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## Bubbles and Snuggles: Interventions to Reduce Pediatric Pain During Vaccination

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# Bubbles and Snuggles: Interventions to Reduce Pediatric Pain During Vaccination

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## Background

- Vaccines save approx. 42,000 lives every year, three times more than the use of seatbelts and child restraints.<sup>1</sup> Therefore, routine childhood vaccination is an important component of preventative care.
- Children will experience 27 well-child checks in their first 18 years of life, and receive about 29 immunizations by their sixth birthday.<sup>2,3</sup>
- Under-recognition of pediatric pain related to vaccination in the ambulatory care setting can lead to a cascade of negative impacts.
- The prevalence of this procedure in the ambulatory care setting, and the potential for improved outcomes through the introduction of non-pharmacological pain management strategies provides an opportunity for quality improvement (QI).

## Problem Statement

- Scope of the problem:** There is a wide research foundation surrounding pediatric procedural pain and the management of needle-related pain. However, there is lack of discussion surrounding the delivery of these interventions into ambulatory care settings.
- Purpose:** to introduce the use of age-appropriate comfort positioning, including breastfeeding, and distraction techniques to aid in the reduction of overall pain experienced by children receiving routine childhood vaccination in the primary care office.



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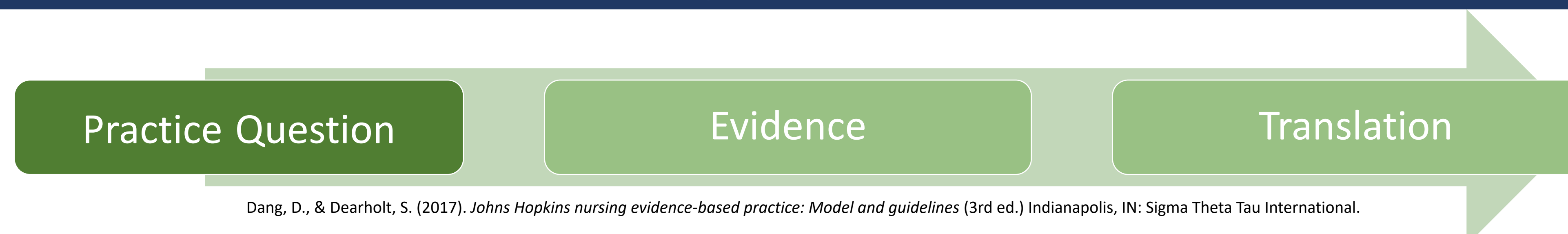
## Methods

- PICO:** In pediatric patients ages 2 months to 7 years receiving an immunization in the primary care setting, does the use of comfort positioning and distraction techniques reduce pain as measured by the Face, Legs, Activity, Cry, Consolability (FLACC) scale during immunization administration when compared to standard administration?
- Project Design:** A quality-improvement initiative aiming to systematically translate evidence-based research into a local setting in order to advance care quickly, and effectively
- A **systematic review** of the best available evidence was performed
  - Databases:** CINAHL, Medline, PubMed, Google Scholar, and PsychINFO
  - Search Terms:** pediatric, needle-related pain, procedural pain and distress, pain reduction, FLACC pain scale, distraction, comfort positioning, and breastfeeding
  - Inclusion criteria:** provided interventions including distraction or comfort positioning, age range of 2 months-7 years, English publication, appropriate setting (ambulatory care), exclusion of children with developmental delays, years 2013-2020
  - Evidence Based Practice Model Used:** Johns Hopkins Nursing Evidence Based Practice Model (JHNEBP)
  - Articles included:** A total of 17 articles were included in the evidence appraisal. Evidence ranged from JHNEBP Level 1-V, and comprised of A/B level evidence. Level C evidence excluded.

