Physical Education, Health and Social Sciences

https://journal-of-social-education.org

E-ISSN: 2958-5996
P-ISSN: 2958-5988

Preventing Needle Phobia in Children: The Efficacy of Distraction Techniques

Naheed Akhtar [1], Rooh Ullah [2], Rizwan Ullah [3], Javid Ali 4, Dr. Shah Hussain [5], Dr. Muhammad Anwar [6], Nasar Mian [7]

[1] Principal/ assistant professor Sina Institute of Nursing & Allied Health Science. Corresponding author Email: ayeshanidi@gmail.com
[2] Principal/ Assistant Professor Peshawar College of Nursing KPK. Email: roohullah721@gmail.com
[3] Principal MEDICAID College of Nursing and Allied Health Sciences, Chakdara. Email: swatrizwan660@gmail.com
[4] Principal/ assistant professor Ismail Nursing Institute Matta Swat. Email: alijavidali83@gmail.com
[5] Principal/ Assistant Professor Zalan College of Nursing KPK. Email: shahpicu@gmail.com
[6] Principal/ Assistant Professor Medtech College of Nursing KPK. Email: m.anwar.ma528@gmail.com
[7] Principal/ Assistant Professor National College of Nursing Swat, KPK. Email: nasarmian819@gmail.com

DOI: https://doi.org/10.63163/jpehss.v3i2.249

Abstract

Background: Needle phobia exists in almost 50% of children despite being a condition that produces significant discomfort regarding necessary medical treatments. Virtual reality (VR) bubble blowing and tablet games demonstrate the potential to decrease both procedural pain and fear in children, but established standard operating procedures are currently absent.

Aim: This study evaluated the effectiveness of structured distraction interventions compared to standard care in reducing pain, fear, and distress during pediatric needle procedures while assessing procedural success and parent satisfaction.

Methods: A quasi-experimental research study included 60 children aged 3-12 years who received randomized grouping into either structured distraction intervention (VR, bubbles, or tablets) or standard care conditions at Saidu Teaching Hospital. The outcomes addressed pain using FPS-R/FLACC scales and fear through CFS measurements, success rate figures for the first attempt procedures, assessment of duration and parent satisfaction levels, and documentation of distress behaviors. The SPSS v28 program with $p<0.05$ significance level analyzed the data using independent t-tests and chi-square tests.

Results: First-attempt success proved higher, along with decreased pain (2.1±1.4 vs. 4.7±1.8) and fear (1.8±0.9 vs. 3.9±1.2) among subjects receiving structured distraction methods ($p<0.001$). VR provided the most significant success rate along with the least amount of pain (1.7±1.1) among all intervention methods, yet bubbles (2.0±1.3) and tablets (2.6±1.6) showed intermediate outcomes. Twenty-four seconds shortened the procedural time ($p=0.002$), and parent satisfaction rates increased to 83.3% while remaining at 40% in the control group ($p<0.001$).

Conclusion: The adoption of structured distraction techniques leads to better procedural findings and improved patient experience outcomes. Research has demonstrated virtual reality as the best approach, although cost-effective bubble techniques could also deliver successful results. Medical staff should adopt this intervention into their practice for improved care of pediatric patients.

Keywords: Needle phobia, pediatric pain management, virtual reality, distraction techniques

Introduction

A high number of children across the globe suffer from needle phobia, which describes a severe fear of medical needles. Medical needle phobia manifests as significant distress, which causes patients to shun essential medical treatment and establishes persistent medical concerns. (1). For needle procedures, science has developed distraction techniques that combine virtual reality with interactive games and basic methods such as bubble blowing to reduce procedural fear and pain without medications. (2). Researchers evaluate the needle phobia relief capabilities of distraction techniques, which children experience during routine vaccinations and blood draw procedures.

Studies show needle phobia affects a significant number of pediatric patients to levels approaching half of the child population. (3). Young children between the ages of 3 and 7 experience the most intense needle phobia because they have not developed effective ways to deal with procedure-related stress. (4). When medical intervention is not present during childhood, this condition can carry into adulthood, where it fosters people avoiding medical services and vaccines. Evidence-based strategies must be developed urgently because needle phobia affects many children and negatively impacts their healthcare experiences. (5).

