

Needle pain and fear are barriers to health. In 1995, James Hamilton published one of the first needle fear papers.¹ At the time, he concluded that 10% of adults and 25% of children feared needles - and that it was a serious health risk. By 2012, research showed 24% of adults and 63% of those born in 2000 feared injections.² We now know fear correlates the number of injections given on a single day in the 4-6 year window.³ At this preschool age, children remember pain and fear, but can't abstract enough to understand why people they trust are hurting them. Before 1985, the number of scheduled preschool injections was zero; by 2000, it was often as high as five. Buzzy is the most proven needle pain reliever and the only intervention proven to reduce fear. Addressing needle pain is a public health priority - Buzzy Helps!

1 Hamilton JG. Needle phobia: a neglected diagnosis. J Fam Pract. 1995 Aug;41(2):169-75. PMID: 7636457

2 Taddio A, Ipp M, Thivakaran S, et al. Survey of the prevalence of immunization non-compliance due to needle fears in children and adults. Vaccine. 2012 Jul 6;30(32):4807-12. PMID: 22617633

3 Baxter AL, Cohen LL, Burton M, Mohammed A, Lawson ML. The number of injected same-day preschool vaccinees relates to preadolescent needle fear and HPV uptake. Vaccine. 2017 Jul 24;35(33):4213-9. PMID: 28647169

The following references are all unfunded independent investigations of Pain Care Labs' products Buzzy and/or DistrACTION Cards as of 4/30/2026. Studies by the inventor (Baxter) were funded by grants from Hope Street Kids and NICHD Grant Number 4R44HD056647-02.

Select Reviews and Meta-Analyses

Cocchi E, Bloise S, Jusufi L, Marchetti F. **Toward Age-Specific Application of Pediatric Non-Pharmacological Pain Strategies: A Bayesian Reanalysis of the Buzzy Device.** Paediatr Anaesth. 2026;36(2):194-201. DOI:10.1111/PAN.70094; PMID: 41307283

Jin F, Wang X, Qi M, Zhang W, Zhang Y. **Effectiveness and safety of Buzzy device in needle-related procedures for children under twelve years of age: A systematic review and meta-analysis.** Medicine (Baltimore). 2024;103(15):e37522. DOI:10.1097/MD.0000000000037522; PMID: 38608108

Su HC, Hsieh CW, Lai NM, Chou PY, Lin PH, Chen KH. **Using vibrating and cold device for pain relieves in children: a systematic review and meta-analysis of randomized controlled trials.** J Pediatr Nurs. 2021 Mar 15;61:23-33. DOI: 10.1016/j.pedn.2021.02.027; PMID: 33735633

da Silva Moura JW, Takashima M, Silva TL, et al. **Effectiveness of Buzzy® for pain relief in children during intramuscular injections: Systematic review and meta-analysis.** J Pediatr Nurs. 2026;86:625-632. DOI:10.1016/j.pedn.2025.12.013; PMID: 41418424

Buzzy® is the **Most Proven & Most Effective Solution** for Needle Pain & Fear

“Conclusion: Interventions using **coolant and vibration together, as well as a combination of site-specific and patient-led interventions, showed the most consistent effects** in reducing self-reported pain, fear or distress.”

Lee VY, Caillaud C et al. 2018;14(11):2737 - 2747. PMID: 29792557

Faghihian R, Rastghalam N, Amrollahi N, Tarrahi MJ. **Effect of vibration devices on pain associated with dental injections in children: A systematic review and meta-analysis.** Aust Dent J. 2021 Mar;66(1):4-12. “The findings revealed that use of DentalVibe for Paediatric dental injections was not effective in reducing pain perception. However, use of Buzzy showed promising results.” PMID: 33258142

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 Anesthesiol. 2025;25(1):115. DOI:10.1186/s12871-025-02991-6; PMID: 40055583



