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Adult and All-Age Studies Italicized; Pediatric Studies

Reviews and Meta-Analyses

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 Feb 28 (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)

Ballard A Khadra C, Adler S, Doyon-Trottier E, Le May S. Efficacy of the Buzzy® device for pain management of children during needle-related procedures: a systematic review protocol. Syst Rev. 2018 May 22;7(1):78.(1-3)

Lee VY, Caillaud C, Fong J, Edwards KM. Improving vaccine-related pain, distress or fear in healthy children and adolescents-a systematic search of patient-focused interventions. Hum Vaccin Immunother. 2018;14(11):2737-2747 "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.

Ueki S, Yamagami Y, Makimoto K. Effectiveness of vibratory stimulation on needle-related procedural pain in children: a systematic review. JBI Database System Rev Implement Rep. 2019 Jul;17(7):1428-1463. Included Buzzy, Dental Vibe, Blaine Labs. "The effect size for the BUZZY tended to be higher than that for the other devices." "Overall, vibratory stimulation was significantly effective: self-rated pain: -0.55, 95% confidence interval [95% CI]: -0.92 to -0.18) observer-rated pain outcomes (SMD: -0.47, 95% CI: -0.76 to -0.18). [With Buzzy] the effect on the child's anxiety (SMD: -1.03, 95% CI: -1.85 to -0.20) was significant."

Venipuncture

Abidin, N., Yahya, N., Izaham, A., Mat, W., Zain, J., Zainuddin, M., Mahdi, S. Assessing the Effectiveness of a Thermomechanical Device (Buzzy®) in Reducing Venous Cannulation Pain in Adult Patients [PDF] Middle East Journal of Anesthesiology 2018 Feb 25(1):61-67. (N=184, Lowest w/ Buzzy Pain score 33.92 ± 15.59 (p = 0.016) 81.0% of patients satisfied w/ Buzzy)

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]

Ballard A, Khadra C, Adler S3, D Trottier E4, Bailey B4, Poonai N, Théroux J, Le May S. External cold and vibration for pain management of children undergoing needle-related procedures in the emergency department: a randomised controlled non-inferiority trial protocol. BMJ Open. 2019 Jan 15;9(1):e023214 (N=346)

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 > cold spray, adult] (N=31, Reduced Pain (mean 9.9 mm, 95% confidence interval 0.82-19, P=0.035, SD 16) compared to vapocolant (mean 7.9 mm, 95% confidence interval -1.8-17.7, P=0.1, SD 16.9))

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 w/ Buzzy (odds ratio, 3.05; 95% CI, 1.03-9.02), pediatric]

Bergomi P, Scudeller L, Pintaldi S, Dal Molin A. Efficacy of Non-pharmacological methods of pain management in children undergoing venipuncture in a pediatric outpatient clinic: A randomized controlled trial of audiovisual distraction and External Cold and Vibration. J Pediatr Nurs. 2018 Sep-Oct;42:e66-e72. (N=150, Buzzy significantly effective in children under 9. Reduced anxiety in parents and children.)

Binay Ş, Bilsin E, Gerçeker GÖ, Kahraman A, Bal-Yılmaz H. Comparison of the Effectiveness of Two Different Methods of Decreasing Pain During Phlebotomy in Children: A Randomized Controlled Trial. J Perianesth Nurs. 2019 Feb 20 S1089-9472(18)30414-3 (block randomization, 3-6 y/o, Pain scores were lower in the groups of external cold and vibration, and blowing soap bubbles than the control group.)

Bourdier S, Khelif N, Velasquez M, Usclada A, Rochette E et al. Cold Vibration (Buzzy) Versus Anesthetic Patch (EMLA) for Pain Prevention during cannulation in children: A randomized trial. Pediatr Emerg Care. 2019 Jun 6. N=607 children 18 months to 6 years. CHEOPS – eval pain relief, cannulation success, venous access times. Pain relief was not as effective with Buzzy; Time until cannulation was “effectively zero” with Buzzy, versus over one hour with EMLA. The cost of Buzzy for 1000 cannulations was equivalent to the cost of 25 EMLA patches.

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):33-9. (N=176, 7-12 y/o, significantly lower anxiety and pain in group using Buzzy.)

