± 9.35	43.42 ± 9.50	0.893; 0.413
Trait anxiety level	43.05 ± 6.93	44.33 ± 8.71	42.84 ± 8.03	0.388; 0.679

F, Analysis of variance in independent groups, intergroup/intra-group/total df, 2/108/110.
SD, standard deviation.

Öner and Le Compte in 1983.[20] This instrument was used to measure anxiety of parents. The STAI is a 40-item self-evaluation scale comprising short statements. It is composed of 2 sections: state anxiety scale and trait anxiety scale, each with 20 items. The state anxiety scale was created to identify feelings of the moment, whereas the trait anxiety scale was created to identify feelings of the past week. The responses to state anxiety scale are (1) never, (2) sometimes, (3) usually, and (4) always; the responses to trait anxiety scale are (1) rarely, (2) sometimes, (3) usually, and (4) almost always. Scores that can be obtained from the scales range from 20 to 80; a high score indicates high anxiety, whereas a low score indicates low anxiety level. The same rule applies when interpreting percentages. A low percentage (<10%) indicates low anxiety level. Kuder-Richardson (Alpha) reliability of the scale is reported to be 0.83 to 0.87, item remainder reliability is reported to be 0.34 to 0.72, and test-retest reliability is reported to be 0.71 to 0.86.

In the current study, Cronbach's alpha reliability coefficient of the state anxiety scale was 0.82 for the entire sample, 0.75 for the parental-involvement group, 0.81 for the parental-presence group, and 0.88 for the parental-absence group. Cronbach's alpha reliability coefficient of trait anxiety scale was 0.78 for the entire sample, 0.72 for the parental-involvement group, 0.82 for the parental-presence group, and 0.77 for the parental-absence group.

State-Trait Anxiety Inventory for Children (STAI for Children)

This scale was developed by Spielberger to measure the state and trait anxiety levels of children aged 9 to 12 years.[19] Turkish adaptation, validity, and reliability studies were performed by Özusta in 1993.[21] The 40-item scale consists of 2 sections: state anxiety scale and trait anxiety scale, each comprising 20 items. The state anxiety scale was created to identify how children felt at a particular moment, whereas the trait anxiety scale was created to identify how children felt in general. The responses in the trait anxiety scale are "almost never," "sometimes," and "frequently." Of these expressions, "frequently" corresponds to 3 points, the highest score, whereas "almost never" corresponds to 1 point, the lowest score. Children's feelings of tension, agitation, and

TABLE 5
Pain levels of children before and during procedure (N = 111)

Children's Pain Levels	Parental involvement group[1] (n = 40) Mean, SD	Parental presence group[2] (n = 40) Mean, SD	Parental absence group[3] (n = 31) Mean, SD	KW value, *P* value
Pain Before Procedure	4.60 ± 2.73	4.70 ± 3.22	4.26 ± 3.00	0.499; 0.779
Pain During Procedure	3.15 ± 2.79	3.70 ± 2.92	6.00 ± 2.88	15.705; 0.000 (1.2 < 3)
Z; *P*	2.409; 0.016	1.889; 0.059	3.186; 0.001	

KW, Kruskal–Wallis analysis, df, 2 (post-hoc analysis: Mann–Whitney U test with Bonferroni correction).
Z, Wilcoxon analysis.

TABLE 6
Relationship between parents' anxiety levels and children's pain and anxiety levels (n = 111)

