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Comparing Three Nurse-Led Non-Pharmacological Interventions for Reducing Fear and Improving Cooperation in Children Undergoing Minor Surgical Procedures

Nurse-Led Interventions for Fear and Cooperation in Children Undergoing Minor Surgery

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ABSTRACT: **Background**: Children's fear of procedures and lack of cooperation with behavioral management are some of the major issues when conducting minor surgeries on children in emergency cases. In order to overcome the problems, various nurse-led non-pharmacological interventions have been recommended. However, direct comparison data between several types of these interventions within one clinical environment is rather scarce.

Methods: A quasi-experimental comparative study was performed at the emergency departments of three governmental hospitals subordinated to Salah Al-Din Health Directorate, Iraq. Altogether 140 children between ages of 5 and 12 years who had undergone minor surgical interventions were assigned to four intervention groups: clay play (n=31), distraction cards (n=33), recreational activities (n=36) and a control group of routine care (n=40). Fear of procedures was measured with the help of Child Medical Fear Scale (CMFS) and behavioral cooperation was estimated by means of Frankl Behavior Rating Scale (FBRS). Statistical analysis included Mann-Whitney U and Kruskal-Wallis tests for between-group comparison of nonparametric measurements.

Results: All three interventions led to significant decrease in fear and significant increase in behavioral cooperation compared to the control group ($p<0.001$). Recreational activities proved to be more efficient than the other two interventions for all items of the CMFS scale. Significant between-group difference for both dependent variables was found. Pair-wise analysis showed superiority of recreational activities in reducing children's fear ($p=0.009$) and increasing cooperation ($p=0.009$) over clay play. There were no significant differences between distraction cards and recreation activities in enhancing behavioral cooperation ($p=0.212$). Pre-existing emotional condition was a moderating factor for cooperation.

Conclusions: All three interventions surpassed routine care significantly. Recreational activities provided for a wider range of improvement while distraction cards proved to be

an effective and feasible method. The results suggest incorporation of brief pre-procedure preparation into routine pediatric emergency nursing practice.

1. INTRODUCTION

A wide range of minor surgical procedures – such as wound suturing, foreign body removal, minor burns care, and superficial abscess incision and drainage – account for a significant share of pediatric emergency department (ED) cases internationally (1). Even though these procedures are considered minor from a technical point of view, they present a challenging task for the children psychologically. Among various emotional states experienced before the procedure, fear and anticipatory anxiety are the most common reactions reported in school-age patients resulting from exposure to a strange environment, medical devices, pain perception, and loss of control (2,3). The children's inability to assess danger from a clinical perspective makes them more sensitive to the stimuli of the procedure, leading to crying, body resistance, and non-compliance behavior (4,5). The above-mentioned reactions make procedure delivery complicated for nurses, create extra work for medical staff, and may prolong total procedure time (6).

In the past, pharmacological approaches have been widely used to cope with fear during a procedure. However, there is a variety of risks associated with the use of sedatives and analgesic drugs, as well as additional expenditures required for the procedure. Furthermore, pharmacological interventions do not provide solutions to the children's psychological distress caused by fear (7). Non-pharmacological approaches to the treatment of child medical fear have started receiving increasing recognition over recent years due to being safe, economically viable, and backed up by the results of rigorous research (8). Among several existing options, therapeutic play, distraction, and recreational activities should be mentioned for being appropriate for children's developmental level, feasible in terms of the ED environment, and non-technological (9).

Clay play utilizes a tactile approach and allows children to externalize emotions and pay attention to something else besides procedural stimuli (10). As research shows, nursing interventions based on play may prove effective in promoting better functional and emotional outcomes for children suffering from chronic illnesses (11). Cards for distraction rely on the principles of attentional competition, which means that visual and cognitive attention will be drawn away from procedural fear stimuli (12). Finally, recreational activities are related to the process of emotional adjustment to the environment through creating a sense of enjoyment (13). Nevertheless, even though evidence proves the effectiveness of each approach on its own as compared with the conventional procedure without any interventions, there is no existing study that includes all three approaches in a comparative experimental design with measurement of fear and cooperation using validated instruments (14,15).

The lack of evidence regarding the comparative effectiveness of therapeutic play, distraction, and recreation is relevant from the perspective of clinical practice since ED nurses choose between these inexpensive techniques with little knowledge about their comparative efficacy. Thus, the current study aimed to address this issue through the comparison of the chosen interventions in relation to routine care as well as each other regarding their impact on fear reduction and behavioral cooperation of children waiting for minor surgical procedures.