Needle phobia results in prolonged effects that go beyond momentary distress because it triggers physical body reactions, including accelerated heart rate, fainting episodes, and heightened sensory perceptions toward pain. (6). Such reactions lead to complications during medical procedures, extending recovery periods and forming negative impressions of the healthcare environment. Specific necessary treatments sometimes need physical restraint for completion, yet this process leads to additional trauma for both the child and their caregivers. (7). Effective needle phobia treatment is crucial for achieving desirable health results along with minimizing the traumatic consequences of medical procedures. (8).

Professional guidelines recommend distraction as the fundamental approach for managing needle-related stress among kids. (9). Healthcare providers currently operate without established protocols when using these techniques, which leads to variable implementation practices. Contrary to observable distress reduction, virtual reality distraction shows promising results, but further studies should determine its effects on both pain reporting and long-term fearful behavior. (10). This study aims to evaluate different distraction methods so healthcare practitioners can develop standardized clinical protocols. (11).

The effectiveness of needle procedures on children depends heavily on how actively their parents participate throughout the process. Children's fear during needle procedures increases when anxious parents witness and express their distress. (12). The study eliminates parental effects by having healthcare professionals trained to use distraction methods with standardized approaches. The standardized application of interventions ensures consistent delivery, which creates a proper assessment process that gauges treatment effectiveness without parent behavior interactions. (13).

Modern technology has produced innovative approaches using virtual reality and tablet-based games to lower patients' experience of procedural discomfort and anxiety. (14). However, several factors, including cost and accessibility issues, prevent some technologies from being routinely used for patient care. (15). The research analyzes premium technology alongside cost-effective attention management strategies to locate manageable intervention methods that healthcare services at different levels can utilize. (16).

The research analyzes distraction methods to determine their effects on pediatric patient fear levels, procedural outcomes, and satisfaction measurements to develop clinical recommendations for healthcare providers. (17). Reducing needle anxiety would boost vaccination administration outcomes and patient-practitioner cooperation, making children

more durable during medical interventions. (18). Research data will create standardized distraction protocols that maximize their utilization in pediatric healthcare settings.

Methodology

The quasi-experimental design was used to evaluate patients, including 30 children who received structured distraction care and 30 who received standard treatment at Saidu Teaching Hospital. The research selected 60 children from 3 to 12 years old who needed typical venipuncture processes through simple random sampling methods. All participants selected for the study must not have developmental disorders except those who had experienced treatment previously. The pediatric wards of Saidu Teaching Hospital operated as the research setting to monitor natural patient allocation according to clinical arrangements such as weekly alternation between groups. This design protected the similarity of demographic traits between participant groups while maintaining the validity of applications within real medical environments.

Data collection procedure

Written consent was obtained from parents, and verbal consent was obtained from children at least seven years old. Cognitive, sociodemographic, health, and needle history data points were captured from all test subjects during the initial assessment. The researchers randomly selected children into two groups for the study; one group received structured distraction methods as part of their intervention, and the other group received regular hospital care. Nurses who received training applied suitable distraction techniques (VR headsets, bubble blowing, or tablet games) among intervention participants beginning five minutes before the procedure started. The independent observer documented needle-related information together with a Child Fear Scale evaluation and FLACC or Faces Pain Scale-Revised assessment of pain responses.

Children assessed their pain reaction directly after the procedure, and then parents evaluated the procedure experience by completing a satisfaction survey with a five-point rating. The Nursing staff recorded all clinical results that showed initial procedure success rates together with recorded incidents of fainting and extreme distress among participants. The research team managed all data through secure password-protected databases that used specific codes for participant identification purposes. Paper forms received equivalent storage in locked cabinets to maintain participant confidentiality. The research methodology focused on maintaining participant consistency while recording instant effects and extended outcomes regarding the intervention.

Interventional protocols

1. Pre-Procedure Preparation:

Research team members performed three checks before the study procedure initiation: they verified participant qualifications and confirmed participant group assignments between intervention and control groups. Research staff created distraction equipment that included VR headsets, bubble wands, and tablets, which they prepared for children in the group receiving the intervention. Team members maintained uniform needle gauges and trained participants properly for their injection sites, establishing a standardized procedure.

