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Effectiveness of Nursing Interventions in Reducing Needle-Related Pain and Distress During Blood Collection

Samah Ibrahim Abdulhadi Alnakhli[1], Samah Sulaiman Albalawi[2], Hanan Salem Butayhan Alenazi[3], Maha Ahmed M, Alhassan[4], Reem Abdulalrhman A Alsabilah[5], Renad Murdhi G Alruwaili[6], Khashman Auwad S Alshammari[7], Ibtihal Mahja Fudhayl Aldaghmani[8], Fatimah Adam I Alsomali[9], Atheer Fadhel Barrak Alruwaili[10]

[1] Nursing and Midwifery – Madinah Health Cluster – Ministry of Health – Madinah – Madinah Region – Saudi Arabia
Email: Snakhli@moh.gov.sa
[2] Nursing Specialist – King Fahad Hospital – Madinah Health Cluster – Ministry of Health – Madinah – Madinah Region – Saudi Arabia
Email: SasuAlbalawi@moh.gov.sa
[3] Nursing Technician – Northern Medical Tower – Northern Borders Health Cluster – Ministry of Health – Arar – Northern Borders Region – Saudi Arabia
Email: hsalenazi@moh.gov.sa
[4] Emergency Nursing Specialist – Dumat Al-Jandal General Hospital, Nursing Services, Emergency Department – Al Jouf Health Cluster – Ministry of Health – Dumat Al-Jandal – Al Jouf Region – Saudi Arabia
Email: mmh-1419@outlook.sa
[5] Nursing Specialist – Dumat Al-Jandal General Hospital, Nursing Services, Neonatal Intensive Care Unit – Al Jouf Health Cluster – Ministry of Health – Dumat Al-Jandal – Al Jouf Region – Saudi Arabia
Email: nreem2201@gmail.com
[6] Nursing Specialist – Dumat Al-Jandal General Hospital – Al Jouf Health Cluster – Ministry of Health – Dumat Al-Jandal – Al Jouf Region – Saudi Arabia
Email: renad9674@gmail.com
[7] Nursing Specialist – Compliance Department, Branch of the Ministry of Health in Hail Region – Ministry of Health – Hail – Hail Region – Saudi Arabia
Email: kha2390@gmail.com
[8] Nursing Specialist – Dumat Al-Jandal General Hospital – Al Jouf Health Cluster – Ministry of Health – Sakaka – Al Jouf Region – Saudi Arabia
Email: Ealdogmany1412@gmail.com
[9] Senior Nursing Specialist – Ministry of Health – Jeddah – Makkah Region – Saudi Arabia
Email: Fatimahhush@gmail.com
[10] Neonatal Intensive Care Nursing Specialist – Dumat Al-Jandal General Hospital – Al Jouf Health Cluster – Ministry of Health – Dumat Al-Jandal – Al Jouf Region – Saudi Arabia
Email: Athooor2109@gmail.com

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ABSTRACT: Nursing interventions play a crucial role in mitigating needle-related pain and distress during blood collection, which is a common procedure that can evoke anxiety and discomfort in patients. Techniques such as distraction, the use of topical anesthetics, and proper communication can significantly enhance the patient's experience. For instance, strategies like guided imagery or deep breathing exercises help to divert attention from the procedure, reducing perceived pain levels. Moreover, educating patients about the process and what to expect can alleviate fear and anxiety, thereby fostering a more positive environment. Research has demonstrated that these interventions not only help in minimizing pain but also enhance overall patient satisfaction and cooperation during blood draws. In addition to psychological strategies, the physical aspects of the procedure can also impact pain perception. Nursing professionals can employ specific techniques such as selecting the optimal vein, applying warmth to improve circulation, or utilizing smaller-gauge needles to lessen pain. The effectiveness of these interventions is often evaluated through patient feedback and pain scales, providing valuable insights into their success. By integrating comprehensive approaches that encompass both emotional and physical care, nurses can significantly reduce distress associated with blood collection, leading to better outcomes for patients. Continued training in pain management techniques and patient care strategies is essential for nursing professionals to improve their effectiveness in this critical area of healthcare.

