Creating an Intervention for Pediatric Pain Management Education in a School-Based Health Clinic

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NURS 703B: DNP Project

Spring Term, 2024

Submitted to: Dr. Rebecca Martinez, DNP Chair

Abstract

Background: Needle procedures, like immunizations and phlebotomy, are very common in outpatient settings that provide care to the pediatric population. Though much is known about the experience of pain and its management in this age group, there is a documented knowledge-to-action gap wherein the literature has not been translated into protocols for needle procedures. Current literature supports the use of an evidence-based, standardized pain management protocol for all needle procedures, and the evidence demonstrates that trainings, in-service presentations, and other educational interventions are effective in improving staff knowledge regarding pain management in the pediatric population.

Methods: This quality improvement project utilized the Kirkpatrick Model and the Iowa Model of implementation science to create and deliver an educational intervention for staff in an outpatient pediatric clinic. This intervention was designed to improve staff confidence and competence on the topic in preparation for the implementation of a standardized needle procedure protocol for pain management. This intervention was presented to staff on January 26, 2024. Participants were surveyed before and after the intervention to assess confidence and competence on the topic.

Results: Results suggest that the educational intervention increased confidence and competence of staff in providing evidence-based pediatric pain management during needle procedures and adapting to a new protocol. Overall, participants rated the intervention as helpful, useful, and important for application in other similar settings.

Conclusion: The educational intervention provided improved overall knowledge and readiness of staff to implement a new protocol for pediatric pain management, eliminating a barrier to the success of implementing a standardized protocol in this setting. This project can serve as a model for future interventions in similar settings designed to improve staff knowledge on pediatric pain management, assess barriers to protocol implementation, and evaluate the readiness of staff for a protocol/workflow change.

Introduction

Problem Description

Pain, anxiety, discomfort, and fear have been reported by both parents and children as major deterrents to immunizations, phlebotomy, and other needle procedures in the outpatient setting and can contribute to the development of negative associations with health care (Beirne et al., 2018; Cooper et al., 2021; Dalley et al., 2020; Dube et al., 2018; Ouach et al., 2018; Taddio et al., 2022c; Yui et al., 2022). Needle procedures are ubiquitous in primary care settings – most especially routine childhood immunizations, which significantly reduce morbidity and mortality related to infectious diseases, helping to lay a foundation for a long, healthy life (Echeverria-Londono et al., 2021). Immunizations prevent an estimated 2-3 million deaths worldwide annually, and improving global vaccine coverage could save an additional 1.5 million lives (Echeverria-Londono et al., 2021). Current evidence on pediatric pain management suggests that pain during needle procedures is a modifiable barrier to vaccination (MacKenzie et al., 2021; Ouach et al., 2018; Yui et al., 2022; Taddio et al., 2022c). Making immunizations and other needle procedures as comfortable, demystified, and pain-free as possible is a simple and achievable change that may improve vaccine uptake and help create a long-term positive association with health care in children of all ages (Beirne et al., 2018; Taddio et al., 2022c). Importantly, interventions aimed at doing so can be implemented at little or no cost (Taddio et al., 2015).

A standardized approach for needle procedures using age-appropriate non-pharmacological and pharmacological interventions to reduce pain, anxiety, and fear is an evidence-based intervention which has been successfully implemented in numerous inpatient and outpatient settings (Friedrichsdorf et al., 2018; Gudzak et al., 2022; Postier et al., 2018; Taddio et al., 2022a; Taddio et al., 2023; Tetui et al., 2022; Thacker et al., 2022; Trottier et al., 2019). Standardized approaches to pediatric pain management are

informed by an understanding of child development and a central principle of emotional safety (Association of Child Life Professionals, 2021).

The research consistently points to three main interventions for pediatric pain management of school-age children and adolescents: topical anesthetics, comfort positioning, and age-appropriate distraction (Association of Child Life Professionals, 2021; Ballard et al., 2019a; Friedrichsdorf, 2016; Friedrichsdorf et al., 2018; Ouach et al., 2018; Taddio et al., 2015; Taddio et al., 2022a; Yu et al., 2023; Yui et al., 2022). Despite what is known regarding pediatric pain management during needle procedures, a significant knowledge-to-action gap exists in practice due to a lack of knowledge translation of the evidence to healthcare staff (MacKenzie et al., 2022).

This project will explore the evidence for age-appropriate pediatric pain management during needle procedures and describe a pilot protocol based on the literature for a school-based health clinic (SBHC) setting, which will be presented to staff during an educational in-service.

Search Strategy

The CINAHL, PubMed, and Scopus databases were searched for peer-reviewed, English-language articles published after 2009. Keywords and MeSH terms included combinations of the following: pain, anxiety, fear, pediatrics, comfort, comfort promise, immunization, vaccination, needle, procedure, distraction, child, non-pharmacological interventions, pharmacological interventions, hesitancy, noncompliance, topical anesthetics, pain management, pain science, needle pain, immunizations and pain, procedural pain, comfort positioning, knowledge translation, Buzzy, Shot Blocker, meta-analysis, systematic review, randomized controlled trial, RCT. Findings from this review of the literature include six randomized controlled trials, two Cochrane Systematic Reviews, three metanalyses and systematic reviews, one clinical guideline, and a scoping review.

Available Knowledge

There is a robust body of knowledge on pharmacological and non-pharmacological interventions for pediatric pain management, including specifically for needle procedures in the pediatric population and the benefits of their use (Ballard et al., 2019a; Bradford et al., 2019; Olsson Duse et al., 2022; Friedrichsdorf et al., 2018; Friedrichsdorf & Goubert, 2020; Ouach et al., 2018; Yu et al., 2023). Despite what is known about this topic, healthcare providers often fail to discuss pain management options with parents and children ahead of time, or to provide interventions to mitigate pain and fear during needle procedures (Benoit et al., 2022; MacKenzie et al., 2021; Marseglia et al., 2019; Ouach et al., 2018; Taddio et al., 2022c; Thacker et al., 2022). This knowledge-to-practice gap has been successfully addressed in the literature via a standardized approach to needle procedures that prioritizes the patient's comfort and emotional safety and builds trust between providers, patients, and their families (Balice-Bourgois et al., 2019; Benoit et al., 2022; Friedrichsdorf et al., 2018; MacKenzie et al., 2021; Ouach et al., 2018).

Of the three modalities used to mitigate pain with immunization, age-appropriate distraction is featured most in the literature (Trottier et al., 2019). A Cochrane Systematic Review found distraction to be highly efficacious for reducing needle-related pain, distress, or both in children ages two to 19 (Birnie et al., 2018). Although this review found very low- to low-quality evidence to support its efficacy, the authors conclude that clear benefits combined with low risk justify its use (Birnie et al., 2018). Examples of appropriate distraction vary by age and developmental stage but include toys, books, pictures, verbal distraction, blowing bubbles, lollipops, stress balls, and the use of apps, music, videos, virtual reality, or games on electronic devices (Birnie et al., 2018; Bradford et al., 2019; Chumpitazi et al., 2021; Erdogan & Ozdemir, 2021; Friedrichsdorf et al., 2018; Pillai Riddell et al., 2022; Trottier et al., 2019). No form of distraction has been found to be superior to any other in all or most circumstances, so the intervention must be tailored to the patient (Birnie et al., 2018).

Comfort positioning is an effective pain and fear reduction strategy for all ages (Birnie et al., 2018; Taddio et al., 2015). For infants older than 6 months, children, and adolescents, sitting upright without being restrained has been shown to reduce distress and the perception of pain during needle procedures (Birnie et al., 2018; Friedrichsdorf et al., 2018; Taddio et al., 2015; Trottier et al., 2019; Wu et al., 2022). The absence of physical restraint increases the child's sense of control, decreasing fear and ameliorating the experience of pain (Taddio et al., 2015; Trottier et al., 2019). Comfort positioning often requires staff to partner with parents, as distress is further reduced by having a parent near the child, or, for younger children, having the child sit upright on a parent's lap (Friedrichsdorf et al., 2018; Taddio et al., 2015). Additionally, bolsters and pillows may provide greater flexibility with positions, further decreasing discomfort and anxiety (Friedrichsdorf et al., 2018).