Cozzi G, Crevatin F, Dri V, Bertossa G, Rizzitelli P, Matassi D, Minute M, Ronfani L, Barbi E. Distraction Using Buzzy or Handheld Computers During Venipuncture. Pediatr Emerg Care. 2018 Dec 27 (N=200, Mean age=8, Buzzy = to handheld computer distraction, both statistically significantly less pain than control.)

García-Aracil N, Ramos-Pichardo JD, Castejón-de la Encina ME, José-Alcaide L, Juliá-Sanchís R, Sanjuan-Quiles Á. Effectiveness of non-pharmacological measures for reducing pain and fear in children during venipuncture in the emergency department: a vibrating cold devices versus distraction. Emergencias. 2018 Jun;30(3):182-185 (3 study groups, Reduced pain and fear in adults, Reduced pain in children)

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 Mar 17. (N=121, Buzzy = VR, both statistically significantly less pain than control.)

Inal S., Kelleci M. The Effect of External Thermomechanical Stimulation and Distraction on Reducing Pain Experienced by Children During Blood Drawing. Pediatr Emerg Care. 2020 Feb;36(2):66-69 (N=218, Control, Buzzy, DistrACTION cards, Buzzy + Distraction cards. All groups using Buzzy had significantly reduced pain ($P < 0.001$), Lowest pain measured w/ Buzzy in combination w/ DistrAction Cards.)

Inal S, Kelleci M. Relief of pain during blood specimen collection in pediatric patients. MCN Am J Matern Child Nurs. 2012 Sep;37(5):339-45. [Buzzy v. control, pediatric] (N=120, 6-12y/o, Lower pain ($p < .001$) and anxiety ($p < .001$) w/ Buzzy)

Kearl YL, Yanger S, Montero S, Morelos-Howard E, Claudius I. Does Combined Use of the J-tip® and Buzzy® Device Decrease the Pain of Venipuncture in a Pediatric Population? J Pediatr Nurs. 2015 Jul 27 [no sig. added benefit putting J-tip with Buzzy]

Küçük Alemdar D, Yaman Aktaş Y. The use of the Buzzy, Jet lidocaine, bubble-blowing and aromatherapy for reducing pediatric pain, stress and fear associated with phlebotomy. J Pediatr Nurs. 2019 Jan 30 S0882-5963(18)30352-X (N=195, 5-10 y/o, Significant difference in intervention and control groups, Buzzy made the most impact on reducing 26fear and pain ($p < 0.05$))

Moadad N, Kozman K, et al. Distraction Using the BUZZY for Children During an IV Insertion. J Pediatr Nurs. 2016 Jan-Feb;31(1):64-72. (N=48, 4-12 y/o, Buzzy significantly reduced pain)

Pakiş Çetin S, Çevik K. Effects of Vibration and Cold Application on Pain and Anxiety During Intravenous Catheterization. J Perianesth Nurs. 2019 Aug:34(4):701-709." Vibration and cold gel pack application is suggested to relive pain during IV catheterization in adults."

Potts, D., Davis KF, Fein J. A Vibrating Cold Device to Reduce Pain in the Pediatric Emergency Department: A Randomized Clinical Trial. Pediatr Emerg Care. 2019 Jun;35(6):419-425. (N=224, 4-18y/o, Buzzy equivalent to LMX for pain, satisfaction patients, satisfaction nurses. Time for IV procedure completion significantly shorter in group using Buzzy.)

Redfern RE, Micham J, Sievert D, Chen JT. Effects of Thermomechanical Stimulation During Intravenous Catheter Insertion in Adults: A Prospective Randomized Study. J Infus Nurs. 2018 Sept/Oct;41(5):294-300. (N=105 elective surgical adults, no mean pain score difference. "Higher preprocedural anxiety benefitted most.")

Schreiber S, Cozzi G, Rutigliano R, Assandro P, Tubaro M, Cortellazzo Wiel L, Ronfani L, Barbi E. Analgesia by cooling vibration during venipuncture in children with cognitive difficulties. Acta Paediatr. 2016 Jan;105(1):e12-6. [N=70, pediatric, severe cognitive impairment, "reported no or mild procedural pain in 32 cases (91.4%) in the Buzzy group and in 22 cases (61.1%) in the no-intervention group (p = 0.003)."]

Susam V. Friedel M, Basile P, Ferri P, Bonetti L. Efficacy of the Buzzy System for pain relief during venipuncture in children: a randomized controlled trial. Acta Biomed. 2018 Jul 18;89(6-S):6-16. N=72, Buzzy pain 3.65 v. Magic Glove 4.67, p=.039)

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 Distracting 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.)