Venipuncture

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- 🔑 **Andrews TJ, Fennell J, Wrotniak BH, Territo H. The effectiveness of a gate channel device on pain the pediatric emergency department: A randomized controlled trial. Int Emerg Nurs. 2025;83:101704. DOI:10.1016/j.ienj.2025.101704; "Buzzy was highly superior to vapocoolant and control, reducing FACES score 1.5 while the other two increased scores." PMID: 41151204**
- * **Apuzzo L, Burrai F, Sellami S, Brioni E, Micheluzzi V. Effectiveness of Buzzy on Pain and Anxiety in Children and Adolescents Undergoing Needle Procedures: A Meta-Analysis. Holist Nurs Pract. 2025 July 14. DOI:10.1097/HNP.0000000000000750; PMID: 40657920**
- Bahorski JS, Hauber RP, Hanks C, Johnson M, Mundy K, Ranner D, Stoutamire B, Gordon G. Mitigating procedural pain during venipuncture in a pediatric population: A randomized factorial study. Int J Nurs Stud. 2015 Oct;52(10):1553-64. [N=173, Buzzy[®] equivalent to LMX4] PMID: 26118441**
- 1st **Ballard A, Khadra C, Adler S, Doyon-Trottier E, Le May S. Efficacy of the Buzzy Device for Pain Management during Needle-Related Procedures: A Systematic Review and Meta-analysis. Clin J Pain. 2019 Jun;35(6):532-543. (N= 1138, pain reduction -1.11; 95% confidence interval [CI]: -1.52 to -0.70; P<0.0001), anxiety reduction (SMD -1.37; 95% CI: -1.77 to -0.96; P<0.00001.) First Buzzy Meta-Analysis. PMID: 30829735**
- * **Basiouny NS, Hamad I. Effect of Thermo-Mechanical Stimulation on Pain Associating Venipuncture among Children with Leukemia. IOSR J Nurs Health Sci. 2019;8(1), 88-98. DOI: 10.9790/1959-0801028898**
- 1st **Baxter AL, Leong T, Mathew B. External thermomechanical stimulation versus vapocoolant for adult venipuncture pain: pilot data on a novel device. Clin J Pain. 2009 Oct;25(8):705-10. [Buzzy reduced pain > cold spray, adult] (N=31, Reduced Pain (mean 9.9 mm, 95% confidence interval 0.82-19, P=0.035, SD 16) compared to vapocoolant (mean 7.9 mm, 95% confidence interval -1.8-17.7, P=0.1, SD 16.9).) PMID: 19920721**
- Baxter AL, Cohen LL, McElvery HL, Lawson ML, von Baeyer CL. An integration of vibration and cold relieves venipuncture pain in a pediatric emergency department. Pediatr Emerg Care. 2011 Dec;27(12):1151-6. (N=81, Pain scores lower with Buzzy (-2; 95% CI, -4 to 0) than with vapocoolant (1; 95% CI, 0-2) Venipuncture success more likely with Buzzy (odds ratio, 3.05; 95% CI, 1.03-9.02), pediatric] PMID: 22134226**
- Bilgen Sivri B, Feng YS, Michler C, Kuemmerle-Deschner J, Mahler C. The effect of Buzzy[®], DistrACTION[®] cards on reducing pediatric pain and fear during blood collection in the rheumatology polyclinic: A randomized controlled trial. J Pediatr Nurs. 2023;73:e446-e454. DOI:10.1016/j.pedn.2023.10.013 PMID: 37919179**
- 📄 **Bourdier S, Khelif N, Velasquez M, et al. Cold Vibration (Buzzy) Versus Anesthetic Patch (EMLA) for Pain Prevention During Cannulation in Children: A Randomized Trial. Pediatr Emerg Care. 2021;37(2):86-91. DOI:10.1097/PEC.0000000000001867; [N = 607.] "Buzzy takes ... no additional time, and can be used 1000 times for the cost of ≈ 25 EMLA patches." PMID: 31181022**
- Canbulat N, Ayhan F, Inal S. Effectiveness of external cold and vibration for procedural pain relief during peripheral intravenous cannulation in pediatric patients. Pain Manag Nurs. 2015 Feb;16(1):33-39. (N=176, 7-12 y/o, significantly lower anxiety and pain in group using Buzzy.) DOI:10.1016/j.pmn.2014.03.003; PMID: 24912740**
- Chandraleka S, Sumathy P, Renuka K. Effectiveness of Buzzy technique on pain curing intravenous cannulation among children admitted in pediatric ward at MGMCRI, Puducherry. Int J Appl Res. 2019; 5(6): 404-407. DOI:10.5005/JIP-JOURNALS-10085-7197**

Cho YH, Chiang YC, Chu TL, Chang CW, Chang CC, Tsai HM. **The Effectiveness of the Buzzy Device for Pain Relief in Children During Intravenous Injection: Quasirandomized Study.** JMIR Pediatr Parent. 2022;5(2):e15757. DOI:10.2196/15757; PMID: 35486419

Erdogan B, Ozdemir AA. **The Effect of Three Different Methods on Venipuncture Pain and Anxiety in Children: Distraction cards, Virtual Reality, and Buzzy.** J Pediatr Nurs. May-June 2021;58:e54-e62. 4 groups RCT age 7-12, n=108, Buzzy > VR > Distraction cards and all >> control. PMID: 33485746