INTRODUCTION:

Blood collection, whether by venipuncture or capillary sampling, is one of the most frequently performed invasive procedures in healthcare settings worldwide, and needle-related pain is a modifiable clinical problem rather than an unavoidable side effect of care [1]. For most patients, the procedure is brief; for many, however, it is a source of significant pain, anticipatory anxiety, and lasting distress. Needle-related pain triggers physiological stress responses, including sympathetic activation and peripheral vasoconstriction, which can paradoxically make venous access more difficult, prolong the procedure, increase the number of puncture attempts, and reduce first-attempt success [2]. Psychologically, unrelieved needle pain contributes to fear of needles, avoidance of future blood tests and vaccinations, and reduced adherence to medical monitoring, with consequences that extend well beyond the immediate procedure [2]. For children, repeated painful experiences in early life may alter pain processing and produce long-term hyperalgesia, while for adults, particularly those with chronic conditions requiring frequent monitoring, the cumulative burden of needle distress can erode trust in care providers and engagement with treatment [2].

Nurses are at the center of blood collection practice and therefore bear primary responsibility for preventing and relieving procedure-related pain. Nursing interventions for needle pain span a wide spectrum: pharmacological measures such as topical anesthetics; physical techniques such as vibration, cold application, and acupressure; cognitive-behavioral strategies such as distraction, music, and virtual reality; and relational interventions such as positioning, breastfeeding, and parent coaching. The evidence base supporting these interventions has grown substantially, yet implementation in routine practice remains inconsistent, often reflecting gaps in education, workflow pressures, and the normalization of procedural pain as unavoidable [3].

The physiological basis of needle pain is best understood through the gate control theory. Nociceptive signals from the puncture site travel via A-delta and C fibers to the dorsal horn of the spinal cord, where the "pain gate" can be opened or closed by competing sensory input. Interventions that provide non-painful tactile stimulation—vibration, cold, pressure, or rubbing—activate larger-diameter A-beta fibers, which inhibit transmission of the painful signal and effectively close the gate. This mechanism explains why physical interventions such as the Buzzy device, which combines high-frequency vibration with cold, can produce analgesia without pharmacological agents. At the same time, psychological factors modulate the gate: anxiety, fear, and anticipatory distress increase pain perception, while distraction, relaxation, and a sense of control reduce it [2].

The clinical consequences of unmanaged needle pain are both immediate and delayed. Immediately, pain and fear provoke autonomic arousal, including tachycardia, hypertension, and peripheral vasoconstriction. Vasoconstriction is particularly consequential during blood collection because it reduces vein visibility and caliber, increasing the likelihood of failed puncture, multiple attempts, and procedure abandonment [2]. In pediatric patients, distress behavior such as crying, movement, and

resistance further complicates the procedure and may necessitate restraint, which itself is a source of additional distress for the child, family, and nurse. In the longer term, negative needle experiences consolidate into needle phobia and avoidance, with downstream effects on vaccination uptake, screening participation, and chronic disease monitoring [2]. These consequences establish needle pain relief not as a comfort measure but as a safety and quality-of-care priority.

Pharmacological Nursing Interventions: Topical Anesthetics and Cooling Agents

Topical anesthetics are among the most established nursing interventions for needle pain. Eutectic mixture of local anesthetics, containing lidocaine and prilocaine, is widely used and has a well-documented evidence base. A network meta-analysis of 40 randomized controlled trials involving 4,481 children compared nine local analgesia methods and found that most active methods, including eutectic mixture of local anesthetics cream, lidocaine cream, lidocaine iontophoresis, amethocaine, and a needle-free lidocaine injection system, produced greater pain reduction than placebo or routine care [1]. Amethocaine had the highest probability of being the best intervention, followed by the Buzzy device and lidocaine iontophoresis; importantly, vapocoolant spray alone was no more effective than placebo or routine care in that analysis, although other studies of cold spray have reported favorable results when the spray is applied for an adequate duration and at the correct distance [1].