Topical anesthetics and non-pharmacological pain-reducing devices are the broadest category of interventions, encompassing many different approaches. There is high quality evidence supporting the application of a topical anesthetic agent to numb the skin prior to a needle procedure for reduced pain; it is considered the gold-standard for needle procedures (Birnie et al., 2018; Dasarraju et al., 2020; Kohli et al., 2019; Sridharan & Sivaramakrishnan, 2018; Taddio et al., 2015; Trottier et al., 2019; Yu et al., 2023). A disadvantage of pharmacological topical anesthetics is the waiting period until therapeutic effect has been reached, which can be up to 60 minutes from application to the skin (Chumpitazi et al., 2021; Lepa et al., 2022). There are preparations of topical anesthetic with expedited onsets of action, allowing for faster accomplishment of anesthesia; however, these tend to be more expensive (Chumpitazi et al., 2021; Lepa et al., 2022; Trottier et al., 2019). Vapocoolant spray is a non-pharmacological topical anesthetic in which a blast of cold air is used to numb the skin, taking immediate effect. Vapocoolant sprays have limited evidence of efficacy in the literature; they are less efficacious than pharmacological topical anesthetics and more effective when used in combination with other pain management modalities (Chumpitazi et al., 2021; Friedrichsdorf & Goubert, 2020; Kohli et al.,

2019; Sridharan & Sivaramakrishnan, 2018). In the category of non-pharmacological devices, there is ample low-quality data on "Buzzy®" and "ShotBlocker" devices. Both rely on the gate control theory of pain by providing sensory stimulation to the nerve endings in the area of application, decreasing the perception of pain (Gürdap & Cengiz, 2022). Buzzy® (MMJ Labs, Atlanta, GA) is a palm-sized device that combines cold and vibration (Ballard et al., 2019a). ShotBlocker is a small, U-shaped plastic tool with rounded protrusions on the side that is applied to the skin (Gürdap & Cengiz, 2022). Buzzy® has demonstrated success: compared to no treatment, a systematic review and meta-analysis found that the device significantly reduced self-report of pain in several very low-quality trials (Ballard et al., 2019b). Additionally, RCTs found the device to be superior for pain reduction and in shortening completion time for IV insertion compared to topical anesthetics (AlHareky et al., 2021; Potts et al., 2019) and found the device to be superior for pain reduction to distraction cards and virtual reality (Erdogan & Ozdemir, 2021).

On the topic of facilitating knowledge translation to staff members in a healthcare setting, the literature suggests that it is necessary to first assess the baseline knowledge and readiness of staff to change and provide them with an educational intervention (Alzghoul & Abdullah, 2015; Cirik et al., 2019; Fenta et al., 2023; Gagnon et al., 2016; Schechter et al., 2010; Vagnoli et al., 2019). It is important that such an intervention dispel pervasive myths and update staff knowledge regarding pediatric pain and its management (Vagnoli et al., 2019). A 2016 systematic review found that the format of an in-service increased knowledge and confidence of healthcare professionals to assess and treat pediatric pain properly and promptly, increased the use of topical anesthetic and nonpharmacological strategies for pain management, and lowered patient pain scores (Gagnon et al., 2016). This review demonstrates that competence with and confidence in pediatric pain management can be assessed using many different measurements and can be improved using an educational in-service intervention.

Rationale

Literature suggests that an evidence-based protocol for pain management during pediatric needle procedures should be integrated into standard practice, and that an educational in-service would facilitate knowledge translation before the implementation of such a protocol (Balice-Bourgois et al., 2019; Benoit et al., 2022; Friedrichsdorf et al., 2018; MacKenzie et al., 2021; Ouach et al., 2018).

The frameworks used to guide the project were the Kirkpatrick Model and the Iowa Model of implementation science. The Kirkpatrick Model provided a metric for designing the educational in-service. Developed in the 1950s, it is a framework used to evaluate whether training and educational programs meet the needs and requirements of participants and has been applied to the evaluation of health care trainings (Dorri et al., 2016; Heydari et al., 2019; Savul et al, 2021; Shinohara et al., 2020; Smidt et al., 2009). The Kirkpatrick Model evaluates four criteria of educational interventions: reaction, which measures the participants' impressions of the intervention and is typically captured by a post-intervention evaluation of participants' impressions; learning, measured by the acquisition of knowledge; behavior, assessment of whether participants are able to apply their newly learned knowledge; and results, a measurement of the impact the training has had on the organization and its practices (Heydari et al., 2019; Smidt et al., 2009;). Behavior and results can be measured in a future project involving implementation of the protocol, which is beyond the scope of this current project.

The Iowa Model of implementation science supported the success of reaching this project's aim by defining the series of steps necessary to create sustainable organizational and practice change. Implementation science describes a process by which research can be translated into sustained organizational and practice changes which can create high-quality, evidence-base care environments (Tucker et al., 2021). Implementation science addresses knowledge-to-practice gaps through facilitation of evidence-based practice into clinical practice by utilizing strategies that identify key stakeholders in the change process, factors of the organization, staff, setting, and patient population, and barriers to implementation (Tucker et al., 2021). The Iowa Model is an implementation science model which

features a step-by-step approach involving identifying an issue, synthesizing the body of evidence on the topic, and designing the practice change protocol (Cullen et al., 2022).

Specific Aims

This project aimed to create, facilitate, and evaluate the success of an educational in-service for SBHC staff focused on pediatric pain science and management during needle procedures by January 26th, 2024. The in-service goal was to improve knowledge of the subject of pediatric pain management, increase staff confidence in creating process change at the SBHC, and identify perceived barriers to process change. Its long-term aim is successful implementation of a protocol for needle procedures at the SBHC.

Methods

Setting

The setting for this project was one of Multnomah County's nine SBHCs. The county's clinics are Federally Qualified Health Centers (FQHCs) that serve any community youth in kindergarten through 12th grade, regardless of their school of enrollment. Although the clinic is in a high school, most patients are younger children accompanied by their parent(s). The clinics are full-service medical centers, complete with laboratories, phlebotomy, behavioral health staff, and frequently ordered medications in stock. The services most frequently provided include school immunization visits, annual wellness visits, prescription medication refills, sports physicals, mental and behavioral health services, visits for illness or injury, confidential family planning visits for adolescents, physical and mental health screenings, routine laboratory tests, health education and wellness promotion, and referrals to outside providers. The SBHC which piloted this program has one pediatric nurse practitioner, one medical assistant, one front desk staff member, one behavioral health (BH) staff member two days a week, and occasional support from a registered nurse (RN) or licensed practical nurse (LPN).

The county's SBHCs are funded by Medicaid programs, private insurance reimbursement, financial support from the county health department and a variety of grant programs. Insurance is not required to be seen at these clinics. The clinics serve many lower-income individuals, sometimes serving as their primary care home, and newly arrived immigrants, for whom the clinic may be their first interaction with healthcare in America.

Interventions

The intervention of this project provided a one-hour educational in-service to SBHC staff on January 26, 2024, utilizing pre- and post-intervention surveys (Appendix A) to evaluate respondents' baseline competence on the subject, and level of confidence in creating change, before and after the in-service intervention. Development of the educational intervention was guided by literature on models and frameworks involving education-based interventions aimed at increasing healthcare staff competence and confidence (Alzghoul & Abdullah, 2015; Cirik et al., 2019; Fenta et al., 2023; Gagnon et al., 2016; Schechter et al., 2010; Vagnoli et al., 2019). This intervention was expected to improve staff members' competence and confidence with pediatric pain management during needle procedures and lay the groundwork for future successful implementation of a protocol. The presentation, entitled "'Comfort Promise': A Roadmap to Implementing Pain Management for Kids at Centennial," prepared staff with current evidence for best practices in mitigating pediatric pain and fear during needle procedures (Appendix B). The presentation created for the intervention was based on the literature review findings, focusing on the three pediatric pain management interventions relevant for the population at the SBHC. The example protocol presented during the in-service was guided by concepts from successfully implemented pediatric pain management programs, such as the program implemented at Children's Hospitals and Clinics of Minnesota, a hospital-based, system-wide quality improvement initiative to standardize the approach to needle procedures (Friedrichsdorf et al., 2018).