Groups and Variables belonging to children	State Anxiety Level of Parents		Trait Anxiety Level of Parents	
	r	*P*	r	*P*
Parental Involvement Group				
Pain level of children before procedure	0.13	0.410	0.16	0.318
Pain level of children during procedure	−0.17	0.282	−0.31	0.051
State anxiety level of children	0.08	0.617	−0.05	0.739
Trait anxiety level of children	−0.01	0.934	−0.03	0.873
Parental Presence Group				
Pain level of children before procedure	−0.06	0.709	0.10	0.531
Pain level of children during procedure	−0.22	0.179	0.12	0.464
State anxiety level of children	−0.13	0.438	−0.00	0.989
Trait anxiety level of children	0.09	0.570	0.22	0.149
Parental Absence Group				
Pain level of children before procedure	0.01	0.974	0.37	0.042
Pain level of children during procedure	0.10	0.603	0.42	0.019
State anxiety level of children	0.35	0.057	0.29	0.115
Trait anxiety level of children	−0.04	0.834	0.40	0.025
TOTAL				
Pain level of children before procedure	0.03	0.782	0.21	0.025
Pain level of children during procedure	−0.12	0.207	0.02	0.831
State anxiety level of children	0.08	0.398	0.06	0.530
Trait anxiety level of children	0.02	0.822	0.19	0.044

r, Pearson correlation analysis.

nervousness are evaluated by the state anxiety scale. The highest score (3 points) indicates the presence of these feelings, and the lowest score (1 point) indicates that these feelings do not exist. The scores that can be obtained from the trait anxiety scale and the state anxiety scale range from 20 to 60.

In the current study, Cronbach's alpha reliability coefficient of the State Anxiety Scale for Children was 0.90 for the entire sample, 0.90 for the parental-involvement group, 0.90 for the parental-presence group, and 0.91 for the parental-absence group. Cronbach's alpha reliability coefficient of the trait anxiety scale for children was 0.86 for the entire sample, 0.88 for the parental-involvement group, 0.83 for the parental-presence group, and 0.85 for the parental-absence group.

Visual Analog Scale (VAS)

The VAS, developed by Price et al in 1983 for measuring and monitoring the severity of pain is suitable for individuals aged ≥ 7 years.[22] It is a 10-cm long ruler with "no pain" at 1 end (0) and "most severe pain" at the other end (10).

DATA COLLECTION PROCEDURES

The data were obtained from 111 cases in the pediatric emergency department of İstanbul University, Istanbul Medical Faculty, between October 2016 and January 2017 (parental-involvement group: parents involved in the procedure, n = 40; parental-presence group: parents present but not involved in the procedure, n = 40; parental-absence group: parents not present, n = 31).

In the emergency unit where this study was conducted, parents are present with their children during routine invasive procedures. In addition, as one of the nonpharmacological pain-management methods used in the clinic, music is played to reduce pain during painful procedures. When previous invasive procedures on children who were included in the study were evaluated, it was determined that all children in all groups had previously undergone invasive procedures. Prior to invasive procedures, children were asked to fill out STAIs for Children, and parents were asked to fill out STAIs. To determine pain levels before and during invasive procedures, children were asked to mark their pain level on the VAS. The parents in the parental-involvement group were

involved in the procedure by holding their children's arms during blood withdrawal, establishment of vascular access, and intravenous injections, by holding their children's legs during intramuscular injections, and by continued communication with their children during procedures. The parents in the parental-presence group communicated with their children during procedures by simply being present without being involved in the procedure. The parents who did not want to be present with their children waited outside the room while procedures were performed. Invasive procedures in all 3 groups were performed by the same nurse.

ETHICAL CONSIDERATIONS

Before starting the research, written permission (ethical number: 24.06.2016; Decision no.12) was obtained from Istanbul University Istanbul Medical Faculty's Department of Child Health and Diseases and local ethics committee. Voluntary informed consent was obtained from the parents of children who met the research criteria.

DATA ANALYSIS

Statistical Package for the Social Sciences (SPSS) for Windows 21 software package (IBM, Armonk, New York) was used in the analysis of data. Number, percentage, mean, and standard deviation were used as descriptive statistics in this study. The Pearson Chi-square test was used to compare categorical variables, and 1-way analysis of variance (ANOVA) was used to compare continuous variables (anxiety scores among all 3 groups). Wilcoxon analysis compared pain scores according to time, and the Kruskal–Wallis test compared pain levels of all 3 groups, followed by Mann–Whitney U test with Bonferroni correction as a post-hoc test. A P value < 0.05 was considered significant.

Results

There was no significant difference among the groups in terms of gender, age, parental characteristics, type of invasive procedures, and anxiety levels of parents and children ($P > 0.05$) (Tables 1-4).