The principal limitation of topical anesthetics is time. Eutectic mixture of local anesthetics requires a minimum application period of 30 to 45 minutes, and recommendations for children often specify at least 60 minutes for minor needle procedures [2]. In busy emergency departments, outpatient laboratories, and inpatient units where blood collection is often urgent, this delay is frequently impractical. Consequently, nurses may omit topical anesthesia not because they doubt its efficacy but because the workflow does not accommodate the waiting time. This has stimulated interest in faster-onset alternatives, including cold spray, vibration devices, and needle-free lidocaine delivery systems. Cold spray, applied for a few seconds immediately before puncture, reduces pain through rapid cooling of the skin and localized sensory inhibition. A randomized controlled trial in blood donors found that both cold spray and the ShotBlocker device significantly reduced venipuncture pain compared with a control group, with the ShotBlocker rated as the most effective of the two [3]. Another trial comparing eutectic mixture of local anesthetics cream, cold spray, and the Buzzy device in children aged 7 to 12 years reported that all three interventions reduced venipuncture pain, while eutectic mixture of local anesthetics and cold spray also reduced fear [4].

For nursing practice, the choice among pharmacological options should be guided by urgency, patient age, procedure history, and setting. When time permits, eutectic mixture of local anesthetics or amethocaine provides robust analgesia and is particularly appropriate for children and needle-anxious adults [1]. When time is short, cold spray or a combined cold-vibration device offers a practical alternative with immediate onset [3]. Nurses should also recognize that topical anesthetics are not interchangeable with distraction; rather, they are complementary. A child who receives topical anesthesia but remains fearful may still benefit from distraction, positioning, and parental presence, whereas a child who receives excellent distraction but no topical anesthetic may still experience sharp puncture pain [4].

Table 1. Summary of Pharmacological and Cooling Interventions for Needle Pain During Blood Collection

Intervention	Onset and Application Time	Evidence of Effect	Key Nursing Considerations
Eutectic mixture of local anesthetics cream	30–60 minutes; occlusive dressing required	Reduces self-reported and observer-reported pain; widely recommended [1], [2]	Allow adequate time; check for methemoglobinemia risk in infants; avoid in preterm neonates without specialist guidance
Amethocaine cream	Approximately 30–45 minutes	Highest probability of being the best local analgesic in network meta-analysis [1]	Effective but availability varies; observe for transient skin reactions
Lidocaine iontophoresis	10–20 minutes	Superior to placebo; ranked among top three methods [1]	Requires device; useful when rapid anesthesia is needed

Cold spray	Immediate; 4–10 seconds before puncture	Reduces venipuncture pain in blood donors and children; variable evidence depending on application protocol [3], [4]	Protect eyes and mucous membranes; use short bursts; do not substitute for adequate technique
Needle-free lidocaine injection	Rapid	Greater pain reduction than placebo or routine care [1]	Requires training; may cause transient pressure discomfort

Physical and Device-Based Non-Pharmacological Interventions: Vibration, Cold, and Pressure

Physical interventions exploit the gate control mechanism by introducing competing sensory input at or near the puncture site. The Buzzy device, a small reusable plastic unit shaped like a bee that combines a vibrating motor with an ice pack, is the most extensively studied device in this category. A 2025 systematic review and meta-analysis of 16 randomized controlled trials involving 1,486 children and adolescents found that cold vibration stimulation significantly reduced pain and anxiety compared with control conditions [5]. The authors rated the strength of the recommendation as weak but directionally favorable, noting that the device may be particularly useful when pharmacological anesthesia is unavailable or time is limited [5].

Evidence in older children and adults is more nuanced. A randomized controlled trial of 120 children aged 7 years and above compared external cold alone, vibration alone, cold combined with vibration, and a control condition. All three active interventions significantly reduced changes in pulse rate and pain scores, and the combined cold-vibration group showed the smallest pulse changes and the lowest pain scores [6]. However, the study did not find significant benefits for anxiety or cooperation, leading the authors to conclude that pain management in older children should not depend solely on this device but should incorporate additional methods [6]. This is an important nursing consideration: device-based physical interventions are effective analgesic adjuncts, but they are not a complete solution for needle distress.