The protocol was tailored to reflect the specific clinic's needs, gathered via informal check-ins with the lead provider.

The presentation also included an evidence-based needle procedure protocol designed as an example for the clinic, including: (1) a suggested standardized workflow, (2) example scripts for staff and providers, and (3) a "menu" of options for children and their families to use when deciding which interventions they want, as well as educational materials for the clinic waiting room (Appendix C). During the in-service, staff discussed case studies as a group to explore the presented science in depth. The pre- and post-intervention surveys, presentation PowerPoint, proposed protocol, example scripts for staff and providers, and educational materials for parents and patients were reviewed by SBHC staff before the in-service was conducted.

Several validated tools for measuring attitudes, knowledge, practices, and beliefs of healthcare workers about pain and pain management were reviewed in the development of pre- and post-intervention knowledge assessments and confidence surveys. The Knowledge, Attitude, and Practices (KAP) model utilizes a Likert Scale self-report questionnaire which has been shown to independently predict nurses' practices of pain management based on their attitude towards it (whether they are more or less favorable towards performing pain management) and their knowledge of pain management (Alzghoul & Abdullah, 2015). The Pediatric Pain Management Knowledge Scale developed by Aydın & Bektaş was designed to be an objective measurement tool for assessment of pediatric pain management knowledge of all healthcare workers (2021). A questionnaire developed by researchers about knowledge, practices, and beliefs about pain in pediatric nurses was also consulted to develop the pre- and post-intervention knowledge assessments and confidence surveys (Cırık et al., 2018). The Knowledges and Attitudes Survey Regarding Pain (KASRP) tool has been used since 1987 and revised over the years to reflect current knowledge (Ferrell, 2014). KASRP was modified in the creation of the Pediatric Healthcare Provider's Knowledge and Attitudes Survey Regarding Pain (PHPKAS), which has

been used to assess multiple healthcare team members' knowledge about pediatric pain management (Manworren & Laprise, 2021). Based on these scales, two separate surveys were created featuring multiple-choice and Likert Scale questions and fill-in-the-blank, open-ended spaces for comments.

Study of the Interventions

Pre- and post-intervention knowledge questions evaluated knowledge acquisition (competence) while others assessed belief in the ability of staff and the clinic to adapt the change in protocol (confidence). Feedback questions assessed attitudes towards the protocol and presented information. Analyses of the results of the pre- and post-intervention competence surveys assessed the increase in the number of questions answered correctly between the participant-completed pre- and the post-intervention surveys. Analyses of the results of the pre- and post-intervention confidence surveys assessed the qualitative readiness and confidence of staff in implementing and sustaining the new protocol. Fill-in-the-blank questions included in the post-survey assessed concerns and perceived barriers and the readiness of staff and providers to implement the program.

Measures

The primary outcome measures utilized are competence and confidence. Competence was reflected in an increase in correct answers on the knowledge assessment questions in the post-surveys versus the pre-surveys. Competence in this case is defined as demonstrating the knowledge needed to perform to the expectations of the protocol, in consistency with the evidence (Levine & Johnson, 2014). A subjective increase in confidence was also measured by comparing questions on the pre- and post-surveys. Confidence, identified more commonly in the literature as self-efficacy, was defined as belief in the ability to perform the recommended skills and activities in alignment with the evidence, as well as a positive attitude towards overcoming anticipated barriers (Gagnon et al., 2016; Landsverk et al., 2023).

Both pre- and post-intervention surveys included open-ended questions about perceived barriers to success of the protocol, with the goal of increasing stakeholder investment in the success of

the project and reducing barriers to its successful implementation. All patient-facing staff members and providers were considered stakeholders in this project. Lastly, the survey elicited feedback about the educational in-service itself.

Analysis

Data was collected through pre- and post-intervention surveys administered to all stakeholders who attended the in-service. Respondents on both pre- and post-intervention surveys were asked to generate an anonymous identifier consisting of the last three numbers of their phone number and the first letter of their middle name. The results were compiled in an Excel spreadsheet and organized with the oversight of an Oregon Health and Science University (OHSU) statistician. Due to the small sample size, the raw data was compared rather than averages or scores. Questions from the confidence block, including fill-in-the-blank questions, were reviewed for common themes to assess confidence in the project and in staff's ability to create process change. Questions from the competence block were compared to reflect differences between the pre- and post-intervention surveys that reflect increased competence.

Bar charts and tables were created to reflect these comparisons and to highlight areas of change between the pre- and post-intervention surveys (Appendix D).

Ethical Considerations

The in-service intervention included anonymized surveys of SBHC staff only and did not include any data on patients or families. Ethical considerations for the educational in-service included protecting participant confidentiality and proper de-identification of data, ensuring the appropriate handling of data. Participation was voluntary, and responses were anonymous. Pre- and post-intervention surveys were linked only through an anonymous identifier. The project champion at the SBHC signed a letter of support for the project (Appendix E). The project proposal was submitted to the OHSU Investigational

Review Board (IRB) and the Multnomah County IRB and met exemption criteria as nonhuman research (Appendix F).

Results

Six individuals received invitations via email for the in-service, including Multnomah County clinic providers, behavioral health staff, support staff, and administrative and managerial staff. Of those, four completed the pre-intervention survey sent out in the same email. Three individuals were present for the in-service: the pediatric nurse practitioner, medical assistant, and administrative staff member of the project site. All three in attendance completed the post-intervention survey.

Pre-Intervention Survey: Confidence

Of the four pre-survey respondents, only one had received previous training in pediatric pain science or management; this respondent elaborated that their training consisted of “nursing required pain management.” 75% of pre-survey respondents did not feel confident in the clinic’s current workflow for pain management during needle procedures.

Of respondents who work in a clinical capacity, two strongly agreed and one somewhat agreed with the statement: “I am confident with my current ability to decrease patients' **pain** during needle procedures” on the pre-intervention survey.” The statement, “I am confident with my current ability to decrease patients' **fear/anxiety** during needle procedures” saw the same three respondents answering, “disagree, “agree,” and “strongly agree.” This indicates less confidence among the group in their ability to decrease fear/anxiety versus pain. All three strongly agreed they could learn better ways to manage pain during needle procedures.

Two items assessed confidence regarding a new workflow for needle procedures, each with three respondents. One item assessed respondents’ confidence in their ability to adapt to a new workflow; two strongly agreed and one agreed. The second item assessed respondents’ confidence in the clinic’s ability to change the current workflow; one still strongly agreed, one responded, “agree,”

and the other, “somewhat agree.” This reflects a lower confidence in the clinic’s ability to change the workflow than in the individual’s own capacity for adapting to a new workflow.

Of the evidence-based interventions for pediatric pain management, 50% responded that they were aware of vapocoolant spray, 100% were aware of distraction techniques, 75% were aware of positional techniques, and 75% were aware of pain reduction devices, with three mentioning the Shot Blocker device and two mentioning the Buzzy Bee device.

Respondents’ beliefs about barriers to these interventions are described in-depth in Table 1 in Appendix H. In summary, none of the respondents believed time or staffing would be barriers to their use. Most did not believe there were any barriers to using any of the interventions. The most commonly identified barrier was cost (2 respondents), which was not listed as an item on the survey but was written into the blank text entry box under “other.” Respondents also named “infection prevention” as a barrier to the use of pain reduction devices and policy-related barriers to the use of vapocoolant spray.

Post-Intervention Survey: Confidence

Of the three respondents who filled out the post-intervention survey, the responses to the question, “How well did the training prepare you to implement a new workflow related to Comfort Promise?” were “very well,” “extremely well,” and “moderately well.” Two of the three felt it was “extremely important” to implement this workflow at other SBHCs and one felt it was “very important.”

All three respondents to the post-intervention survey responded “definitely yes” to the following six questions:

- “Did this presentation improve your confidence in providing adequate pain management?”
- “Did this presentation improve your confidence in the clinic's ability to implement a new workflow?”
- “Did this presentation improve your understanding of pediatric pain science?”
- “Did this presentation improve your understanding of pain management options?”

- “Did this presentation improve your confidence in describing the options to patients?”
- “Did this presentation improve your readiness to follow the new workflow being proposed?”