When children's pain levels were compared, we found a highly significant difference between the pain levels of the groups during the procedure ($P < 0.001$). In the post-hoc analysis conducted to determine the source of this difference among the groups, it was found that children in the parental-absence group had significantly higher levels of pain at the time of the procedure than those in the parental-involvement and parental-presence groups (Table 5).

When the relationship between parental anxiety levels and children's pain and anxiety levels was examined, we found that trait anxiety levels of parents significantly affected pain levels before procedure ($P = 0.042$) and during procedure ($P = 0.019$) and trait anxiety levels ($P = 025$) of children in the parental-absence group ($P < 0.05$). A weak, positive, and significant relationship was found between trait anxiety levels of parents and preprocedural pain ($P = 0.025$) and trait anxiety levels of children in all 3 groups ($P = 0.044$) (Table 6).

Discussion

Parents are the most important source of support for children during hospitalization and painful procedures. Not being with people whom the child trusts in a hospital setting may reduce tolerance to pain during procedures experienced by the child. The most important emotional reactions that accompany pain are anxiety and fear. Anxiety usually occurs with acute and short-term pain. Previous studies have shown a direct relationship between anxiety and pain, either of which increases the severity of the other. Persons who experience high levels of anxiety are more sensitive to pain.[23] Parental presence during painful procedures can make it easier for the child to cope with pain and anxiety.[24]

In this study, we found that pain levels during procedures were significantly higher in the parental absence group than the other groups. Previous studies provided evidence that parental support was effective in reducing pain during invasive procedures in children.[11-13] Contrary to our findings, 1 previous study investigated the effect of parental presence on pain during establishment of vascular access in 135 children aged 3 to 6 years and concluded that there was no difference in pain levels between children who were with their parents during the procedure and children who were with health care personnel.[25] This difference was possibly associated with the young age of children in this study.

We found no difference between the trait and state anxiety levels of children and parents in all 3; however, the preprocedural pain levels and trait anxiety levels of children who had parents with high trait anxiety levels were also high. Previous studies provided evidence that parental support was effective in reducing anxiety during

invasive procedures in children.[11,14,15] Conversely, several studies reported that parental presence had no effect on the child's anxiety.[26-28] We found no published studies examining the effect of state and trait anxiety levels of parents on state and trait anxiety levels of children, thus justifying the need for this study.

The results of the current study indicate that family presence positively affects the level of pain during invasive procedures. Therefore, during invasive procedures, parents should stay with their children to support them and even be involved in the process. However, because parents with high anxiety levels might have a negative effect on their children, emergency nurses should provide the necessary information and training before the procedure to alleviate their anxiety, and only then should parents be involved in the procedure to support their children.

Limitations

There are several limitations of this study. First, this was a single-site study, which limited generalizability of research findings. Second, it was planned that there would be 2 groups at the beginning of the research, but, as the study began, some family members preferred to wait outside, and the third group formed spontaneously. This group was not randomized. In addition, measures of patients' perception of pain were self-reported.

Implications for Emergency Nurses

Our findings have several important implications for emergency nurses. Emergency nurses should be aware of the importance of parental presence in pain management and should be able to decide how the family should be involved during invasive procedures. Nurses should be aware that parents with low levels of anxiety could calm their children, thereby reducing the chaos in the environment. Nurse educators should teach nurses and nursing students about the benefits of allowing parental presence during invasive procedures in their nursing practice. Positive effects of parental presence on children during invasive procedures should be based on scientific evidence by placing more focus on randomized controlled experimental studies, and major professional organizations should come together to develop written evidence-based guidelines on the importance of family presence during invasive procedures and family-centered care.

Conclusion

Pain levels of children whose parents were present at their sides during invasive procedures and involved in the procedure were lower, and anxiety levels in all 3 groups during procedure were not affected; however, the children of parents with high trait anxiety levels had higher preprocedural pain and trait anxiety levels. In light of these results, we believe that parental involvement and support during invasive procedures will be effective in decreasing levels of pain in children.

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