The ShotBlocker is another device that applies the gate control principle through blunt pressure at the puncture site. Unlike the Buzzy device, it does not use vibration or cold; instead, it presents multiple rounded contact points to the skin, creating a field of pressure that competes with nociceptive input. A randomized controlled trial among blood donors found that ShotBlocker significantly reduced venipuncture pain and was rated more effective than cold spray in that population [3]. This finding is notable because blood donors represent a unique group: they are generally healthy adults, often repeat donors, and their willingness to return depends partly on the comfort of the donation experience. Nurses working in blood donation settings can therefore consider ShotBlocker as a low-cost, rapidly applied intervention that requires no electricity, no refrigeration, and minimal training [3].

Acupressure has also emerged as a nurse-delivered physical intervention. A systematic review and meta-analysis of acupressure for venous access procedural pain in children found that acupressure significantly reduced pain intensity during both peripheral catheter insertion and venipuncture compared with control groups [7]. Acupressure is attractive because it is non-invasive, inexpensive, and can be taught to nurses and parents; however, the evidence base is smaller than that for distraction or topical anesthetics, and standardized application protocols vary across studies [7].

Table 2. Summary of Physical and Device-Based Nursing Interventions for Needle Pain

Intervention	Mechanism	Best-Supported Populations	Evidence Highlights	Practical Nursing Notes
Buzzy device	Gate control; cold-induced sensory inhibition	Children and adolescents; adults in selected settings	Reduces pain and anxiety in pediatric meta-analysis [5]	Apply just above puncture site; avoid in children with cold intolerance or skin breakdown
ShotBlocker	Pressure-based gate control	Blood donors; adults; children	Significantly reduces venipuncture pain; more effective than cold spray in blood donors [3]	Place near intended vein entry; no power source required

External cold alone	Reduced nerve conduction and sensory input	Children aged 7 years and older	Reduces pain and pulse changes; less consistent for anxiety [6]	Use brief application; monitor skin tolerance
Vibration alone	Gate control and sensory competition	Children; adults	Effective but generally less robust than combined cold-vibration [6]	May be used when cold is contraindicated
Acupressure	Sensory modulation at acupoints	Children undergoing venipuncture or catheter insertion	Pooled effect favors acupressure for venous access pain [7]	Requires brief training; can be combined with distraction

Cognitive and Distraction-Based Interventions: Music, Virtual Reality, and Active Distraction

Distraction is the most extensively studied psychological nursing intervention for needle pain. A Cochrane summary of findings examining distraction compared with control for needle-related procedural pain and distress in children and adolescents synthesized data from 30 randomized controlled trials involving 2,802 participants for self-reported pain [8]. Distraction produced a moderate reduction in self-reported pain and a large reduction in self-reported distress, although the certainty of evidence was low to very low for most outcomes [8]. The breadth of the evidence—covering venipuncture, immunization, intravenous insertion, and other needle procedures—supports distraction as a core nursing competency rather than an optional adjunct.

Music therapy has been evaluated specifically for venipuncture. A 2025 systematic review and meta-analysis of 16 studies involving 657 children in intervention groups and 707 in control groups found significant reductions in self-reported pain, observer-reported pain, and distress [9]. However, no statistically significant effect was found for anxiety [9]. The dissociation between pain and anxiety outcomes is clinically meaningful: music may reduce the sensory and distress components of the needle experience without necessarily altering anticipatory anxiety. Nurses should therefore not assume that music alone will calm an anxious child before the procedure; preparatory explanation, parental presence, and choice of music may be needed to address anxiety [9].