2. METHODOLOGY

2.1. Study Design

A quasi-experimental design with comparison was utilized in this study. Subjects were allocated into any one of the four groups – clay work, distraction cards, entertainment, and routine care group. Groups were formed on the basis of the colored-card method where participants allocated themselves to any one group based on their choice and in accordance with emergency department requirements.

2.2. Setting and Ethics

This research was carried out in the emergency departments of three governmental hospitals, namely, Balad General Hospital, Al-Dhalouiya General Hospital, and Al-Dujail Emergency and Maternity Hospital in Salah Al-Din Health Directorate, Iraq. All ethical considerations, administrative approvals, and informed consents are mentioned under Ethical Approval heading above.

2.3. Participants

Of the total 165 children who had been approached at the outset, 12 refused to participate, 9 did not meet inclusion criteria, and 4 withdrew due to the emergence of adverse effects including hypotension in three cases and intraoperative bleeding requiring immediate nursing assistance in one case, leading to a total sample size of 140 children. Children requiring major surgery, those with cognitive impairment affecting comprehension, and those with unstable medical conditions were excluded. The final group distribution was: clay play (n=31), distraction cards (n=33), recreational activities (n=36), and control (n=40).

2.4. Methods of Data Collection

The primary researcher obtained sociodemographic and clinical data from participants when they joined the study before starting any treatment by using a dedicated demographic and clinical information form created for this research. The form recorded the following information about children: age and sex and surgical history and planned minor surgical procedure and expected operation time which medical records later verified. The researcher used direct observation with standardization to assess baseline emotional states during enrollment which they classified into four categories: calm and slightly anxious and very anxious and crying. The medical staff recorded the total time used for the surgical procedure right after they finished the operation.

2.5. Instruments

Child Medical Fear Scale (CMFS): A validated 20-item self-report scale measuring children's medical fear across domains including fear of needles, medical devices, clinical personnel, physical examinations, procedural pain, and procedural uncertainty. Each item is scored 0–3 (0 = not afraid at all; 3 = extremely afraid), yielding a total score of 0–60. Total scores are classified as low (0–15), moderate (16–35), or high (36–60). The scale was administered before the intervention and read aloud in Arabic by the researcher using age-appropriate language. Content validity was confirmed by a ten-member expert panel comprising specialists in pediatric nursing, psychiatric nursing, community health nursing, and pediatric medicine.

Frankl Behavior Rating Scale (FBRS): A four-category observational instrument that classifies child behavioral cooperation during a clinical procedure as: 1 – definitely negative, 2 – negative, 3 – positive, 4 – definitely positive. The FBRS was applied immediately after the procedure by a trained ED nurse who was blinded to the study hypotheses.

2.6. Interventions

All interventions were delivered immediately before the assigned surgical procedure.

Clay Play: Each child received single-use modeling clay and was encouraged to shape it freely for 5–15 minutes without a prescribed design, promoting sensory engagement, emotional expression, and active attention redirection.

Distraction Cards: Children participated in a researcher-guided visual-cognitive activity lasting 8–12 minutes. Cards included picture comparison tasks, cartoon identification, and image-connection exercises. Verbal interaction during the activity simultaneously supported nurse-child rapport.

Recreational Activities: Children engaged in age-appropriate self-selected activities — including puzzles, model assembly, and drawing — for 10–15 minutes. Freedom of activity choice was intentional, enhancing the child's sense of control and environmental comfort.

Control Group: Children received routine hospital care only, with no researcher-led pre-procedural activity.

2.7. Statistical Analysis

Data were analyzed using SPSS version 28. Normality was assessed via the Kolmogorov-Smirnov test; both CMFS and FBRS data were non-normally distributed across all four groups, supporting the exclusive use of non-parametric methods. Mann-Whitney U tests were used for two-group comparisons, the Kruskal-Wallis test for global comparisons across all four groups, and the Chi-square test or Fisher's exact test for examining associations between categorical sociodemographic variables and outcome classifications. Statistical significance was set at $p \leq 0.05$.