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Gahlawat M, Kodi M, Deol R. **Effect of external cold and thermomechanical stimulation on anxiety and pain during intravenous cannulation among children.** Sudan J Paediatr. 2021;21(2):01–11. (N=60 age 3-12. Self-reported procedural pain 2.80 ± 1.86 with Buzzy[®], control 7.47 ± 2.40 p<.0001.) PMID: 35221428

Gerçeker GÖ, Binay Ş, Bilsin E, Kahraman A, Yılmaz HB. **Effects of Virtual Reality and External Cold and Vibration on Pain in 7- to 12-year-old Children During Phlebotomy: A Randomized Controlled trial.** J Perianesth Nurs. 2018 Dec;33(6):981-989. (N=121, Buzzy = VR, both statistically significantly less pain than control.) PMID: 29559294

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Faheim SS, Mahfoz FFA. **Efficacy of Buzzy with Distraction Cards Versus The Traditional Method for Reducing Pain and Parent's Satisfaction during Venipuncture in Healthy Children.** *IOSR-JNHS.* 2019;8(3): 78-89. e-ISSN: 2320-1959. p-ISSN: 2320-1940

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Tork HM, **Comparison of the Effectiveness of Buzzy, Distracting Cards and Balloon Inflating on Mitigating Pain and Anxiety During Venipuncture in a Pediatric Emergency Department.** *Am J Nursing Science* 2017 Feb;6(2):26-32. (N=180, Pediatric, Lowest pain scores with Buzzy (1.90 ± 1.34) vs Distraction cards (3.17 ± 2.13) vs Balloon inflating (2.83 ± 1.41) vs control (4.15 ± 1.29), ($p = 0.012$), Buzzy and Distraction card groups had the greatest reduction in anxiety.) DOI:10.11648/J.AJNS.20170601.14

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Immunization

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Dur Ş, Karadağ Aytemiz ÖE, Dinç S. **Comparative effectiveness of the Buzzy®, ShotBlocker® and Helfer skin tap technique in reducing pain and fear during pediatric intramuscular injections: A randomized controlled trial.** *Int Emerg Nurs.* 2026;84:101744. (4-12 yr, pain and fear lowest in Buzzy.) DOI:10.1016/J.IENJ.2026.101744; PMID: 41512361

Girgin BA, Aktas E, Kiliç D, Gözen D. **Let's Prefer the Pain Reducing Intervention, Buzzy or ShotBlocker: A Randomized Controlled Trial.** *J Dr Behcet Uz Child Hosp.* 2020;10(3):290-8. DOI:10.5222/BUCHD.2020.13007 Buzzy significantly more effective, highest parent satisfaction.

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Injections

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Dermatology

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Heel Stick

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Dental Injections

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AlHareky M, AlHumaid J, Bedi S, et al. **Effect of a Vibration System on Pain Reduction during Injection of Dental Anesthesia in Children: A Randomized Clinical Trial** Int J Dent. 2021;8896408. PMID: 33564311

Baldawa H, Tirupathi S, Ramakrishnan M, et al. **Effectiveness of combined extraoral vibration and cooling on pain perception due to inferior alveolar nerve block administration in children: a systematic review and meta-analysis.** J Dent Anesth Pain Med. 2025;25(4):227-237. DOI:10.17245/JDAPM.2025.25.4.227; PMID: 40787135

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Dhembare-Patil AA, Jain M, Sogi HPS, Sharma P, Gambhir A, Kumari S. **Comparative Evaluation of Buzzy System and Conventional Masked with Camouflage Syringe for Pain Perception in 5-12-year-old Children: A Split-mouth Study.** Int J Clin Pediatr Dent. 2026;19(2):164-170. PMID: 41800015

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Buzzy® Reduces Impact of Prolonged Tourniquet Application for Hematology:

In a study by Dr. Lima-Olivieri et al., it was found that leaving a tourniquet in place 120 seconds caused the largest derangement of hematology lab values compared to free flowing blood collection. (1) Dr. Lima-Olivieri et al. then tested Buzzy®, leaving it in place between 90 and 180 seconds and comparing results to free-flowing blood.(2)

The changes from leaving a tourniquet in place for 2 minutes were greater than the changes from leaving Buzzy® in place 2 minutes. Dr. Lima-Olivieri did not reference his earlier work, or discuss his labs funding by the maker of the free-flow unit. The Journal solicited an opinion.