Virtual reality has emerged as a more immersive form of distraction. A randomized controlled trial of 150 children aged 6 to 12 years compared active fully immersive virtual reality, passive immersive virtual reality, and a control condition during blood collection. Both virtual reality groups had significantly lower pain, anxiety, and negative emotional behavior scores than the control group, and the active virtual reality group had significantly lower fear scores than both the passive virtual reality and control groups [10]. These findings suggest that the degree of immersion matters, particularly for fear reduction. However, virtual reality requires equipment, hygiene protocols, and staff training, and its cost-effectiveness relative to simpler distraction methods remains uncertain. A subsequent trial comparing interactive and non-interactive virtual reality for venipuncture in school-age children found that virtual reality distraction may reduce venipuncture-related pain and support more positive observable behavior, reinforcing the potential of immersive approaches while underscoring the need for pragmatic implementation models [11].

Low-technology active distraction methods remain highly relevant, particularly in resource-limited settings. A randomized controlled trial of active versus passive distraction in preschool children found that active pinwheel blowing was associated with lower venipuncture-related pain and fear compared with passive cartoon watching and usual care [12]. Another trial in children aged 6 to 12 years demonstrated that both blowing a pinwheel and performing a cough trick significantly reduced pain perception during venipuncture compared with a control group [13]. These methods are inexpensive, require no devices, and engage the child in a physical action that competes with pain processing. A participatory storytelling intervention for children aged 3 to 6 years did not show a significant reduction in anxiety or pain compared with commonly used distraction methods, suggesting that not all active distraction formats are equally effective and that developmental fit matters [14].

Table 3. Summary of Cognitive and Distraction-Based Nursing Interventions for Needle Pain

Intervention	Format	Best-Supported Age Groups	Key Outcomes	Implementation Considerations
Distraction, general	Active or passive; varies	Children and adolescents	Reduces self-reported pain and distress [8]	Match to developmental stage; offer choice; involve parents
Music therapy	Listening to preferred music	Children; adolescents	Reduces pain and distress; anxiety not significantly reduced [9]	Use headphones; allow music selection; begin before puncture
Virtual reality, active or passive	Head-mounted immersive or semi-immersive	Children aged 6–12 years	Reduces pain, anxiety, and negative behavior; active virtual reality reduces fear most [10]	Requires equipment and hygiene; consider cost and staff training
Interactive virtual reality	Game-based or interactive	School-age children	May reduce venipuncture pain and improve observable behavior [11]	Needs staff familiarity and device cleaning protocols
Pinwheel blowing	Active oral motor distraction	Preschool and school-age children	Lower pain and fear than passive distraction or usual care [12]	Low cost; teach child to blow slowly and steadily
Cough trick	Active motor distraction	School-age children	Significantly lower pain intensity than control [13]	Simple to teach; may be less suitable for children with respiratory conditions
Storytelling and participatory distraction	Interactive narrative	Preschool children	Not consistently superior to standard distraction; developmental fit matters [14]	Use as part of a menu of options rather than a universal first-line method

Infant and Neonatal-Specific Nursing Interventions: Breastfeeding, Sucrose, Skin-to-Skin, and Positioning

Blood collection in infants and neonates requires a distinct evidence base because pharmacological options are limited and developmental considerations differ. A systematic review and network meta-analysis of interventions for pain management during venipuncture in neonates found that breastfeeding was the best intervention for reducing pain during venipuncture, followed by non-nutritive sucking [15]. Sucrose and skin-to-skin contact have also been consistently shown to reduce procedural pain in neonates, and parent-led interventions and oral sweet solutions are identified as among the most effective strategies [15]. These findings align with the broader literature on infant pain: breastfeeding provides multimodal sensory stimulation—sucking, warmth, maternal odor, and close physical contact—that is uniquely suited to the neonatal nervous system.

Skin-to-skin contact has been specifically evaluated during venipuncture in premature infants. A study using near-infrared spectroscopy to measure cerebral pain responses found that skin-to-skin contact between premature infants and their mothers during venipuncture had a pain-relieving effect [16]. This is an important finding because it moves beyond behavioral pain scores to a neurophysiological outcome, suggesting that the analgesic effect of skin-to-skin contact is not merely a soothing response but a genuine modulation of pain processing. For nurses, this reinforces the practice of encouraging mothers to hold their infants skin-to-skin before, during, and after blood collection whenever clinically feasible [16].