3. RESULTS

3.1. Baseline Characteristics

As shown in Table 1, the four groups were comparable across all major sociodemographic and clinical characteristics. Males constituted 60.7% of the total sample, with proportions ranging from 58.0% to 66.7% across groups. Participants ranged in age from 5 to 12 years (mean 8.71 ± 2.164 years), with the 10-year age group being the most frequently represented (21.4%). The majority of children (65.7%) had no prior surgical experience. The most common procedure types were wound suturing and removal (35.7%) and wound dressing (32.9%). Before any intervention, 38.6% of children were observed as very anxious and 25.7% as actively crying, confirming a high baseline level of emotional distress across all groups. Mean procedure duration was 11.76 ± 2.833 minutes, ranging from 6 to 20 minutes.

Table 1. Sociodemographic and Clinical Characteristics of Study Participants by Group (n=140)

Characteristic	Clay Play (n=31)	Distraction Cards (n=33)	Recreational Activities (n=36)	Control (n=40)	Total (n=140)
Male sex, %	58.1	66.7	58.0	60.0	60.7
Female sex, %	41.9	33.3	42.0	40.0	39.3
Age, mean ± SD (years)	8.97 ± 2.359	8.73 ± 2.035	8.50 ± 2.287	8.68 ± 2.055	8.71 ± 2.164
No prior surgical experience, %	64.5	60.6	72.2	65.0	65.7
Very anxious at baseline, %	41.9	18.2	44.4	47.5	38.6
Crying at baseline, %	22.6	18.2	38.9	22.5	25.7
Wound suturing/removal, %	41.9	15.2	38.9	45.0	35.7
Wound dressing, %	41.9	33.3	36.1	22.5	32.9
Procedure duration, mean ± SD (min)	10.23 ± 2.291	10.00 ± 2.385	13.44 ± 2.372	12.90 ± 2.530	11.76 ± 2.833

n: Number; SD: Standard Deviation; %: Percentage

3.2. Normality Testing

The Kolmogorov-Smirnov test confirmed that CMFS and FBRS data were not normally distributed in any of the four groups ($p<0.05$ for all) justifying the consistent use of non-parametric statistical procedures throughout the analysis.

3.3. Item-Level Fear Responses

The item-by-item analysis of the 20 CMFS domains showed a clear progression in the scores among the intervention groups compared to the control group. The recreational activities group obtained low fear scores on 15 out of 20 items, including fear of sounds made by medical devices, fear while getting their vital signs checked, and fear of entering the exam room. The distraction cards group reached low fear on approximately half of all items, with the remainder classified as moderate. The clay play group showed predominantly moderate ratings, with fear of going to the hospital and fear when seeing needles persisting at a high level. The control group maintained high fear ratings across nearly all 20 items.

Table 2. Item-Level Mean Fear Scores and Assessments on the Child Medical Fear Scale by Group (n=140)

#	CMFS Item	Clay Play Mean	Assessment	Distraction Cards Mean	Assessment	Recreational Activities Mean	Assessment	Control Mean	Assessment
1	Fear of going to the hospital	2.10	High	1.85	Moderate	1.53	Moderate	2.60	High
2	Fear when seeing needles	2.26	High	1.91	Moderate	1.47	Moderate	2.68	High
3	Fear when doctor/nurse wears gloves	1.35	Moderate	1.30	Moderate	0.69	Low	2.25	High
4	Fear when entering the examination room	1.19	Moderate	1.27	Moderate	0.67	Low	2.42	High
5	Fear during vital sign measurement	1.03	Moderate	1.00	Low	0.38	Low	2.37	High
6	Fear of medical device sounds	0.94	Low	0.70	Low	0.28	Low	2.32	High
7	Fear when seeing medical equipment	1.74	Moderate	1.52	Moderate	1.11	Moderate	2.47	High
8	Fear when the procedure room door closes	1.26	Moderate	1.15	Moderate	0.67	Low	2.35	High

9	Fear when medical staff gather around	1.19	Moderate	0.94	Low	0.39	Low	2.60	High
10	Fear of hospital smell	0.35	Low	0.64	Low	0.28	Low	1.67	Moderate
11	Fear when seeing other children cry	1.45	Moderate	0.85	Low	0.81	Low	2.25	High
12	Fear of expected pain during procedure	1.00	Low	0.91	Low	1.31	Moderate	2.35	High
13	Fear when asked not to move	1.13	Moderate	1.06	Moderate	0.25	Low	2.50	High
14	Fear when asked to lie on the medical bed	0.90	Low	0.85	Low	0.25	Low	2.33	High
15	Fear of devices attached to the body	0.97	Low	1.12	Moderate	0.03	Low	2.45	High
16	Fear when separated from parents	2.32	Moderate	1.42	Moderate	0.92	Low	2.52	High
17	Fear of medical uniforms	0.90	Low	0.55	Low	0.58	Low	2.42	High

