

What's All the Buzzy About? Using Cryotherapy and Vibration for Pain During Vaccinations in Children

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Background & Significance

- Vaccinations are the most common painful needle procedure, with an estimated 12 billion injections given per year (McMurtry et al., 2018)
- Majority of these vaccinations occur in children between the ages of newborn and 18 years (CDC, 2019)
- Children often report receiving a shot as one of the most feared and painful experiences (McMurtry et al., 2015)
- Failure to implement evidence-based pain management strategies during these procedures can lead to high risk for the development of severe levels of needle fear (McMurtry, 2015)
- Needle phobias lead to negative consequences (McLenon & Rogers, 2018)

PICOT

In pediatric patients, under 7 years of age, receiving routine vaccinations (P), what is the effectiveness of using non-pharmacological Buzzy® device (I) compared to standard practice of no comfort policy (C) in helping to promote a decrease in pain measured by the FLACC or Wong-Baker Faces Scale (O) during an eight-week period (T)?

Literature Review

- Key Terms:** "Buzzy" OR vibrat* OR cryotherapy OR "cooling vibrat*" OR cool* AND (pain* OR discomfort) AND (vaccin* OR immun* OR inject* OR needle*)
- Limiters:** (a) scholarly (peer-reviewed) journals, (b) literature published from 2014 to 2019, (c) English language
- Inclusion Criteria:** (a) utilization of only Buzzy® (not in combination with other interventions), (b) participants were identified as pediatric patients (0 to 18 years old), (c) undergoing a needle-based procedure (IV, blood specimen collection, or vaccination/IM injection), and (d) identified pain as a major outcome being measured
- Exclusion Criteria:** (a) literature published before 2014, (b) non-English language, (c) inclusion of adult participants, (d) children with disabilities (mentally or medically)

Evidence Search Table

Database	Yielded	Duplicates	Reviewed	Accepted
Cochrane	68	8	13	6
JBI	32	0	1	0
CINAHL	31	11	12	1
Medline	30	13	13	0
ProQuest	30	1	1	0
Health Source	5	1	1	0
Citation Chasing	5	0	4	0
Total	201	34	45	7

Synthesis of Evidence

- Appraisal of Evidence**
 - Level of Evidence:** Evaluated and categorized using the Johns Hopkins Evidence-Based Practice: Research Evidence Appraisal Tool
 - Quality:** Johns Hopkins Evidence Based Practice: Research Evidence Appraisal Tool
 - (A) high quality, (B) good quality, or (C) low quality
- Major Themes**
 - Use of cryotherapy and vibration via the Buzzy™ device for pain during needle-based procedures
 - Measuring pain as the outcome
 - Pain management works best for children younger than nine years of age

Results of Literature Search

Level of Evidence	Included	Quality of Evidence	Study Designs
Level 1	1	A	Systematic Review
Level 1	3	A	Randomized Control Trial
Level 1	3	B	Randomized Control Trial

Decision to Change

- The clinic does not currently provide management of pain for children during vaccination
- Incorporating pain management strategies can be beneficial in helping to improve patient comfort and overall compliance as children get older
- Evidence-Based Practice Model: Johns Hopkins Nursing Evidence Based Practice Model

Implementation

- Project Setting:** Family practice office with one FNP and physician located in Northern Indiana
- Population:** Pediatric patients newborn to seven years of age who present for routine visit for vaccinations
- Design:** Pre-intervention, Post-intervention
 - Comparison:** 4 weeks pre-intervention; 4 weeks post-intervention
 - Time:** 8 weeks
- Intervention**
 - 30 minute educational in-service on use of Buzzy® device and pain scales
 - Guardian consent for approved use of Buzzy®
 - Use of Buzzy® device during vaccination
 - Pain scales for select age groups: Face Legs Activity Cry Consolability (FLACC) scale for <3 years of age and Wong-Baker FACES scale for ≥ 3 years of age

Outcomes

- Demographic Characteristics:** Age, gender, race, previous painful procedure, number of vaccinations being given
- Pain Measurement:** Assessed using FLACC or FACES scale based on age

Evaluation

- Demographics**
 - No significant difference in demographics for pre-intervention and post-intervention groups:
 - Age:** ($t(11, N=28) = 0.799, p > 0.05$)
 - Gender:** ($\chi^2(1, N=28) = 0.428, p > 0.05$)
 - Race:** ($\chi^2(3, N=28) = 2.82, p > 0.05$)
 - Previous Procedure:** All participants had no history of previously painful procedure
 - Number of Vaccinations:** ($t(11, N=28) = 1.23, p > 0.05$)

Primary Outcomes

- FLACC Score was significant for pre-intervention compared to post-intervention
 - ($\chi^2(4, N=18) = 12.48, p < 0.05$)
- FACES Score was not significant for pre-intervention compared to post-intervention
 - ($\chi^2(3, N=10) = 5.94, p > 0.05$)

Pain Scale	Included Participants	Mean Score
FLACC Pre	8	4.5
FLACC Post	10	1.2
FACES Pre	4	3.5
FACES Post	6	1.5

Conclusion and Recommendations

- Analysis of the primary outcomes demonstrated statistically significant improvement in pain scores for pediatric patients less than three years of age
- Implementation of cryotherapy and vibration during vaccinations can lead to better management of pain during needle-based procedures
- The family practice office has continued to use cryotherapy and vibration via the Buzzy® device
- Major limitations that were involved included a small sample size and limited time to test the same participants
- Future research for pain management strategies during needle-based procedures is still essential for improving patient comfort