Pre- and Post-Intervention Surveys: Comparison of Competence Measures

Unmatched Comparison

All respondents answered the four true/false questions, the Covid vaccine case study question, and the 5-year-old vaccine case study question correctly in both pre- and post-intervention surveys. On the choose-all-that-apply questions regarding which interventions are appropriate in each case study, the percentage of participants who selected each correctly applicable intervention increased between pre- and post-intervention surveys in almost every case. The exception is that none of the post-intervention survey respondents selected “increased rate of mental illness” and “decreased cognitive functioning” as possible long-term consequences of poorly treated/untreated pediatric pain, even though this information was included in the presentation and 50% selected the former, 25% the latter on the pre-intervention survey.

Matched Comparison

We can compare the data from one respondent who correctly filled out the anonymous identifier. In the pre-survey, Participant 1 replied, “I don’t know” to the statement, “It is ideal to "get it over with" as quickly as possible when it comes to needle procedures.” In the post-survey, the same respondent replied “strongly disagree” to the same statement. Similarly, this respondent shifted on the item, “Explaining options for pain management to children and adolescents before needle procedures will scare them” -- from, “I don’t know” to, “disagree.” Among multiple choice questions, the same trend was observed. This respondent rightly selected, “Decreased cognitive functioning,” and, “Increased pain sensitivity/lower pain threshold” among other correct choices as a possible long-term consequence of poorly treated/undertreated pain in the pediatric population in their post-intervention survey. They did

not include either item in their pre-intervention survey, suggesting that they learned from the presentation.

Participant 2's survey responses also indicate shifts after the intervention, though inconsistently and not in alignment with the respondent's other write-in comments or with discussion during the presentation, suggesting that the respondent incorrectly chose "strongly disagree" when they may have intended to choose "strongly agree" on a few items.

Training Feedback

Of the text entry feedback questions on the post-intervention survey, respondents offered the following suggestions for improving the presentation provided: "cold spray and shot blocker training," and "I would like to have had demonstration of how to use items that we are offering." One respondent offered the following response to the question regarding improvement of the provided sample workflow: "Workflow looks great, will implement with a PDSA." In response to the question about which, if any, of their questions about the workflow were left unanswered by this training, two left the item blank and one wrote, "None." The optional fill-in-the-blank question at the end of the survey provided for any miscellaneous questions or feedback had only one respondent, who stated, "Great job today! So excited to get this new project off and running as we enter immunization exclusion dates!!"

Discussion

Summary

This project created and presented an educational intervention to improve staff knowledge of evidence-based pediatric pain science and gauge readiness for a new pediatric pain management protocol for needle procedures at the clinic. The goal of this project was to lay the groundwork for this process change and provide a recommended workflow, scripts, and educational materials for patients to facilitate the protocol's implementation. Pre- and post-intervention surveys were conducted and analyzed to assess the success of this intervention.

Interpretation

The purpose of the anonymous identifier-generating question on the surveys was to link pre- and post-intervention surveys anonymously for direct comparison. However, due to an extra respondent on the pre-intervention survey who did not attend the in-service nor fill out the post-intervention survey, and one respondent's incorrect usage of the anonymous identifier-generating question on either the pre- or post-survey, only two participants' identifiers matched between surveys. Therefore, it was only possible to directly compare two participants' pre- and post-intervention data. In addition, it seems likely that one of the two correctly identified and paired respondents made errors on the post-survey (selecting "strongly disagree" when it is most likely they meant to select "strongly agree," based on their pre-survey responses, discussion during the in-service, and fill-in-the-blank comments). These factors impact this author's ability to accurately interpret the results.

Despite this, and the small sample size of participants, the results suggest that staff confidence was increased by the intervention. This is a meaningful target, as only one of the four total surveyed before the intervention responded that they were confident in the current clinic workflow for pain management during needle procedures. The pre-intervention survey revealed high confidence in each respondent's ability to adapt to a new workflow, with slightly decreased confidence in the clinic's ability to change the workflow for needle procedures. 100% of the participants in the post-survey felt that the presentation "definitely" improved their confidence in providing and describing pain management options to their pediatric patients and the clinic's ability to adapt to a new workflow and improved their understanding of pediatric pain science and pain management options. Importantly, 100% felt it improved their readiness to follow the proposed workflow, suggesting that the in-service helped respondents feel ready to implement a new protocol for pediatric pain management. All respondents assigned a high level of importance to implementing such a workflow at other SBHCs in the post-survey,

suggesting that there is confidence among respondents that this type of a project is feasible for school-based health centers.

Competence appears to have been increased to a much lesser degree. Participants correctly answered multiple knowledge assessment items both before and after the intervention. This may be due to a higher-than-expected baseline knowledge of staff before the intervention, or that the questions were not challenging enough to demonstrate the learning acquired. In the matched comparison of pre- and post-intervention competence blocks, Participant 1's responses shifted in such a way as to suggest the respondent's post-intervention perceptions of pediatric pain management aligned with the evidence base due to the educational intervention. Among multiple choice questions, the same trend was observed for this participant.

A common theme among respondents was a desire to better understand the interventions offered via a demonstration and/or training component as part of the presentation. Participants had concerns about cost, infection prevention, and clinic policies as potential barriers to intervention use, but were not concerned about insufficient staffing or time to implement the interventions. Participants seemed overall to believe the workflow was feasible and a desirable improvement to the services the SBHC offers for pediatric pain management.

Limitations

The aforementioned issues regarding the anonymous identifier and possible incorrect responses limit the interpretation of the data and certain inferences that might be gleaned from it. The survey questions may have been made clearer and plainer to avoid interpretation errors; namely, the avoidance of double negatives might have improved readability. Due to last-minute schedule changes and clinic xing needs, the sample size of participants was smaller than originally planned, which also limits the usefulness of the results.

While the literature supports many different strategies, skills, and tools for pediatric pain management, the SBHC that was the site of this project was limited by budgetary concerns and could therefore only acquire some of the recommended items. Additionally, some items were impractical for use in the context of the clinic, such as the Buzzy Bee; due to the ice pack component that requires freezing, the device would not remain frozen when there were many needle procedures scheduled in a row without time to place it in the freezer between patients.

Because of the time limitations surrounding project completion and the project champion's absence for part of 2023 due to a family matter, the original project had to be pared down. Instead of culminating with the implementation of a new protocol for pediatric pain management, the project focused on education and assessment of knowledge and confidence of staff.

Lastly, tailoring an educational intervention to an interprofessional audience composed of clinicians, support staff, and administrative staff yielded content that was necessarily more general and less scholarly, perhaps resulting in incomplete or insufficient knowledge translation for clinicians.

Conclusions

The ability to draw conclusions from the data collected was hindered by a very small sample size of three participants and the challenges related to survey execution. The dynamic nature of healthcare workplaces can interfere with attendance at extramural meetings. Because of last-minute staff absences and other pressing clinic needs, the in-service was poorly attended. The low attendance rate at the in-service impacted the ability to glean inferences from comparing the pre- and post-intervention data.

Data collected and analyzed suggest that this intervention could be successfully repeated in another setting in preparation for the introduction of a pediatric pain management protocol and may help address knowledge gaps and other barriers to implementation of such a protocol. A project focused on studying the future implementation of a protocol in this setting would be a next step that may help

identify more specifically the needs of the clinic and staff to successfully integrate a standardized pediatric pain management approach to every needle procedure.

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Appendix A: Surveys

Pre-Intervention Survey

OHSU

Screener

Evidence-Based Pediatric Pain Management: Comfort Promise

The purpose of this survey is to assess your knowledge about pediatric pain management options and your confidence in the success of a new proposed workflow before a training and presentation is provided on the topic. It should take only 5 to 8 minutes.

Your feedback is anonymous and individual responses will not be associated with your name or identity.

Please write the last 3 digits of your cell phone number and the first letter of your middle name. If you have no middle name, use X. This will be the anonymous ID assigned to your pre- and post-surveys. Example: 567S

Do you perform needle procedures (immunizations, blood draws) at the clinic?

- ○ Yes
- ○ No

Confidence Block

Are you confident in the current clinic workflow for pain management during needle procedures for our pediatric patients?

- ○ Yes
- ○ No
- ○ I'm not sure

Have you had previous training in pediatric pain science or management?