18	Fear when someone holds the arm/hand	0.87	Low	0.73	Low	0.47	Low	2.58	High
19	Fear while waiting for the procedure	0.55	Low	0.30	Low	0.17	Low	2.48	High
20	Fear of something unexpected happening	1.23	Moderate	1.09	Moderate	1.22	Moderate	2.45	High

Low = mean 0.00–1.00; Moderate = mean 1.01–2.00; High = mean 2.01–3.00

3.4. Overall Fear Classification

Following the interventions, the large majority of children in the recreational activities group were classified in the low-fear category. The distraction cards group showed predominantly low-to-moderate fear, while the clay play group was concentrated in the moderate category. In the control group, the predominant classification remained high fear with no meaningful change from baseline.

3.5. Fear Outcomes: Intervention Groups versus Control

Mann-Whitney U testing confirmed statistically significant differences between each intervention group and the control group in CMFS scores ($p<0.001$ for all three comparisons), confirming that each of the three interventions produced clinically meaningful fear reductions relative to routine care.

Table 3. Mann-Whitney U Comparisons for CMFS and FBRS between Intervention Groups and Control

Comparison	Mean Rank (Intervention)	Mean Rank (Control)	U	Z	p-value
Clay Play vs. Control (CMFS)	27.50	52.19	—	—	<0.001*
Distraction Cards vs. Control (CMFS)	29.18	49.11	—	—	<0.001*
Recreational Activities vs. Control (CMFS)	24.74	57.30	—	—	<0.001*
Clay Play vs. Control (FBRS)	50.73	24.59	163.500	−5.574	<0.001*
Distraction Cards vs. Control (FBRS)	46.29	29.34	353.500	−3.549	<0.001*

Recreational Activities vs. Control (FBRS)	50.64	27.58	283.000	−4.732	<0.001*

** p < 0.001; CMFS: Child Medical Fear Scale; FBRS: Frankl Behavior Rating Scale*

3.6. Comparative Fear Outcomes among Intervention Groups

Kruskal-Wallis testing confirmed a significant overall difference in CMFS scores among all four groups (H=85.382, df=3, p<0.001). Subsequent pairwise Mann-Whitney U testing revealed highly significant differences between clay play and distraction cards (p<0.001) and between clay play and recreational activities (p<0.001), as well as a significant difference between distraction cards and recreational activities (p=0.023). These results establish a clear and graded effectiveness hierarchy for fear reduction: recreational activities > distraction cards > clay play.

3.7. Behavioral Cooperation: Intervention Groups versus Control

Structured pre-procedural preparation proved to be significantly more effective in increasing FBRS scores in all three intervention groups compared to the control group (p < 0.001 for all comparisons).

3.8. Comparative Cooperation among Intervention Groups

Kruskal-Wallis test revealed a significant difference between all four groups concerning FBRS scores (H = 58.233, df = 3, p < 0.001). Pairwise comparison proved that recreation was significantly more effective than working with clay in promoting cooperation (p = 0.009). No significant differences were found between clay play and distraction cards (p=0.127) or between distraction cards and recreational activities (p=0.212).

Table 4. Kruskal-Wallis and Pairwise Mann-Whitney U Results for Between-Group Comparisons

Comparison	Instrument	U / H	df	p-value	Significance
All four groups	CMFS	H=85.382	3	<0.001	Highly significant
All four groups	FBRS	H=58.233	3	<0.001	Highly significant
Clay Play vs. Distraction Cards	CMFS	U=75.000, Z=−5.887	—	<0.001	Highly significant
Clay Play vs. Recreational Activities	CMFS	U=221.000, Z=−4.251	—	<0.001	Highly significant
Distraction Cards vs. Recreational Activities	CMFS	U=407.500, Z=−2.266	—	0.023	Significant
Clay Play vs. Distraction Cards	FBRS	U=402.500, Z=−1.526	—	0.127	Non-significant
Clay Play vs. Recreational Activities	FBRS	U=358.000, Z=−2.623	—	0.009	Significant
Distraction Cards vs. Recreational Activities	FBRS	U=496.000, Z=−1.247	—	0.212	Non-significant