Level of Evidence	# of Studies	Summary of Findings	Overall Quality
Level 1	7	<ul style="list-style-type: none"> <li>Potential to reduce pain and distress supports the use of distraction in practice.<sup>4</sup></li> <li>Breastfeeding reduces behavioral pain response in infants up to 12 months.<sup>5</sup></li> <li>Overall evidence quality supporting the use of distraction is low and further study rigor is warranted.<sup>4</sup></li> </ul>	A
Level II	1	<ul style="list-style-type: none"> <li>Distraction, such as bubble blowing was useful during painful procedures and widely accepted by parents and nurses.<sup>6</sup></li> </ul>	B
Level III	2	<ul style="list-style-type: none"> <li>FLACC score is reliable and sensitive to detect pain during procedures, and has demonstrated intra and inter-rater agreement with children receiving immunization.<sup>7,8</sup></li> </ul>	B
Level V	7	<ul style="list-style-type: none"> <li>Most commonly used strategies for pain control during vaccination are distraction and comfort positioning.<sup>9</sup></li> <li>Selection of distraction tools should consider developmental stage of the child.<sup>10</sup></li> <li>When toddlers are being evaluated, it is helpful to include observational assessment of pain.<sup>11</sup></li> <li>FLACC scores recorded among children receiving distraction and comfort interventions decreased by 4.7 points from baseline group.<sup>3</sup></li> </ul>	B
Total	17		B

## Translation Model:

The Johns Hopkins Nursing Evidence Based Practice PET Process



Dang, D., & Dearholt, S. (2017). *Johns Hopkins nursing evidence-based practice: Model and guidelines* (3rd ed.). Indianapolis, IN: Sigma Theta Tau International.

## Intervention

- An evidence-based intervention using age-appropriate distraction tools and comfort positioning was implemented during routine vaccination at a rural family practice.
- A convenience sample of children between 2 months and 7 years old who presented to the a primary care office in rural, central Pennsylvania were included.
  - Staff at the clinic were educated by the DNP student regarding eligibility criteria, application of evidence-based interventions, and proper data collection.
  - Baseline data was collected for the control group (n=11) who received usual care (no intervention)
  - FLACC scores were recorded by the clinician one minute before, during, and one minute after immunization.
  - During intervention, the clinician chose a developmentally appropriate distraction tool such as bubbles or a light-up wand and the patient was placed in a position of comfort on the parents lap and observer-reported FLACC scores were collected at the above specified intervals.
  - Intervention group consisted of five participants (Data collection shortened by COVID-19 pandemic).



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## Results

- Sample:** Mean age of 2.5 years (SD 2.13), majority of the subjects were male (62.5%, n=10), Caucasian (93.8%, n=10), parents/caregivers reported their religious affiliation to be unknown or unspecified (81.3%, n=13)
- Control/Intervention Groups:** No statistically significant differences in the control or intervention group for age [ $t(14) = .705, p = .492.$ ], gender [ $\chi^2(1) = .95, p = .588$ ], ethnicity [ $\chi^2(1) = .485, p = 1.000$ ], or religious affiliation [ $\chi^2(1) = .2156, p = .214$ ].
- Data Analysis:** to make clinical sense, the “during” FLACC score was compared to the “before” FLACC score for each participant, and a “difference score” was calculated for each participant.
  - Mean difference scores:** There was a decrease in the mean FLACC pain scores when the control group was compared to the intervention group ( $M = 5.36, SD = 3.50$  vs  $M = 3.80, SD = 3.1$ )
  - Outcome Measure:** No statistically significant difference among the difference FLACC scores between the intervention and control groups ( $U = 21.50, Z = -.685, p = .49$ )
  - Effect Size:** Found to be small (Cohen’s  $d = 0.19$ )



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## Conclusion

- The use of evidence-based distraction and comfort positioning during pediatric vaccination may help to decreased pain scores when compared with no intervention. This presents a cost-effective, easy to implement, parent/clinician supported intervention to reduce pediatric procedural pain.
- Limitations:**
  - Small sample size and small effect size at single, rural site may limit generalizability of project findings
  - Timeline: Interventions did not capture peek immunization months (August-January)
  - Restricted opportunity for data collection due to COVID-19
  - Inability to capture patients who were eligible to use breastfeeding as a comfort position as recommended by the literature
- Recommendations:**
  - Practice:** Incorporate distraction tools and comfort positioning with routine vaccination procedures for the pediatric population.
  - Research:** Additional research is recommended with increased sample size, inclusion of breastfeeding, and implementation across multiple primary care and pediatric sites. A power analysis was completed and the required sample size for a future pilot study would be 79 participants per group (N=158) for a power of 80% and an alpha 0.05. To account for attrition, total sample of N=174 is recommended.

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