Whelan HM, Kunselman AR, Thomas NJ, Moore J, Tamburro RF. The impact of a locally applied vibrating device on outpatient venipuncture in children. ClinPediatr (Phila). 2014 Oct;53(12):1189-95. [N=64, historic cohort study, no sig. pain difference but 81% phlebotomists said easier with Buzzy, pediatric.]

Yilmaz D., Heper Y., Gözler. Effect of the Use of Buzzy during Phlebotomy on Pain and Individual Satisfaction in Blood Donors. Pain Management Nursing. 2017 Aug;18(4):260-267. [N=90, Pain reduced, satisfaction increased, adult, ($p < .05$)]

*In Progress/Recruiting: Clark J. DHHS Buzzy for IV access pain relief in adults with cognitive difficulties.

*In Progress/Completed: Ronfani L, Garofolo B, Buzzy versus Distraction during venipuncture. N=200 NCT02969902

*In Progress/Completed: Stein K. Buzzy Use for IV access in Dentistry. University of Iowa College of Dentistry. NCT03619135

Injections

Alshawan M. A Prospective comparison between skin cooling and skin vibration in reducing the pain of local anesthetic injection. J Cosmet Dermatol 2019 Sept 26 e pub ahead of print. "Skin vibration may be more effective than skin cooling in alleviating the pain caused by local anesthetic infiltration. (Buzzy without ice).

*Canbulat Şahiner N, İnal S, Sevim Akbay A. The effect of combined stimulation of external cold and vibration during immunization on pain and anxiety levels in children. J Perianesth Nurs. 2015 Jun;30(3):228-35. [72-75% TDaP pain reduction, 7 year olds]

Canbulat Sahiner N, Turkmen AS, Acikgoz et al. Effectiveness of Two Different Methods for Pain Reduction During Insulin Injection in Children with Type 1 Diabetes: Buzzy and Shotblocker. Worldviews Evid Based Nurs 2018 Oct 11. Epub ahead of print. (N=60, Buzzy and Shotblocker both reduced pain compared to control.)

Redfern RE, Chen JT2, Sibrel S3. Effects of Thermomechanical Stimulation during Vaccination on Anxiety, Pain, and Satisfaction in Pediatric Patients: A Randomized Controlled Trial. J Pediatr Nurs. 2018 Jan-Feb;38:1-7 [N=50, pain significantly less (3.56 vs 5.92, p=0.015), pediatric]

Redfern RE, Micham J, Seegert S, Chen JT. Influencing Vaccinations: A Buzzy Approach to Ease the Discomfort of a Needle Stick – a Prospective, Randomized Controlled Trial. Pain Management Nursing, 2019 Apr;20(2):164-169. (N=497 pain 0.87 v 1.12 p=.035, better than previous experiences 62% Buzzy 23.9% control p<.0001.)

Rundell JD, Sebag JA, Kihm CA, Herpen RW, Vlahovic TC. Use of an external vibratory device as a pain management adjunct for injections to the foot and ankle. The Foot and Ankle Online Journal 2016 9 (4): 6 (N=108, 31.3% decrease in pain associated w/ injections in treatment vs control group)

Russell K, Nicholson R, Naidu R. Reducing the pain of intramuscular benzathine penicillin injections in the rheumatic fever population of Counties Manukau District Health Board. J Paediatr Child Health. 2014 Feb;50(2):112-7. [N=118, Nonadherent group, pain and fear reduced 50%, teens and adults]

Sahin M. Effect of Buzzy® application on pain and injection satisfaction in adult patients receiving intramuscular injections. Pain Management Nurs 2018 Dec:19(6):645. Diclofenac, (N=65, average age 52, Pain 74% reduced, satisfaction 95 v. 84. P<.001 both)

Sivri Bilgen B, Balci S. The Effect on pain of Buzzy and Shotblocker during the administration of intramuscular injections to Children: A randomized Controlled Trial. J Korean Acad Nurs 2019 Aug;49(4):486-494. "The children in the Buzzy group had significantly less pain than the children in both the Shotblocker and control groups p<.001."