- ○ Yes
- ○ No

Please describe the nature of the training(s) you have received and what year(s) you received it.

Are you aware of the option of using vapocoolant (cold) spray to numb the skin before performing needle procedures?

- ○ Yes
- ○ No

Do you think any of the following are barriers to using vapocoolant (cold) spray in the clinic setting before performing needle procedures? Select all that apply.

	Yes, this is true	No, this is not true
It takes too much time to prep	○	○
It takes too much time to take effect (cause numbing)	○	○
It does not improve the child's experience	○	○
I don't think it would help decrease pain	○	○
I don't think there are any barriers	○	○
Other - please elaborate	○	○

Are you aware of the use of distraction techniques (lollipops, stress balls, toys, blowing bubbles, etc.) to reduce pain during needle procedures?

- ○ Yes
- ○ No

Which, if any, distraction technique(s) are you familiar with? Check all that apply.

- ☐ Candy (sour lollipops, gum)
- ☐ Blowing bubbles
- ☐ Squeeze/stress balls
- ☐ Fidget toys
- ☐ Providing headphones
- ☐ Music
- ☐ Games
- ☐ Books
- ☐ Video
- ☐ [ ] Other - please elaborate

Do you think any of the following are barriers to using distraction techniques in the clinic setting during needle procedures? Select all that apply.

	Yes, this is true	No, this is not true
It takes too much time to use distraction techniques	○	○
It does not improve the child's experience	○	○
I don't think it would help decrease pain	○	○
There isn't enough staff support to do this	○	○
I don't think there are any barriers	○	○
Other - please elaborate [ ]	○	○

Are you aware that there are different positional techniques to reduce pain during needle procedures?

- ○ Yes
- ○ No

Do you think any of the following are barriers to using positional techniques in the clinic setting during needle procedures? Check all that apply.

	Yes, this is true	No, this is not true
It takes too much time to use positional techniques	○	○
It does not improve the child's experience	○	○
I don't think it would help decrease pain	○	○
There isn't enough staff support to do this	○	○
I don't think there are any barriers	○	○
Other - please elaborate [ ]	○	○

Are you aware of the option of using pain reduction devices (Buzzy Bee, ShotBlocker, etc.) to reduce pain during needle procedures?

- ○ Yes
- ○ No

Which, if any, pain reduction device(s) are you familiar with? Check all that apply.

- ☐ Buzzy Bee device
- ☐ Shot Blocker device
- ☐ [ ] Other - please elaborate

Do you think any of the following are barriers to using a pain reduction device in the clinic setting during needle procedures? Select all that apply.

	Yes, this is true	No, this is not true
It takes too much time to use pain reduction devices	○	○
It does not improve the child's experience	○	○
I don't think it would help decrease pain	○	○
There isn't enough staff support to do this	○	○
I don't think there are any barriers	○	○
Other - please elaborate [ ]	○	○

Competence Block

Indicate how much you agree or disagree with the following statements. Note: "needle procedures" means immunizations and blood draws (phlebotomy). If you do not perform needle procedures, you may select "N/A."

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree	N/A
I am confident with my current ability to decrease patients' pain during needle procedures.	○	○	○	○	○	○	○	○
I am confident with my current ability to decrease patients' fear/anxiety during needle procedures.	○	○	○	○	○	○	○	○
I could learn better ways to manage my patients' pain during needle procedures.	○	○	○	○	○	○	○	○
I am confident in the clinic's ability to change the workflow for needle procedures.	○	○	○	○	○	○	○	○
I am confident in my ability to adapt to a new workflow for needle procedures.	○	○	○	○	○	○	○	○

Indicate how much you agree or disagree with the following statements. Note: "needle procedures" means immunizations and blood draws (phlebotomy). **Please answer even if you do not perform needle procedures.**

	Strongly disagree	Disagree	Somewhat disagree	I don't know	Somewhat agree	Agree	Strongly agree
It is ideal to "get it over with" as quickly as possible when it comes to needle procedures.	○	○	○	○	○	○	○
Distraction or other nonpharmacological techniques can help ease the patient's pain and fear during needle procedures.	○	○	○	○	○	○	○
Explaining options for pain management to children and adolescents before needle procedures will scare them.	○	○	○	○	○	○	○
It is important to involve patients and their family members in their care when it comes to needle procedures.	○	○	○	○	○	○	○
Pediatric patients accurately report their pain and/or when they are feeling scared.	○	○	○	○	○	○	○
It is always obvious when needle procedures are scary or painful for a patient.	○	○	○	○	○	○	○

Indicate how much you agree or disagree with the following statements. Note: "needle procedures" means immunizations and blood draws (phlebotomy). **Please answer even if you do not perform needle procedures.**

	Strongly disagree	Disagree	Somewhat disagree	I don't know	Somewhat agree	Agree	Strongly agree
Holding a child down during immunizations does not increase pain levels.	○	○	○	○	○	○	○
Age and developmental level of the child should be considered in determining pain management strategies for needle procedures.	○	○	○	○	○	○	○
Pain is an inevitable part of needle procedures.	○	○	○	○	○	○	○
The position a patient is in during their needle procedure can make a difference in their pain.	○	○	○	○	○	○	○
Explaining how the needle procedure will help them and what it will do/be used for helps patients feel positively about their experience.	○	○	○	○	○	○	○

A 5-year-old presents for her required school immunizations with her father. What is the best age-appropriate position for this patient to receive her vaccines?

- ○ Her father should pin her arms to her sides while she's on his lap, so she can't move and cause a needle stick injury
- ○ She should lay down on the exam table during the vaccination so she is as still as possible; her father can help if she won't stay still
- ○ She should sit upright on the table; her father should not interfere by sitting near or holding her down
- ○ She should be given the choice to sit upright on her own, or upright on her father's lap, and no one should restrain her

What interventions would you offer this 5-year-old patient to help with pain and anxiety related to vaccination? Check all that apply.

- ☐ Sour lollipops
- ☐ Blowing bubbles
- ☐ Buzzy Bee
- ☐ Fidget toy
- ☐ Vapocoolant/cold spray
- ☐ Discussing their options with them beforehand

A 14-year-old is scheduled for his first Covid vaccine and is coming in during a break between classes. He is only getting the Covid vaccine and nothing else today. He is worried about pain and wants pain management for the vaccination. Is topical vapocoolant (cold) spray appropriate for him?

- ○ Yes, if he wants it
- ○ No, that's used for younger kids

What else might be appropriate for the 14-year-old? Check all that apply.

- ☐ Sour lollipops
- ☐ Blowing bubbles
- ☐ Buzzy Bee
- ☐ Squeeze/stress ball
- ☐ Fidget toy
- ☐ Headphones/listening to music
- ☐ Playing a handheld video game
- ☐ Vapocoolant/cold spray
- ☐ Sitting upright
- ☐ Discussing their options with them beforehand

What are some of the possible long-term consequences of poorly treated/untreated pain in the pediatric population? Check all that apply.

- ☐ Fear and avoidance of healthcare setting
- ☐ Needle phobia
- ☐ Addiction issues
- ☐ Increased pain sensitivity/lower pain threshold
- ☐ Decreased pain sensitivity/higher pain threshold
- ☐ Decreased cognitive functioning
- ☐ Increased rate of mental illness

Providing children with education and printed materials explaining pain management options before needle procedures has been shown to improve their experience.

○ True
○ False

Because of their underdeveloped nervous systems, young children have decreased pain sensitivity and decreased capacity to remember pain.

○ True
○ False

Untreated pain can make a child anxious, depressed, or fearful about health care.

○ True
○ False

When managing pain in children/adolescents, only one type of pain relief should be used at a time.

○ True
○ False

Post-Intervention Survey

Post Screener

Evidence-Based Pediatric Pain Management: Comfort Promise

The purpose of this survey is to collect feedback on your recent training and assess your knowledge and confidence after receiving the training. It should take only 5 to 8 minutes.