Comfort positioning is a related nursing intervention that spans age groups. A hospital-wide initiative to eliminate or reduce needle pain in children using lean methodology implemented four core strategies across inpatient units, emergency departments, outpatient laboratories, and ambulatory clinics: topical anesthetics, sucrose or breastfeeding for infants 0 to 12 months, comfort positioning including swaddling, skin-to-skin, or facilitated tucking for infants and sitting upright for children, and age-

appropriate distraction [17]. The initiative required all departments to offer all four strategies at least 95% of the time and reported that wait times for services decreased, patient satisfaction increased, and staff concerns about implementation—such as concerns about wait times and venipuncture success rates after topical anesthesia—were allayed [17]. This is a powerful example of how nursing-led standardization can change culture and practice at scale.

For older infants and toddlers, positioning on a parent's lap, upright holding, and allowing the child to see the parent's face can reduce distress. A quality improvement assessment at a pediatric test center found that positions offered to children under 1 year included breastfeeding and cradling, while older children could sit on a caregiver's lap, in the phlebotomy chair, or on a stretcher; reading and blowing bubbles were used in older children [18]. These practices are simple, low-cost, and adaptable across settings. The key nursing principle is that restraint should be avoided whenever possible; a child who feels secure and supported is more likely to cooperate and less likely to experience escalating distress [18].

Parental Involvement and Coaching: Extending the Nursing Role

Parents are not passive observers during pediatric blood collection; they are potential co-therapists. Parent coaching interventions typically involve teaching parents before the procedure about distraction techniques, providing a rationale, modeling effective distraction, and helping the child select a distractor. A Cochrane review of psychological interventions for needle-related procedural pain and distress examined parent coaching plus distraction and found that the evidence base was limited, with some trials showing no efficacy across assessed outcomes [19]. However, subsequent studies have reported more favorable results. A randomized controlled study evaluating parental active participation in supporting children with cancer during venipuncture found that children in the parental involvement group had significantly lower pain and anxiety than children whose parents were present but not actively involved [20]. This suggests that the quality and structure of parental involvement matter more than mere presence.

For nurses, parent coaching is a feasible extension of the nursing role. It requires a brief preparatory conversation, demonstration of distraction techniques, and coaching during the procedure. In high-volume settings, this can be supported by printed materials, short videos, or pre-procedure checklists. The benefit is twofold: the child receives continuous distraction from a trusted adult, and the parent gains a sense of agency and usefulness, which may reduce their own distress [20]. However, nurses should assess parental anxiety and willingness; a highly anxious parent may need support and modeling before being able to coach effectively [19].

Integrating Evidence into Nursing Practice: Barriers, Facilitators, and a Practical Framework

Despite the strength of the evidence, needle pain management remains inconsistently implemented. A scoping review of the minimization of needle pain in clinical practice identified four overarching themes: normalization of procedural pain, patient and caregiver distress, provider attitudes and knowledge gaps, and systemic and policy-level shortcomings [21]. Barriers include the absence of standardized protocols, limited provider training, and a lack of institutional accountability [21]. These findings are consistent with earlier work showing that nurses often lack formal training in pain mitigation strategies and face time constraints, workflow pressures, and inadequate support [22].

Translating evidence into practice therefore requires a multilevel approach. At the individual nurse level, competency in at least one pharmacological, one physical, and one cognitive-behavioral intervention should be considered a baseline expectation for anyone performing blood collection. At the unit level, standardized protocols should specify which interventions are available, how they are applied, and how their use is documented [23]. At the organizational level, leadership must provide resources—topical anesthetics, cold packs, distraction kits, and virtual reality devices where appropriate—and build accountability mechanisms such as audits and feedback [23]. The success of the hospital-wide comfort positioning and needle pain reduction initiative demonstrates that system-level commitment can overcome the perception that needle pain is unavoidable [17].