CMFS: Child Medical Fear Scale; FBRS: Frankl Behavior Rating Scale; U: Mann-Whitney U statistic; H: Kruskal-Wallis statistic

3.9. Sociodemographic Moderation of Outcomes

For all the analyzed groups, sex, age group, surgery procedure and previous experience of having a surgery were not significantly correlated with the fear classification criterion. Emotional condition at baseline appeared to be the key predictor of cooperation outcome. Significant correlation between pre-procedural emotional state and scores on the FBRS was detected in the clay play group (Fisher's Exact Test, p=0.039), in the distraction cards group (p=0.040) and in the control group (p=0.000). In turn, the significant relationship between procedure duration and FBRS score was found in the distraction cards group (p=0.041) and in the control group. Thus, a child who is in acute pre-procedural distress, particularly one who is crying and very anxious, may need extra preparation for achieving cooperative behavior.

4. DISCUSSION

4.1. Sample Representativeness and Baseline Characteristics

Demographics of the studied sample are comparable to the expected patient profile for emergency surgeries in pediatrics. Higher incidence of boys among all the groups is consistent with the known statistics of boys' higher presentation rates for injuries and other types of traumatic and wound-related procedures (1,16). A mean age of approximately 8.7 is consistent with the school age period, when children become ready for participation in structured play due to concrete operational thinking (17). An observation that 65.7% of participants had never had a surgical procedure before is clinically relevant since anticipation fear is heightened when children lack the cognitive framework of how to make sense of the clinical environment (18). An especially notable finding is that 38.6% of patients were very anxious and 25.7% of them were crying even before being provided with any intervention, thus showing their high pre-procedural anxiety level. This is what makes such patients' management particularly challenging from the standpoint of nursing care practice. The poor nurses' knowledge and skills regarding how to communicate with children and handle their anxiety can be seen as the main institution-specific cause of the problem under investigation (19).

4.2. Fear Outcomes and Intervention Effectiveness

Analysis of item-level and total fear measurements shows consistent patterns reflecting the mechanisms of action of the corresponding interventions. The recreation activities showed the highest degree of fear reduction in terms of low scores for the majority of 20 CMFS items measured. This pattern confirms the hypothesis that multi-modal intervention engaging multiple psychological channels (attentional diversion, environmental normalization, emotional expression, and social interaction) leads to a wider fear reduction than monomodal interventions relying solely on a single mechanism (20). Recreational activities, in particular, make a potentially effective intervention in terms of turning waiting time into a positive and socio-normative experience and helping the child to perceive the clinical environment as more controllable.

Distraction cards group showed low and moderate fear scores for the majority of the CMFS items consistent with the attentional distraction mechanism by which visual and cognitive engagement decreases the cognitive resources available to monitor the threat and anticipate the pain (12). In accordance with a prospective randomized controlled trial in Turkey investigating the effect of distraction cards and kaleidoscopes on procedural anxiety and pain in phlebotomy of children aged 7-11 years old, Canbulat Sahiner and Türkmen (2019) showed that the distraction card group had the lowest scores for procedure-related anxiety and pain – results showing the same directional trend as the results reported herein (21). Another randomized controlled trial conducted by Goktas and Avci (2023) in Turkey investigating visual and auditory distraction techniques to relieve pain and procedural anxiety during invasive medical procedures in 7-12-year-old children showed the effect of distraction on pain and procedural anxiety together with medical fear – corroborating the role of attentional distraction mechanisms on the reduction of fear in the current study (22). The effect of attentional distraction techniques has also been shown in other regions including Iraq in pediatric nursing studies. Ahmed and Al-Musawi (2025), investigating the effect of the Buzzy device and distraction cards on relieving pain during intravenous cannulation in children using a randomized controlled trial, reported significant pain relief in the distraction cards group (23).

Clay play resulted in mostly medium fear scores – indicating a significant difference from routine care with no fear reduction yet underperforming relative to the other two interventions. This pattern shows that tactile engagement and emotional externalization are likely more effective in coping with internal emotional distress than attentional distraction, and less effective

than attentional distraction in distracting the child from the procedural environment (e.g., visual stimuli such as a needle or instrument) (10). As evidenced in a meta-analysis investigating the impact of art therapy on child and adolescent anxiety by Zhang (2024), creative and tactile activities can reduce anxiety via emotional processing (24). Similarly, in a quasi-experimental study conducted by Celik and Sahiner (2024) in Turkey comparing anxiety and fear in preoperative therapeutic play with preschool children (aged 3-6 years old), structured play was shown to be better than routine care in reducing anxiety and fear, adding supporting findings for the use of expressive play irrespective of the exact magnitude of effect (25). Anxiety level in hospitalized children suffering from serious illness has also been investigated; Kassar and Ali have found high levels of depression and anxiety among school-age children with acute lymphoblastic leukemia in Baghdad undergoing chemotherapy (26).