Your feedback is anonymous and individual responses will not be associated with your name or identity.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree	N/A
I am confident with my current ability to decrease patients' pain during needle procedures.	○	○	○	○	○	○	○	○
I am confident with my current ability to decrease patients' fear/anxiety during needle procedures.	○	○	○	○	○	○	○	○
I am confident in the clinic's ability to change the workflow for needle procedures.	○	○	○	○	○	○	○	○
I am confident in my ability to adapt to a new workflow for needle procedures.	○	○	○	○	○	○	○	○

Please write the last 3 digits of your cell phone number and the first letter of your middle name. If you have no middle name, use X. This will be the anonymous ID assigned to your pre- and post-surveys. Example: 567S

Do you perform needle procedures (immunizations, blood draws) at the clinic?

○ Yes
○ No

Competence Block 1-19

Indicate how much you agree or disagree with the following statements. Note: "needle procedures" means immunizations and blood draws (phlebotomy). If you do not perform needle procedures, you may select "N/A."

Indicate how much you agree or disagree with the following statements. Note: "needle procedures" means immunizations and blood draws (phlebotomy). **Please answer even if you do not perform needle procedures.**

	Strongly disagree	Disagree	Somewhat disagree	I don't know	Somewhat agree	Agree	Strongly agree
It is ideal to "get it over with" as quickly as possible when it comes to needle procedures.	○	○	○	○	○	○	○
Distraction or other nonpharmacological techniques can help ease the patient's pain and fear during needle procedures.	○	○	○	○	○	○	○
Explaining options for pain management to children and adolescents before needle procedures will scare them.	○	○	○	○	○	○	○
It is important to involve patients and their family members in their care when it comes to needle procedures.	○	○	○	○	○	○	○

	Strongly disagree	Disagree	Somewhat disagree	I don't know	Somewhat agree	Agree	Strongly agree
Pediatric patients accurately report their pain and/or when they are feeling scared.	○	○	○	○	○	○	○
It is always obvious when needle procedures are scary or painful for a patient.	○	○	○	○	○	○	○

Indicate how much you agree or disagree with the following statements. Note: "needle procedures" means immunizations and blood draws (phlebotomy). **Please answer even if you do not perform needle procedures.**

	Strongly disagree	Disagree	Somewhat disagree	I don't know	Somewhat agree	Agree	Strongly agree
Holding a child down during immunizations does not increase pain levels.	○	○	○	○	○	○	○
Age and developmental level of the child should be considered in determining pain management strategies for needle procedures.	○	○	○	○	○	○	○
Pain is an inevitable part of needle procedures.	○	○	○	○	○	○	○
The position a patient is in during their needle procedure can make a difference in their pain.	○	○	○	○	○	○	○
Explaining how the needle procedure will help them and what it will do/be used for helps patients feel positively about their experience.	○	○	○	○	○	○	○

A 5-year-old presents for her required school immunizations with her father. What is the best age-appropriate position for this patient to receive her vaccines?

- ○ Her father should pin her arms to her sides while she's on his lap, so she can't move and cause a needle stick injury
- ○ She should lay down on the exam table during the vaccination so she is as still as possible; her father can help if she won't stay still
- ○ She should sit upright on the table; her father should not interfere by sitting near or holding her down
- ○ She should be given the choice to sit upright on her own, or upright on her father's lap, and no one should restrain her

What interventions would you offer this 5-year-old patient to help with pain and anxiety related to vaccination? Check all that apply.

- ☐ Sour lollipops
- ☐ Blowing bubbles
- ☐ Buzzy Bee
- ☐ Fidget toy
- ☐ Vapocoolant/cold spray
- ☐ Discussing their options with them beforehand

A 14-year-old is scheduled for his first Covid vaccine and is coming in during a break between classes. He is only getting the Covid vaccine and nothing else today. He is worried about pain and wants pain management for the vaccination. Is topical vapocoolant (cold) spray appropriate for him?

- ○ Yes, if he wants it
- ○ No, that's used for younger kids

What else might be appropriate for the 14-year-old? Check all that apply.

- ☐ Sour lollipops
- ☐ Blowing bubbles
- ☐ Buzzy Bee
- ☐ Squeeze/stress ball
- ☐ Fidget toy
- ☐ Headphones/listening to music
- ☐ Playing a handheld video game
- ☐ Vapocoolant/cold spray
- ☐ Sitting upright
- ☐ Discussing their options with them beforehand

What are some of the possible long-term consequences of poorly treated/untreated pain in the pediatric population? Check

all that apply.

- ☐ Fear and avoidance of healthcare setting
- ☐ Needle phobia
- ☐ Addiction issues
- ☐ Increased pain sensitivity/lower pain threshold
- ☐ Decreased pain sensitivity/higher pain threshold
- ☐ Decreased cognitive functioning
- ☐ Increased rate of mental illness

Providing children with education and printed materials explaining pain management options before needle procedures has been shown to improve their experience.

- ○ True
- ○ False

Because of their underdeveloped nervous systems, young children have decreased pain sensitivity and decreased capacity to remember pain.

- ○ True
- ○ False

Untreated pain can make a child anxious, depressed, or fearful about health care.

- ○ True
- ○ False

When managing pain in children/adolescents, only one type of pain relief should be used at a time.

- ○ True
- ○ False

Training Feedback

How well did the training prepare you to implement a new workflow related to Comfort Promise?

- ○ Extremely well
- ○ Very well
- ○ Moderately well
- ○ Slightly well
- ○ Not well at all

How important do you think it is to implement this workflow at other School-Based Health Clinics?

- ○ Not at all important
- ○ Slightly important
- ○ Moderately important
- ○ Very important
- ○ Extremely important

Do you have suggestions or recommendations to improve this presentation?

Do you have suggestions or recommendations to improve the proposed workflow?

Did this presentation improve...

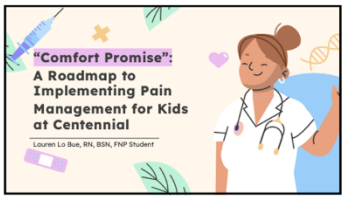
	Definitely not	Probably not	Probably yes	Definitely yes
Your confidence in providing adequate pain management?	○	○	○	○
Your confidence in the clinic's ability to implement a new workflow?	○	○	○	○
Your understanding of pediatric pain science?	○	○	○	○

	Definitely not	Probably not	Probably yes	Definitely yes
Your understanding of pain management options?	○	○	○	○
Your confidence in describing the options to patients?	○	○	○	○
Your readiness to follow the new workflow being proposed?	○	○	○	○

Which, if any, of your questions about the workflow were left unanswered by this training?

This is an optional space for any additional comments or questions.

Appendix B: Presentation



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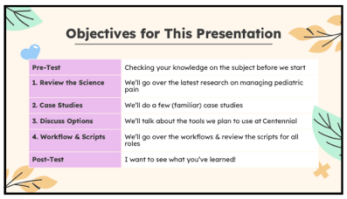

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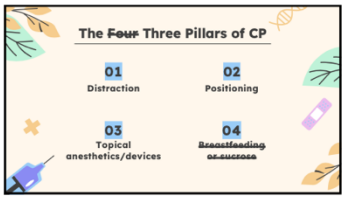

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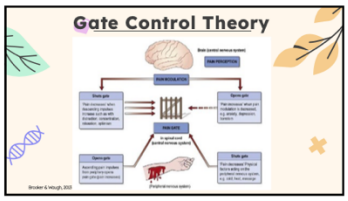

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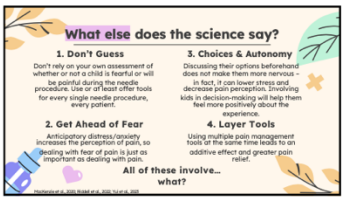

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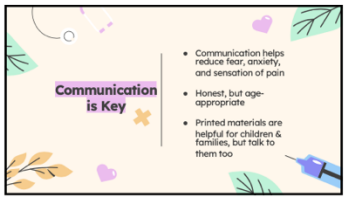

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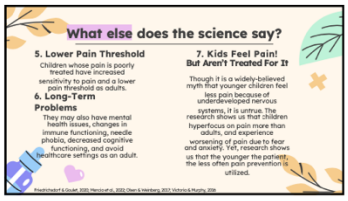

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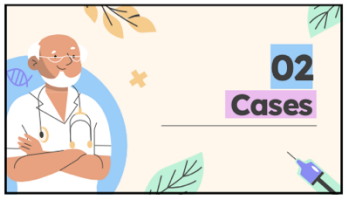