Taddio A, McMurtry CM, Shah V, Riddell RP, Chambers CT, Noel M, MacDonald NE, Rogers J, Bucci LM, Mousmanis P, Lang E, Halperin SA, Bowles S, Halpert C, Ipp M, Asmundson GJ, Rieder MJ, Robson K, Uleryk E, Antony MM, Dubey V, Hanrahan A, Lockett D, Scott J, Votta Bleeker E; HELPinKids&Adults. Reducing pain during vaccine injections: clinical practice guideline. [includes "cold/vibration device"]

Yilmaz G, Alemdar DK. Using Buzzy, Shotblocker, and Bubble Blowing in a Pediatric Emergency Department to Reduce the Pain and Fear caused by intramuscular injection. A Randomized Controlled Trial. J Emerg Nurs. 2019 Sep;45(5):502-511. "Pain and fear were notably less in the group of children receiving the Buzzy intervention. **DISCUSSION:** The Buzzy intervention should be used when children are undergoing IM injections to reduce their levels of pain and fear."

Walter EB (Duke) Harrington T. (CDC) Preventing presyncope and syncope in adolescents using simple, clinic-based interventions: A pilot study. Duke/CDC NCT03533829 results: N=90. No presyncope or syncope in Buzzy or Buzzy + Music intervention. 1 syncope in Music only group.

*In Progress: Katia L, Joret I. Nantes University Hospital, France. Efficacy of the Buzzy® Device on the Prevention of Health Care Induced Pediatric Pain in a Vaccination Center (DOLVAX) NCT03220555

*In Progress: Mesterman R. Pain Perception of Children and Youth Receiving Non-sedated Botulinum Toxin-A Injections Using the Buzzy®. NCT02273284

*In Progress: Feasibility, Acceptability and Satisfaction of a New Device (Buzzy®) for Pediatric Procedural Pain and Anxiety Management During SQ, IV, and IM Needle-Related Procedures: A Pilot Study. NCT02771600

*In Progress: Steiner SJ, Riley Children's Hospital. Buzzy for patients with IBD – improvement of treatment with Humira or Remicade. Presentation at ImproveCareNow.

*In Progress: David Nash, Montefiore Medical Center. N=200. Vibration Analgesia in Propofol Infusion During Adult Anesthesia Induction (VAPI). NCT03509857

*In Progress: Marcio Boniatti, Hospital Nossa Senhora da Conceicao Rio Grande Do Sul, Brazil, Minimizing pain during childhood vaccination. Infants, outcome crying in seconds NCT03540589

*In Progress: Pfieffer Jennifer; Evaluation of Pain Alleviating Strategies During Allergy Shots Nemours Jackson Florida Buzzy v. Shotblocker NCT04181632

*In Progress: Ryan Cobb MD: Thermomechanical distraction and social anesthesia in interventional radiology Temple University, Philadelphia

*In Progress: Seda CEVHEROĞLU: The Effect of Three Different Local Cold Applications on Pain and Ecchymosis in Subcutaneous Heparin Injections: NCT04235244

Teaching Buzzy Technique, Lab Values and pharmacokinetic considerations

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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

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Hendriks J, Stals C, Versteilen A, Mommaas B, Verhoeven M, Tirion F, Haak MT, Ribbens W, Bosch M, Trommel M, Kostense S. Stability studies of binding and functional anti-vaccine antibodies. Bioanalysis. 2014 May;6(10):1385-93.

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

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Dermatology

Alshawan M. A Prospective comparison between skin cooling and skin vibration in reducing the pain of local anesthetic injection. J Cosmet Dermatol 2019 Sept 26 e pub ahead of print. “Skin vibration may be more effective than skin cooling in alleviating the pain caused by local anesthetic infiltration. (Buzzy without ice).

Itching

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Musculoskeletal

Marovino T., Majewski M. Pain Therapy Options for Home. Practical Pain Management 2019 Jan-Feb; 19(1):56-59. (pooled OR of reducing pain by 3 on a 10 pt scare 2.25 95%CI 1.34-3.77 p=.0021)

Dental Injections

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Bilsin E, Gungormus Z, Gungormus M. Efficacy of external cooling and vibration on decreasing the pain of local anesthesia injections during dental treatment in children: A randomized controlled study. J Perianesth Nurs 2020 Feb;35(1):44-47. External cooling and vibration had a significant effect on reducing injection pain during dental treatment.

Cox J., Salama F, Lancaster B.. Effect of Vibration-Cold on Behavior of Children Receiving Local Anesthesia. University of Nebraska College of Dentistry. New York: AAD 2012:A

DistrACTION Cards

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