The fact that all three interventions outperformed routine care is not surprising, given the body of research on this topic. According to a systematic review and meta-analysis conducted by Mustafa et al. (2024) investigating randomized controlled trials involving distraction techniques in multiple countries to manage preoperative anxiety of pediatric patients, distraction techniques were proven to reduce the fear level compared with control condition (7). López-Rodrigo and colleagues (2025), whose updated umbrella review and meta-analysis synthesized evidence on non-pharmacological interventions for anxiety in pediatric preoperative settings, similarly confirmed the consistent superiority of structured interventions over standard care in reducing procedural distress [27].

The significantly lower fear observed with recreational activities compared with distraction cards represents the clearest evidence of differential effectiveness in the present study. Sarman and Günay (2023), who conducted a randomized controlled trial in Turkey involving 112 hospitalized children aged 8–10 years using a goldfish-based recreational program, found that the recreational group demonstrated significantly reduced state anxiety and fear compared with controls, with benefits extending across psychological and emotional well-being domains — suggesting that enjoyment-oriented activities reduce fear more comprehensively than targeted attentional techniques [13]. This conclusion is consistent with the hierarchical pattern established in the present study's fear comparisons. Essawy and colleagues (2024), who conducted a quasi-experimental study in Egypt comparing active play activities — including clay, drawing, and crafts — with passive distraction and routine care in school-age children awaiting surgery, found greater anxiety and fear reductions in the active-play group, reinforcing the advantage of participatory and multi-sensory engagement over single-channel techniques [28].

4.3. Behavioral Cooperation Outcomes

Cooperation results support independent verification of the hypothesis regarding the role of pre-procedural activities in enhancing the behavioral performance of children undergoing care. Differences in FBRS among all intervention groups compared to the control one prove the assumption that pre-procedural preparation enhances the cooperation of children as opposed to routine hospitalization. In their study using video observation of the impact of nurse responses on emotional reactions during needle care, Kleye et al. (2025) showed that recognition of children's emotions positively impacted behavioral involvement and cooperation, thus validating the theoretical connection established within this research (29).

Significant cooperation superiority of the recreation over clay play ($p=0.009$) coupled with insignificant differences between the rest of the pairs illustrates an important clinical aspect. Although distraction cards had a profound fear-reducing impact, they did not differ significantly from clay play in terms of cooperation results. Thus, fear reduction and behavioral cooperation appear interrelated but not identical. Behavioral cooperation during a procedure also depends on the quality of nurse-child rapport established during the activity, the child's experience of engagement, and the degree to which the preparation translated into trust. He and colleagues (2015), who conducted a randomized controlled trial in Singapore and Hong Kong assessing therapeutic play before elective inpatient surgery in 95 children, found fewer negative emotional expressions and lower postoperative pain in the play group compared with controls — a finding consistent with the directional cooperation improvements documented in the present study [30]. Gökolu and Sukut (2025), who conducted a randomized controlled trial in Turkey comparing active and passive distraction during pediatric invasive procedures, found that active distraction produced better behavioral outcomes — aligning with the behavioral superiority of recreational activities and clay play over the passive control condition in the present study [31].

The impact of music interventions on children's pain and anxiety has also been examined in Iraqi clinical settings; Shawq and colleagues (2025), who conducted a randomized controlled trial on children undergoing dressing changes in Iraq, found that music interventions significantly reduced pain severity and anxiety — providing additional evidence for the effectiveness of

nurse-led, non-pharmacological sensory approaches in the local pediatric context and supporting the broader framework of emotional and behavioral management explored in the present study [32]. Furthermore, pain management during other invasive pediatric procedures such as chest tube removal has been shown to benefit from nurse-led relaxation techniques; Naeem and Ajil (2025) demonstrated that deep breathing relaxation exercises reduced pain in children following cardiac surgery, reflecting the wider applicability of structured nursing interventions for procedural distress management [33].