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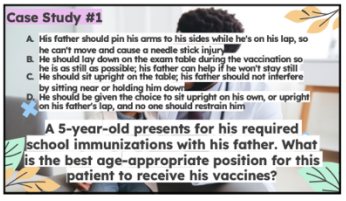

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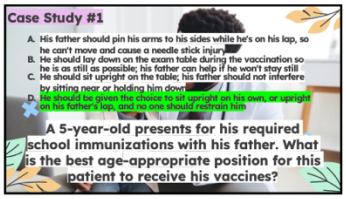

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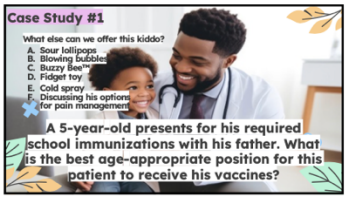

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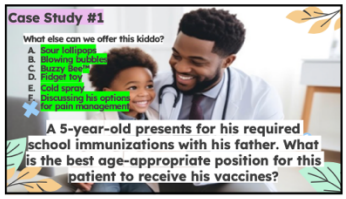

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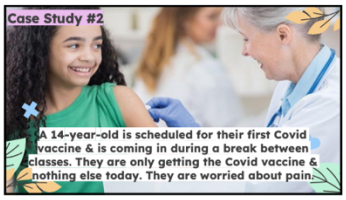

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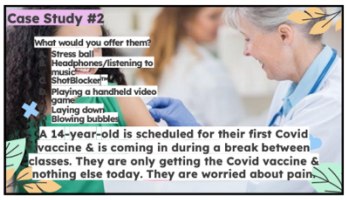

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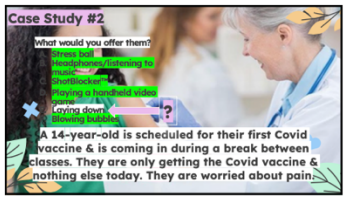

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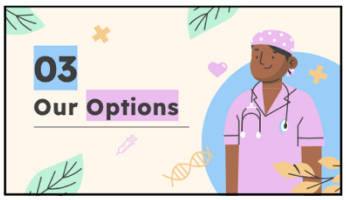

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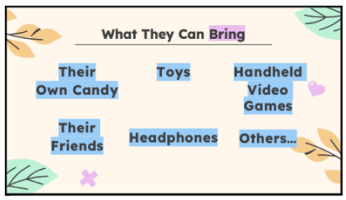

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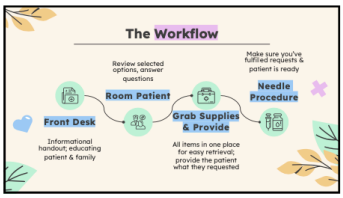

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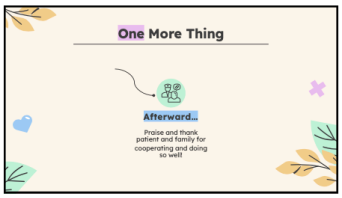

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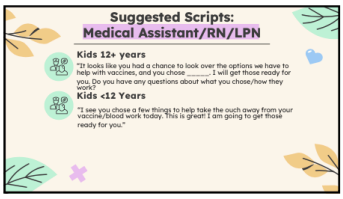

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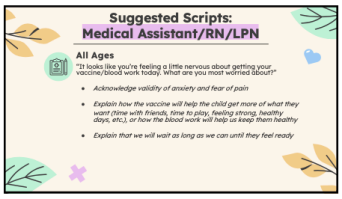

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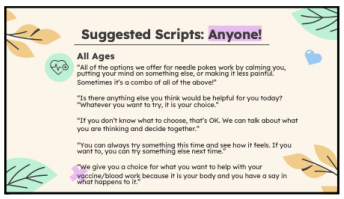

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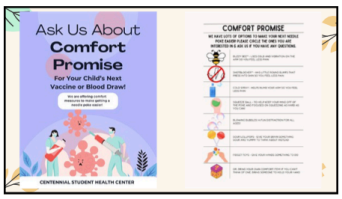

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Thank
You

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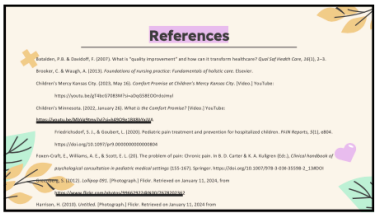
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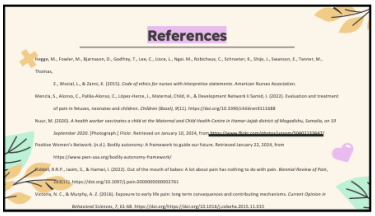
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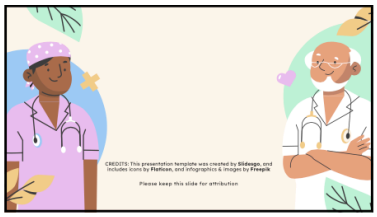
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Appendix C: Posters/Educational Material for the Clinic

"Menu" for Selecting Interventions

COMFORT PROMISE

WE HAVE LOTS OF OPTIONS TO MAKE YOUR NEXT NEEDLE POKE EASIER! PLEASE CIRCLE THE ONES YOU ARE INTERESTED IN & ASK US IF YOU HAVE ANY QUESTIONS.

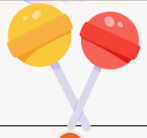
BUZZY BEE™ - USES COLD AND VIBRATION ON THE ARM SO YOU FEEL LESS PAIN

SHOTBLOCKER™ - HAS LITTLE ROUND BUMPS THAT PRESS INTO SKIN SO YOU FEEL LESS PAIN

COLD SPRAY - HELPS NUMB YOUR ARM SO YOU FEEL LESS PAIN

SQUEEZE BALL - TO HELP KEEP YOUR MIND OFF OF THE POKE AND FOCUSED ON SQUEEZING AS HARD AS YOU CAN!

BLOWING BUBBLES! A FUN DISTRACTION FOR ALL AGES!