2. Distraction Intervention Protocol (Intervention Group):

Researchers initiated distraction methods through VR goggles with bubbles or tablets and verbal support starting five minutes before procedures. At the same time, patient engagement continued through needle insertion for one minute after procedures. Standardized procedures maintained equal care conditions between all participant groups.

3. Standard Care Protocol (Control Group):

The control group participants received essential verbal preparation about the duration of the procedure followed by unsupervised coping mechanisms, including parental comfort and eye blocking. The standard care condition remained in place to compare the intervention groups

and standard care practices. Except for this procedural step, the research conditions were equivalent between all treatment groups.

4. Procedure Execution:

Standard procedure involved venipuncture/vaccination following aseptic protocol through measurement of the period from tourniquet application to bandage placement. Research personnel documented whether participants succeeded or failed through their first venous access attempt to determine the efficacy of procedure execution. A standardized procedure delivered uniform data collection procedures for every research group.

5. Post-Procedure Protocol:

The researchers instantly disabled or removed distraction techniques from the intervention group participants right after the procedure. Measures designed to evaluate the intervention's direct effects were administered immediately after the procedure through valid pain and fear assessment tools. The participants and their parents received surveys about their experience post-procedure, followed by planned contact appointments at week one to assess delayed effects.

Quality Control Measures:

The research applied strict evaluation procedures to explore medical procedure distraction strategies by measuring how structured interventions performed compared to regular care practices. The nursing staff received uniform training, while maintenance checks happened regularly, and unplanned video surveillance verified protocol compliance. Multiple researchers recorded the time needed to install devices successfully in both study populations before administering pain scale evaluations and procedure satisfaction surveys. The patients in the intervention group were given directed distraction activities from three points: before procedures started and during and following the guidelines. Meanwhile, patients in the control group received essential support. The study traced all participants throughout one week under equivalent conditions to evaluate both immediate and delayed results of distraction protocols.

Safety Protocols:

The study adopted aggressive safety systems with automatic procedure interruptions for distress and ready emergency supplies for all participants. A strict disinfection protocol for reusable equipment applied during equipment transfer had a documented system for adverse event reporting and addressing steps. Safety measures incorporated in the trial protected participants and preserved hygiene conditions to track possible complications that occurred to participants.

Data analysis procedure

The data analysis started with cleaning and coding all data, after which descriptive statistical methods were used to characterize the study participants and chief variables. Independent sample t-tests were used to evaluate mean variations in pain scores from FPS-R/FLACC measurements and fear levels using CFS assessments and first-attempt success rates by comparing the intervention and control groups. Secondary analyses utilized chi-square tests for satisfaction outcomes paired with linear regression for duration measurements and age-specific model examinations, including baseline anxiety, needle experience, and vein visibility control measures. All statistical calculations were done using SPSS version 28, keeping $p<0.05$ as the statistical threshold for two-tailed tests.

Ethical consideration

Under strict ethical terms, the Institutional Review Board of Saidu Teaching Hospital approved the study. At the same time, written informed consent came from every parent/guardian and verbal consent was obtained from children aged seven years or older. Client anonymity relied on three measures: encryption techniques for data labeling, electronic data storage protected by passwords, and controlled access granted to team members alone. The protocol contained several protective features, such as offering free choice along with withdrawal rights without adverse consequences and quick procedure termination upon participant distress signs and

appropriate language usage and counseling access for those who experienced marked anxiety. Psychological protection measures included the avoidance of restraint practices, nurse training for pediatric distress detection, and developmentally suitable distraction plans, which ran alongside the selection of sensitive data collection tools that avoided discomfort or embarrassment to participants. Study researchers protected participants' integrity by offering detailed procedure descriptions to children and parents with straightforward visual examples when needed and by promising direct findings distribution post-study and participant confidentiality. No monetary incentives were provided because it aimed to prevent coercion; however, regular pediatric care with appropriate reward stickers unrelated to the study was provided to all participants per standard clinical practice.