Table 1 - Both Buzzy and a tourniquet were left on 90 – 180 seconds and compared to a transilluminating free flowing collection device where blood was collected without a tourniquet. Comparison numbers between free-flow versus Buzzy® and free-flow versus Tourniquet with percentage Mean Difference between paired results. **Buzzy® caused less difference after two minutes than a standard tourniquet for all outcomes except lymphocytes: prolonged tourniquet +2.6%, prolonged Buzzy -3.9%. The greatest clinical concern is overestimating WBC and neutrophils, failing to recognize immunocompromise.**

	Units	Trans	Buzzy®	% Diff Buzzy	Trans	Tourniquet	% Diff Tourniquet
RBC	(10 ¹² /L)	4.80±0.55	4.90±0.55	2.0	4.68(0.45)	4.81(0.46)	2.8
Hb	(g/L)	137.9±12.7	141.4±13.2	2.5	14.1(1.4)	14.6(1.4)	2.6
Hct	(%)	40.6±4.0	41.5±4.0	2.2	41.7(4)	42.9(4)	2.9
MCV	(fL)	84.4 (81.8-88.3)	84.6 (81.9-88.1)	0.2	88(5)		1.1
RDW	(%)	12.7±0.5	12.7±0.6	0			
WBC	(10 ⁹ /L)	7.35±1.94	7.10±1.89	-3.5	6.59(1.87)	6.9(2.02)	4.8
Neu	(10 ⁶ /L)	4.27±1.57	4.15±1.49	-2.9	3.72(1.31)	3.87 (1.4)	4.2
Lymp	(10 ⁶ /L)	2.41±0.80	2.32±0.80	-3.9	2.23(0.73)	2.29(0.75)	2.6
Mono	(10 ⁶ /L)	0.29±0.08	0.28±0.05	-3.6	0.33(0.11)	0.34(0.13)	3.9
Eos	(10 ⁶ /L)	0.16±0.08	0.16±0.07	0	0.30(.34)	0.37(0.36)	24.1
Baso	(10 ⁶ /L)	0.046±0.02	0.041±0.02	-12.2	0.026(0.02)	0.021(0.02)	23.8
Plt	(10 ⁹ /L)	274±66	272±66	-0.7	200(46)	208(46)	3.6
MPV	(fL)	9.12±0.81	9.09±0.71	-0.3			

Legend RBC: red blood cell count; Hct: haematocrit; Hb: haemoglobin concentration, MCV: mean corpuscular volume; MCHC: mean corpuscular haemoglobin content; RDW: red blood cell distribution width; WBC: white blood cell count; NEU: neutrophil count; LYMP: lymphocyte count; MONO: monocyte count; EOS: eosinophil count; BASO: basophil count; PLT: platelet count; MPV: mean platelet volume.

1. Lima-Oliveira G, Lippi G, Salvagno GL, et al. **Transillumination: a new tool to eliminate the impact of venous stasis during the procedure for the collection of diagnostic blood specimens for routine haematological testing.** Intl J Lab Hematol. 2011 Oct;33(5):457-62. PMID: 21412480

2. Lima-Oliveira G, Lippi G, Salvagno GL et al. **A new device to relieve venipuncture pain can affect haematology test results.** Blood Transfus. 2014 Jan; 12(Suppl 1): s6–s10 PMID: 24120583

3. Baxter AL, Lawson ML. **Concerns with the methodology, analysis and discussion of the Buzzy® and transillumination comparison article.** Blood Transfus. 2014 Jan;12(Suppl 1): s3–s5 PMID: 24599904

Buzzy® Reduces Impact of Prolonged Tourniquet Application for Chemistry:

In one study by Dr. Lima-Olivieri et al., it was found that leaving a tourniquet in place 2 minutes caused the largest derangement of chemistry lab values from free flowing blood using a device made by a manufacturer in his town.(4)

Dr. Lima-Olivieri et al. then tested Buzzy®, leaving it in place also for 2 minutes and comparing to free-flowing blood.(5) The changes from leaving a tourniquet in place for 2 minutes were greater than the changes from leaving Buzzy® in place, and in neither case was there a derangement in potassium from lysed cells that was clinically significant.