A practical nursing framework for blood collection can be organized around three phases: preparation, procedure, and recovery. In the preparation phase, the nurse assesses the patient's age, developmental stage, previous needle experiences, anxiety level, and preferences; selects interventions accordingly; and explains what will happen in developmentally appropriate language. In the procedure phase, the nurse applies the chosen combination of pharmacological, physical, and cognitive interventions, monitors the patient's response, and adjusts the approach in real time. In the recovery phase, the nurse acknowledges the patient's effort, provides praise and comfort, and documents what worked so that future procedures can be individualized [21],

[23]. This framework is not a rigid protocol but a structured way of thinking that helps nurses integrate multiple evidence-based strategies into busy practice.

Table 4. A Three-Phase Nursing Framework for Needle Pain Management During Blood Collection

Phase	Nursing Actions	Evidence-Informed Examples	Documentation and Communication
Preparation	Assess age, development, anxiety, prior experiences, and preferences; select interventions; prepare patient and family	Topical anesthetic if time permits; explain procedure; choose distraction; arrange comfort positioning; coach parent [1], [17]	Record anxiety level, chosen interventions, and any barriers
Procedure	Apply interventions; monitor response; adjust in real time; maintain communication	Buzzy or ShotBlocker; music or virtual reality; pinwheel blowing; breastfeeding or sucrose for infants; skin-to-skin [3], [5], [9], [15]	Note intervention fidelity, patient response, and number of attempts
Recovery	Acknowledge effort; provide comfort; debrief with patient and family; document effective strategies	Praise, reassurance, comfort positioning, parental involvement [17], [20]	Record what worked and preferences for future procedures [21], [23]

CONCLUSION:

The evidence indicates that needle-related pain during blood collection can be effectively managed through various nursing interventions applicable throughout life. Topical anesthetics, cold sprays, and distraction techniques can alleviate pain, while comfort strategies like breastfeeding and skin-to-skin contact are vital for infants. However, implementation remains a challenge, as nursing gaps in training and resources persist. There's a need for a cultural shift within the healthcare system to prioritize pain relief, parallel to infection control. Nurses, central to the blood collection process, are in a key position to advocate for and implement these evidence-based practices, enhancing patient experience and cooperation.

REFERENCES

[1] Wang L, Fang L, Zhou Y, Fang X, Liu J, Qu G. Efficacy and safety of vapocoolant spray for vascular puncture in children and adults: A systematic review and meta-analysis. PLoS One. 2023 Feb 13;18(2):e0279463.

[2] Kennedy RM, Luhmann J, Zempsky WT. Clinical implications of unmanaged needle-insertion pain and distress in children. Pediatrics. 2008 Nov 1;122(Supplement_3):S130-3.

[3] Alkhalidy AA, Al-Jubouri MB. Effect of Shot blocker and Cold Spray on Venipuncture Pain among Blood Donors: A Randomized Controlled Trial. Next Research. 2025 12:100708.

[4] Andrews TJ, Fennell J, Wrotniak BH, Territo H. The effectiveness of a gate channel device on pain in the pediatric emergency department: A randomized controlled trial. International Emergency Nursing. 2025 1;83:101704.

[5] Zhou ZY, Hu LY, Wang ML, Li SQ, Zhou LS. Effects of Cold and Vibration on Venipuncture Pain Management in Children Aged 2-7 Years Old: Randomized Controlled Trial. JMIR Pediatrics and Parenting. 2025 25;8:e67918.

[6] Ozdemir PA. The effect of three different methods on venipuncture pain and anxiety in children: distraction cards, virtual reality, and Buzzy®(randomized controlled trial). Journal of Pediatric Nursing. 2021 May 1;58:e54-62.

[7] Gold JI, SooHoo M, Laikin AM, Lane AS, Klein MJ. Effect of an immersive virtual reality intervention on pain and anxiety associated with peripheral intravenous catheter placement in the pediatric setting: a randomized clinical trial. JAMA network open. 2021 Aug 25;4(8):e2122569.