Result and analysis

The intervention group matched the control group regarding demographic variables and clinical factors while demonstrating adequate randomization between the two study arms. Data analysis revealed the intervention and control groups matched in terms of their average age (6.2 vs. 5.9 years) and gender distribution (46.7% female in each), as well as their history of lousy needle encounters (60% and 50%). The intervention group displayed slightly better vein visibility than the control group (73.3% versus 63.3%). Testing indicated no statistically significant differences between groups (p-values exceeded 0.40), thus validating equivalent group composition for research evaluation. The equal absence of statistically significant differences showed that random assignment produced equivalent starting groups for comparison. (Table 1)

Table 1: Baseline Characteristics of Participants

Characteristic	Intervention (n=30)	Control (n=30)	p-value
Age (years), mean ± SD	6.2±2.8	5.9±3.1	0.682
Female gender, n (%)	14 (46.7%)	16 (53.3%)	0.612
Previous negative needle experience, n (%)	18 (60%)	15 (50%)	0.437
Good vein visibility, n (%)	22 (73.3%)	19 (63.3%)	0.402

Primary Outcomes Comparison

The patients in the intervention group experienced substantially less pain (2.1±1.4) and fear (1.8±0.9) when compared to controls (4.7±1.8 and 3.9±1.2) as shown by significantly large effect sizes (d=1.62 and 1.95). The procedure succeeded more within the intervention group than the control group (90% vs 63.3%, p=0.013). The results indicate that distraction methods successfully improved all tested outcome measures. (Table 2)

Table 2: Primary Outcomes Comparison

Outcome Measure	Intervention Group	Control Group	p-value	Effect Size (Cohen's d)
Pain score (FPS-R), mean ± SD	2.1±1.4	4.7±1.8	<0.001	1.62
Fear score (CFS), mean ± SD	1.8±0.9	3.9±1.2	<0.001	1.95
First-attempt success, n (%)	27 (90%)	19 (63.3%)	0.013	-

Secondary Outcomes

The distraction intervention made procedures faster by 24 seconds compared to standard protocols (p=0.002), and it led to higher satisfaction from parents (83.3% vs 40%, p<0.001). Children who received the distraction intervention showed 3.7 fewer distress behaviors throughout procedures (10% vs 36.7% and p=0.016). The study indicates that well-organized distraction methods simultaneously raise efficiency in clinics, create better patient experiences,

and produce improved procedural results. The uniform positive findings across every measurement point firmly show why pediatric needle procedures must adopt these interventions. (Table 3)

Table 3: Secondary Outcomes

Variable	Intervention	Control	p-value
Procedure duration (seconds), mean ± SD	58.3±21.4	82.7±34.1	0.002
Parent satisfaction (≥4/5), n (%)	25 (83.3%)	12 (40%)	<0.001
Needle-related distress behaviors, n (%)	3 (10%)	11 (36.7%)	0.016

Subgroup Analysis by Age

Children aged 3-6 years reported the highest pain reduction effects of distraction therapy, which produced 2.8 points above control measurements, whereas 7-12-year-old participants achieved 2.4 points below controls. Significant statistical measurements showed that distraction demonstrated effectiveness in both elementary groups, while the results revealed age-related variations in intervention impact ($p<0.001$). (Table 4)

Table 4: Subgroup Analysis by Age

Age Group (years)	Pain Score Reduction (Intervention vs Control)	p-value
3-6	2.3 vs 5.1	<0.001
7-12	1.9 vs 4.3	<0.001

Distraction Method Efficacy

Research findings demonstrated that Virtual Reality served as an optimal distraction method by minimizing patient pain to 1.7±1.1 and fear to 1.5±0.7 with complete success rates. Bubble distraction showed similar effectiveness to VR intervention (pain scores: 2.0±1.3 and fear scores: 1.9±0.8 with 90% success rate), although tablets yielded slightly reduced but significant outcomes (pain: 2.6±1.6; fear: 2.0±1.1; 80% success). The research showed VR as the leading choice among distraction strategies for treating pain and anxiety during pediatric medical procedures. (Table 5)

Table 5: Distraction Method Efficacy

Method	Pain Score (mean ± SD)	Fear Score (mean ± SD)	Success Rate
VR (n=10)	1.7±1.1	1.5±0.7	100%
Bubbles (n=10)	2.0±1.3	1.9±0.8	90%
Tablet (n=10)	2.6±1.6	2.0±1.1	80%

Discussion

The research study revealed substantial advantages of performing specific forms of diversion techniques in reducing children's discomfort from needle procedures and their associated anxiety during medical procedures. The intervention groups received dramatically reduced pain scores (2.1±1.4 vs 4.7±1.8) and fear measurements (1.8±0.9 vs 3.9±1.2) compared to standard care treatment, especially among participants in the virtual reality group. The research outcomes confirm previous findings about non-drug pain treatments yet introduce important information about using these techniques in healthcare practice. (19).