4.4. Sociodemographic Moderation

The emergence of baseline emotional state as the primary moderator of cooperation outcomes carries direct and practical clinical implications. Children who arrived while crying or highly anxious were less likely to achieve favorable cooperation even after receiving an intervention, particularly in the clay play and distraction cards groups. This finding argues for the routine integration of pre-procedural emotional screening into pediatric emergency nursing assessment. Hammed and Ghafel, who conducted an instructional program study examining nurses' knowledge about reducing fear and anxiety related to nursing interventions in children, found that targeted nurse education improved the capacity to recognize and manage pre-procedural distress — directly supporting the clinical implication of proactive emotional assessment before pediatric procedures [34]. Ma and colleagues (2025), who conducted a narrative review examining moderators of pre-surgical coping strategies in children and families, found that baseline anxiety level and prior medical experience significantly influenced intervention outcomes — directly supporting the moderation pattern identified in the present study [17,35]. The absence of sex-based differences across groups may reflect the developmentally universal appeal of the interventions used, or may indicate that the mechanisms through which play and distraction reduce fear operate equivalently across sexes during the school-age period.

5. STRENGTHS AND LIMITATIONS

5.1. Strengths

The study directly compared three clinically feasible, low-resource interventions within the same emergency setting and the same patient population — addressing a gap that no prior published study has resolved. Examining both fear and cooperation as distinct but complementary outcomes adds depth that single-outcome studies cannot provide. The inclusion of a routine-care control group allowed meaningful quantification of the additional benefit attributable to each intervention above standard practice.

5.2. Limitations

The study was limited to three hospitals within a single health directorate in Iraq, which may constrain generalizability to settings with different cultural, institutional, or resource contexts. Interventions were delivered only immediately before the procedure, so the longer-term impact on children's healthcare attitudes and future procedure experiences was not examined. As the interventions involved behaviors, blinding was not possible for both children and their parents. The behavior of cooperation was measured using an observational tool, which could have been affected by several factors including pain experienced during the procedure, interaction between the nurse and child, and observer variables.

6. Conclusions

For the first time, this study offers a direct comparison between three nurse-led therapies (clay therapy, distracter cards, and recreational therapy) using both fear and behavioral scales within one quasi-experiment for children experiencing a minor surgical procedure. The results show that all nurse-led therapies effectively decrease medical fear and increase behavioral cooperation compared to the control group. A clear and graded effectiveness hierarchy was established for fear outcomes — recreational activities, distraction cards, then clay play — while recreational activities also demonstrated a significant behavioral cooperation advantage over clay play. Baseline emotional state was the primary moderator of cooperation outcomes across all groups.

These findings offer actionable comparative evidence to support clinical decision-making in pediatric emergency nursing. Recreational activities are recommended as the first-line pre-procedural strategy. Distraction cards represent a practical and effective alternative when space or time does not allow for broader play-based activities. Clay play, while less potent in fear reduction, remains meaningfully superior to routine care and may be especially suited to children who respond better to tactile and expressive engagement. Future multicenter research should examine the dose-response effects of preparation duration, the potential benefit of combining interventions, and the long-term impact on children's healthcare attitudes and family satisfaction.

AI Disclosure: Artificial intelligence-assisted language editing tools were used for grammar and clarity improvements during manuscript preparation. All scientific content, data interpretation, conclusions, and clinical judgments were generated, verified, and approved solely by the human authors. AI tools were not used to fabricate, falsify, or manipulate any data, results, or references.

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Data Availability: The data used to support the findings of this study can be obtained from the corresponding author on request and are not publicly available owing to institution-related policies.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

Authors' Contribution

Both authors were involved in the study concept and design. Data collection, statistical analysis, initial writing of the manuscript, and revising the final version were performed by D.K.A. Study supervision, review of all scientific contents, and approval of the final manuscript were done by A.F.H. The two authors assume full responsibility for the integrity of this research work.

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Ethical Approval

Ethical approval has been provided by the College of Nursing – Ethics Committee of the University of Baghdad *(Approval No. 68, December 23, 2025)*. Administrative permissions have also been received from Salah Al-Din Health Directorate and the three hospitals included in the study prior to collecting data. Procedures used in the study have been in accordance with the Declaration of Helsinki. Written informed parental consent and verbal assent of the child were sought prior to participation.

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Abbreviations:

CMFS: Child Medical Fear Scale

ED: Emergency Department

FBRS: Frankl Behavior Rating Scale

SD: Standard Deviation

SPSS: Statistical Package for the Social Sciences

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