[8] Birnie KA, Noel M, Chambers CT, Uman LS, Parker JA. Psychological interventions for needle-related procedural pain and distress in children and adolescents. Cochrane database of systematic reviews. 2018(10).

[9] Zhao L, Qi P, Wang X, Su X, Liao L. Local analgesia for the relief of pain in children undergoing venipuncture and intravenous cannulation: a systematic review and network meta-analysis. BMC anesthesiology. 2025 Mar 7;25(1):115.

[10] Comparcini D, Simonetti V, Galli F, Saltarella I, Altamura C, Tomietto M, Desaphy JF, Cicolini G. Immersive and non-immersive virtual reality for pain and anxiety management in pediatric patients with hematological or solid cancer: a systematic review. Cancers. 2023 Feb 3;15(3):985.

[11] Allamand Moraga D, Öhman Ekman E. Effekten av interventioner som används vid venpunktion på barn: En beskrivande litteraturstudie.
[12] AL-Shammiry SE, AL-Fayyadh S. Manual Pressure verses Shot Blocker in Reducing Intramuscular InjectionRelated Pain: A Comparative Randomized Controlled Trial. Bahrain Medical Bulletin. 2024 Mar 1;46(1):1941.
[13] Merter OS, Sengul ZK, Oguz R. Effects of blowing pinwheel and cough trick on pain in 6-to 12-year-old children during venipuncture: A randomized controlled trial. Journal of pediatric nursing. 2025 1;83:30-7.
[14] Inal S, Kelleci M. Distracting children during blood draw: Looking through distraction cards is effective in pain relief of children during blood draw. International journal of nursing practice. 2012 Apr;18(2):210-9.
[15] Chen X, Li R, Xiong A, Luo B. A review and bibliometric analysis of global research on non-pharmacologic management for neonatal and infant procedural pain. Medicine. 2024 Nov 29;103(48):e40552.
[16] Roué JM, Rioualen S, Gendras J, Misery L, Gouillou M, Sizun J. Multi-modal pain assessment: are near-infrared spectroscopy, skin conductance, salivary cortisol, physiologic parameters, and Neonatal Facial Coding System interrelated during venepuncture in healthy, term neonates?. Journal of Pain Research. 2018 Oct 11:2257-67.
[17] Friedrichsdorf SJ, Eull D, Weidner C, Postier A. A hospital-wide initiative to eliminate or reduce needle pain in children using lean methodology. Pain reports. 2018 Sep 11;3(Suppl 1):e671.
[18] Czarnecki CM, Turner PB, Collins AP, Doellman CD, Wrona CS, Reynolds CJ. Procedural pain management: a position statement with clinical practice recommendations. Pain management nursing. 2011 Jun 1;12(2):95-111.
[19] Riddell RR, Bucsea O, Shiff I, Chow C, Gennis HG, Badovinac S, DiLorenzo-Klas M, Racine NM, Kohut SA, Lisi D, Turcotte K. Non-pharmacological management of infant and young child procedural pain. Cochrane database of systematic reviews. 2023(6).
[20] SEVİL Ü, ÖZBAŞ N, KURT BÇ, editors. Hemşirelikte Tamamlayıcı ve Alternatif Tedaviler. Akademisyen Kitabevi; 2023 Sep 4.
[21] Quon S, Tan J, Nichols E, Low S. Understanding the Minimization of Needle Pain in Clinical Practice: A Scoping Review. International Journal of Pain. 2025 31;16(2):57-65.
[22] Zempsky WT, Cravero JP, Committee on Pediatric Emergency Medicine, and Section on Anesthesiology and Pain Medicine. Relief of pain and anxiety in pediatric patients in emergency medical systems. Pediatrics. 2004 Nov 1;114(5):1348-56.
[23] Stevens B, Swift A, Harrison D. Knowledge Implementation and Dissemination: Effectively Moving Forward. Managing Pain in Children and Young People: A Clinical Guide. 2024 May 2:291-307.