The 90% successful instance figure in the intervention group outperformed results from the control group (63.3%) and existing study data from similar research—a single intervention to provide distractions results in better procedural success rates than traditional results. (20). The experimental data shows effective pain reduction across different pediatric ages, though previous studies demonstrated more substantial success rates in older children because this study applied developmentally specific methods.

The collected data produced several clinically significant outcomes. These procedural techniques demonstrate the potential to influence medical experiences favorably through their considerable reduction of distress behaviors combined with a substantial 26.7% increase in patient success from their first attempt. Parent satisfaction ratings indicate that these

interventions hold great value in family-centered care since 83.3% of parents expressed satisfaction, while only 40% of controls did so. (21).
The researched data presents relevant implementation knowledge for medical facilities to use. Virtual reality showed exceptional results. Although it required a higher initial investment, it remained effective with the other distraction techniques. (22). The low requirements to train providers and inexpensive costs of bubble blowing make this approach implementable at various healthcare facilities. (23). This study demonstrates that these distraction methods have no harmful consequences, thus making them appropriate for daily medical applications.

Conclusion

The research results indicate that distraction protocols must be established as standard procedures during pediatric care delivery. The research data demonstrates that employing these methods results in better patient perception, enhanced clinical results, and enhanced family satisfaction. More investigations should analyze medical attitude changes over extended periods while analyzing the most efficient cost models of distraction tools throughout multiple hospital settings.

Recommendations:

Healthcare facilities need to make distraction techniques part of their standard pediatric needle procedure protocols by using appropriate methods matching children's developmental stage and applying virtual reality techniques for younger students and bubble blowing methods for younger children. Staff members within nursing departments need extensive training regarding distraction protocol procedures, whereby initiation should start five minutes before the procedure, and staff must keep interventions going until they end. Hospitals must establish funding for primary distraction equipment and incorporate immersive technologies after proving their clinical effectiveness. The recommended clinical practice should update their guidelines to include new evidence-based techniques explicitly targeting children who have suffered from adverse needle treatments. Additional studies must evaluate long-term healthcare avoidance patterns among patients and perform financial assessments of various distraction methodologies within multiple healthcare environments. Quality improvement in pediatric care must track how well practitioners prevent procedures and patient satisfaction reports as standard measurement parameters. Healthcare policies need to establish reimbursement methods that support distraction methods in places with limited resources. At the same time, parents must receive proper education about these methods to increase patient acceptance and participation.

References

Alsbrooks K, Hoerauf K. Prevalence, causes, impacts, and management of needle phobia: an international survey of a general adult population. PLoS One. 2022 Nov 21;17(11):e0276814.

Göthesson J, Håkansson L, Olinder AL, Hanberger L, Mörelius E, Nilsson S, Forsner M. Children's and adolescent's narratives about pain and negative experiences in diabetes treatment. Journal for Specialists in Pediatric Nursing. 2023 Jan;28(1):e12396.

von Mücke-Heim IA, Walter I, Nischwitz S, Erhardt A. Combined fainting and psychogenic non-epileptic seizures as significant therapy hurdles in blood-injury-injection phobia: A mini-review and case report. Frontiers in Psychiatry. 2022 Jul 12;13:915058.

Mojgani N, Ashique S, Moradi M, Bagheri M, Garg A, Kaushik M, Hussain MS, Yasmin S, Ansari MY. Gut Microbiota and Postbiotic Metabolites: Biotic Intervention for Enhancing Vaccine Responses and Personalized Medicine for Disease Prevention. Probiotics and Antimicrobial Proteins. 2025 Feb 18:1-23.