Dr. Lima-Olivieri did not reference his earlier study or note funding from the free flowing unit, and the journal solicited an editorial.(6)

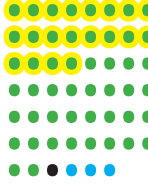
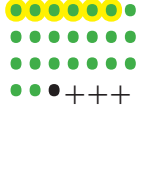
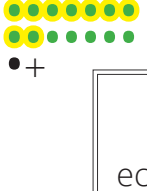















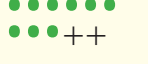




	Units	Free-flowing	Buzzy®	% Diff Buzzy	Free-flowing	Tourniquet	% Diff Tourniquet
Glucose	mmol/L	4.66 (4.33-5.11)	4.66 (4.27-5.11)	0	4.77 ± 1.0	4.83 ± 1.0	1.2
Total Protein	g/L	78.9 ± 3.6	80.1 ± 4.4	1.5	76.0 ± 6.0	79.0 ± 6.0	3.8
Albumin	g/L	47.9 ± 3.4	48.9 ± 3.7	2	46.0 ± 4.0	48.0 ± 5.0	4.2
AlkPhos	μkat/L	1.14 ± 0.3	1.19 ± 0.3	4.2	1.53 ± 0.37	1.56 ± 0.39	1.9
Triglyceride	mmol/L	78.9 ± 3.6	80.1 ± 4.4	1.5	1.63 ± 0.95	1.68 ± 0.96	3.0
Potassium	mmol/L	4.0 ± 0.3	4.0 ± 0.4	0	4.2 ± 0.2	4.3 ± 0.4	2.3
Sodium	mmol/L	144.3 ± 1.8	144.3 ± 1.9	0	142.2 ± 3.2	142.7 ± 3.2	0.4
Phosphate	mmol/L	1.32 ± 0.2	1.30 ± 0.2	-1.5	1.17 ± 0.16	1.18 ± 0.19	0.8
Calcium	mmol/L	2.36 ± 0.1	2.37 ± 0.1	0.4	2.35 ± 0.12	2.40 ± 0.12	2.1
Magnesium	mmol/L	0.81 ± 0.06	0.81 ± 0.07	0	0.810 ± 0.08	0.827 ± 0.08	2.0

4. Lima-Oliveira G, Lippi G, Salvagno GL, et al. **New ways to deal with known preanalytical issues: use of transilluminator instead of tourniquet for easing vein access and eliminating stasis on clinical biochemistry.** *Biochimica Medica*. 2011;21(2):152-9. PMID: 2213855

5. Lima-Oliveira G, Lippi G, Salvagno GL et al. **Quality impact on diagnostic blood specimen collection using a new device to relieve venipuncture pain.** *Indian J Clin Biochem*. 2013 Jul;28(3):235-4. PMID: 24426217

6. Baxter AL, Lawson ML. **Methodological concerns comparing Buzzy® to transilluminator device.** *Indian J Clin Biochem*. 2014 Jan;29(1):114-5. PMID: 24478562

All published needle pain interventional trials as of 4/30/2026. Bibliography available upon request.

	IV RCTs	Non-Vaccine Injection RCTs	Vaccine RCTs	Prep Time	Cost Per Use	Meta-Analyses	Summary	
Buzzy® Multi-Patient	Child  +++	 •+++	 •+	1 min	\$0.10	●●●●	Efficacy increases with age (Bayesian, Cocchi et al., 2026) IV pain relief = to LMX; EMLA ≈ 10% better* Injections: Buzzy > EMLA for age 4+; Buzzy ≈ approximately equivalent age < 4* *Summary data applies to classic positioning. New 2025+ positioning may improve efficacy.	
	Infant  +++	 •+++	 ●●					
	Adult  ●●+	 ++	 ●●●					
DistrACTION® Cards Multi-Use	Child  ●●+	 ●●	 ●	10 sec	\$0.01		97% say better phlebotomy experience	
EMLA® Disposable	Child  ●●		 ● ++ XX	60 min	\$2-6		Vasoconstricts until 90 min; requires 1 hour for pain relief	
Infant  ++		 ●●●●●●●● ++++++ X				++X		
Adult  ●●		 ●						
LMX-4® Disposable	Child  ●●●●●●●● ●●++			20 min	\$2-6		LMX is not FDA-cleared for needle procedures	
Ice Pack		 ●● (Adult)		30 sec	Free			
ShotBlocker® Single Patient	Child  +	 ●●+ (Adult) XX	 ●●+ (Adult) + XX	1 min	\$1 Per Patient	●●	ShotBlocker = Buzzy for insulin; Buzzy > SB for vaccination	

Buzzy is the most studied, economical, & effective needle pain relief intervention with 250 million+ users worldwide.

- Reduced Pain: Compared to Control, Standard of Care, or Another Intervention
- Reduced Pain and Anxiety
- Outcomes Other than Pain/Fear
- Equivocal or Less Effective, Less Time, Less Expensive than Another Intervention
- † Equivalent to Another Intervention
- X Negative Pain Study: Did Not Reduce Pain vs. Control (or Buzzy)