Araf Y, Nipa JF, Naher S, Maliha ST, Rahman H, Arafat KI, Munif MR, Uddin MJ, Jeba N, Saha S, Zhai J. Insights into the transmission, host range, genomics, vaccination, and

current epidemiology of the monkeypox virus. Veterinary Medicine International. 2024;2024(1):8839830.

Mitjà O, Ogoina D, Titanji BK, Galvan C, Muyembe JJ, Marks M, Orkin CM. Monkeypox. The Lancet. 2023 Jan 7;401(10370):60-74.

Au L, Capotescu C, Eyal G, Finestone G. Long covid and medical gaslighting: Dismissal, delayed diagnosis, and deferred treatment. SSM-Qualitative Research in Health. 2022 Dec 1;2:100167.

Lee SM, Lee D. Opportunities and challenges for contactless healthcare services in the post-COVID-19 Era. Technological Forecasting and Social Change. 2021 Jun 1;167:120712.

Cho MK, Choi MY. Effect of distraction intervention for needle-related pain and distress in children: a systematic review and meta-analysis. International journal of environmental research and public health. 2021 Aug 31;18(17):9159.

Sørensen K. Just a little needle stick. Pain and fear related to long-term needle injections in children with rheumatic diseases: An exploratory study.

Taddio A, Ilersich AN, Bucci L, McMurtry CM, Gudzak V, Ipp M, Zita T, Tharmarajah S, MacDonald N. Letting kids play their CARDs (Comfort, Ask, Relax, Distract) to help cope with needle-related fear and pain: Results from user testing. Vaccine. 2022 Dec 12;40(52):7667-75.

Rheel E, Malfliet A, Van Ryckeghem DM, Pas R, Vervoort T, Ickmans K. The impact of parental presence on their children during painful medical procedures: a systematic review. Pain Medicine. 2022 May 1;23(5):912-33.

Sørensen K. Just a little needle stick. Pain and fear related to long-term needle injections in children with rheumatic diseases: An exploratory study.

May K, Alfonso F, Salgado A. An Educational Module on the Utilization of Audiovisual Technology to Reduce Preoperative Anxiety in Pediatric Surgical Patients.

Juba OO, Olumide AF, David JI, Adekunle KA. The role of technology in enhancing domiciliary care: A strategy for reducing healthcare costs and improving safety for aged adults and carers. International bulletin of History and Social Science. 2024 Sep 10;1(3):35-55.

Haleem A, Javaid M, Singh RP, Suman R. Medical 4.0 technologies for healthcare: Features, capabilities, and applications. Internet of Things and Cyber-Physical Systems. 2022 Jan 1;2:12-30.

Wang Q, Su M, Zhang M, Li R. Integrating digital technologies and public health to fight Covid-19 pandemic: key technologies, applications, challenges and outlook of digital healthcare. International Journal of Environmental Research and Public Health. 2021 Jan;18(11):6053.

Paul M, Maglaras L, Ferrag MA, Almomani I. Digitization of healthcare sector: A study on privacy and security concerns. ICT express. 2023 Aug 1;9(4):571-88.

Martinez-Calderon J, Flores-Cortes M, Morales-Asencio JM, Luque-Suarez A. Intervention therapies to reduce pain-related fear in fibromyalgia syndrome: a systematic review of randomized clinical trials. Pain Medicine. 2021 Feb 1;22(2):481-98.

Ryum T, Hartmann H, Borchgrevink P, De Ridder K, Stiles TC. The effect of in-session exposure in Fear-Avoidance treatment of chronic low back pain: A randomized controlled trial. European Journal of Pain. 2021 Jan;25(1):171-88.

Cetintas I, Kostak MA, Semerci R, Kocaaslan EN. The relationship between parents' perceptions of family-centered care and their health care satisfaction. Eurasian Journal of Family Medicine. 2021 Sep 30;10(3):125-34.

Keefe-Marcoux K. The Relationships Between and Among Parental Perceptions of Family-Centered Care, Parental Beliefs, and Parental Stress in the Pediatric Intensive Care Unit.

Bueno YM. Modifying a Family Centered Neonatal Abstinence Syndrome Care Program for Mothers and Infants (Doctoral dissertation, The University of Arizona).