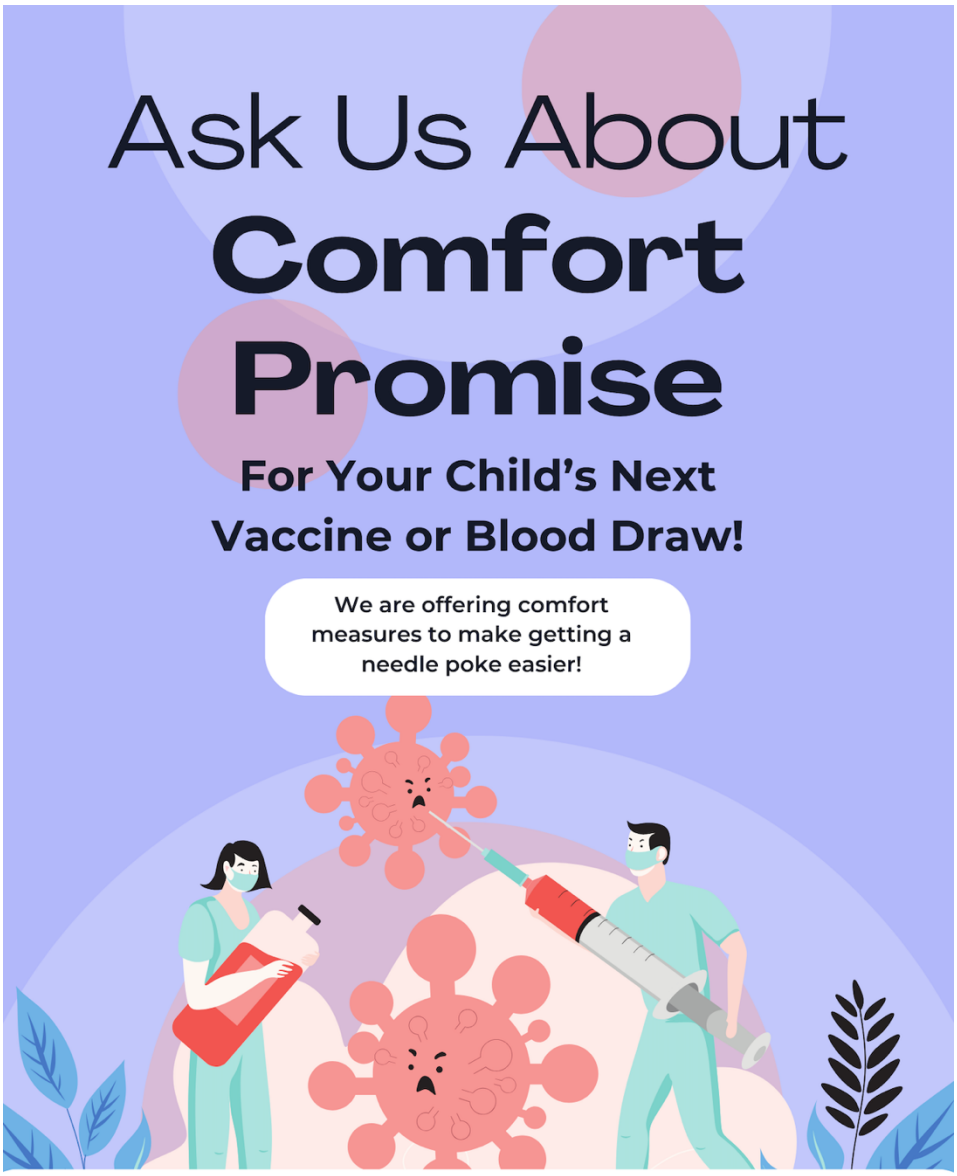


SOUR LOLLIPOPS - GIVE YOUR BRAIN SOMETHING SOUR AND YUMMY TO THINK ABOUT INSTEAD

FIDGET TOYS - GIVE YOUR HANDS SOMETHING TO DO

OR, BRING YOUR OWN COMFORT ITEM! IF YOU CAN'T THINK OF ONE, BRING SOMEONE TO HOLD YOUR HAND

Poster for the Clinic Waiting Room



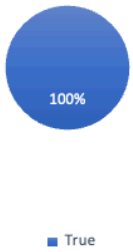
Appendix D: Charts, Tables, and Graphical Representations of Results

Table 1. Agreement with Proposed Barriers to Each Intervention

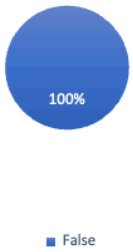
	Intervention			
Barrier	**Distraction Techniques**	**Positional Techniques**	**Pain Reduction Devices**	**Vapocoolant Spray**
"It takes too much time."	0/4	0/4	0/4	0/4
"It does not improve the child's experience."	0/4	0/4	0/4	0/4
"I don't think that would help decrease pain."	0/4	1/4	0/4	0/4
"There isn't enough staff support to do this."	0/4	0/4	0/4	N/A
"I don't think there are any barriers [to its use]."	2/4	2/4	2/4	1/4
"Other": Blank space for other comments	"I think cost is a barrier when we provide these types of items."	N/A	"Barriers, cost, policy. What about infection prevention in between clients?" "Possible cost."	"Do clinic policies have to be amended to be able to offer the cool spray? Or is that something we can do with changing policies?"

Pre & Post

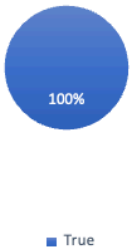
Providing children with education and printed materials explaining pain management options before needle procedures has been shown to improve their experience.



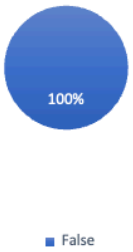
Because of their underdeveloped nervous systems, young children have decreased pain sensitivity and decreased capacity to remember pain.



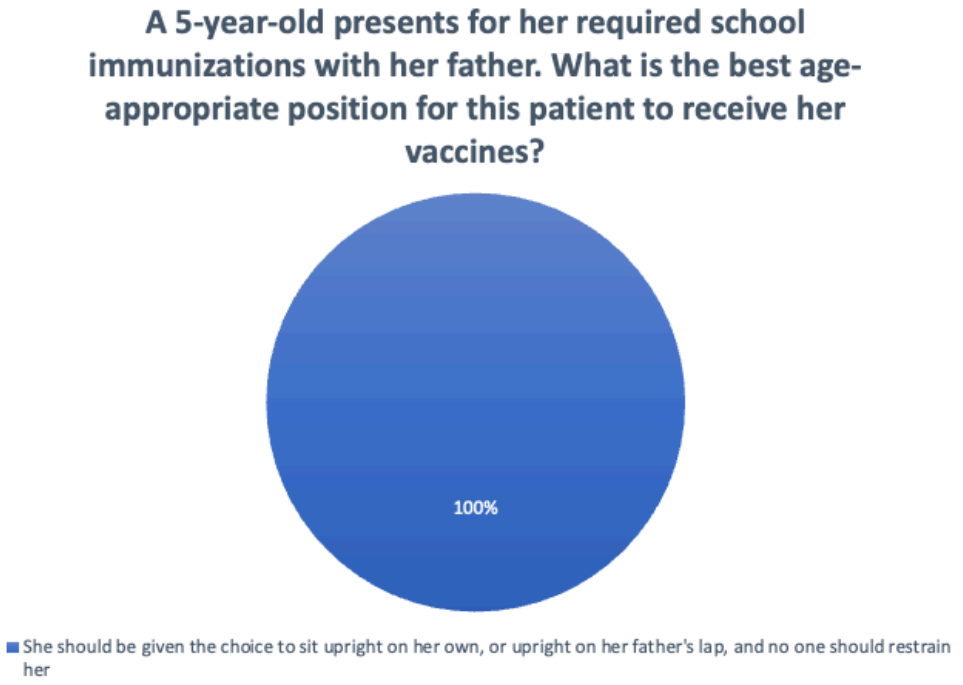
Untreated pain can make a child anxious, depressed, or fearful about health care.



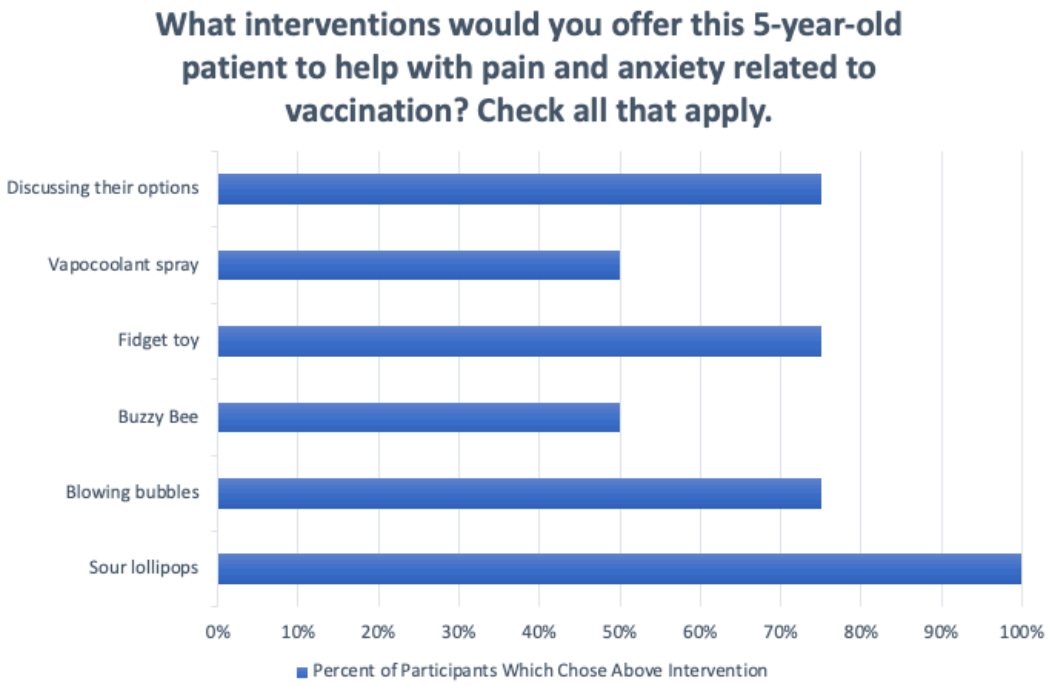
When managing pain in children/adolescents, only one type of pain relief should be used at a time.



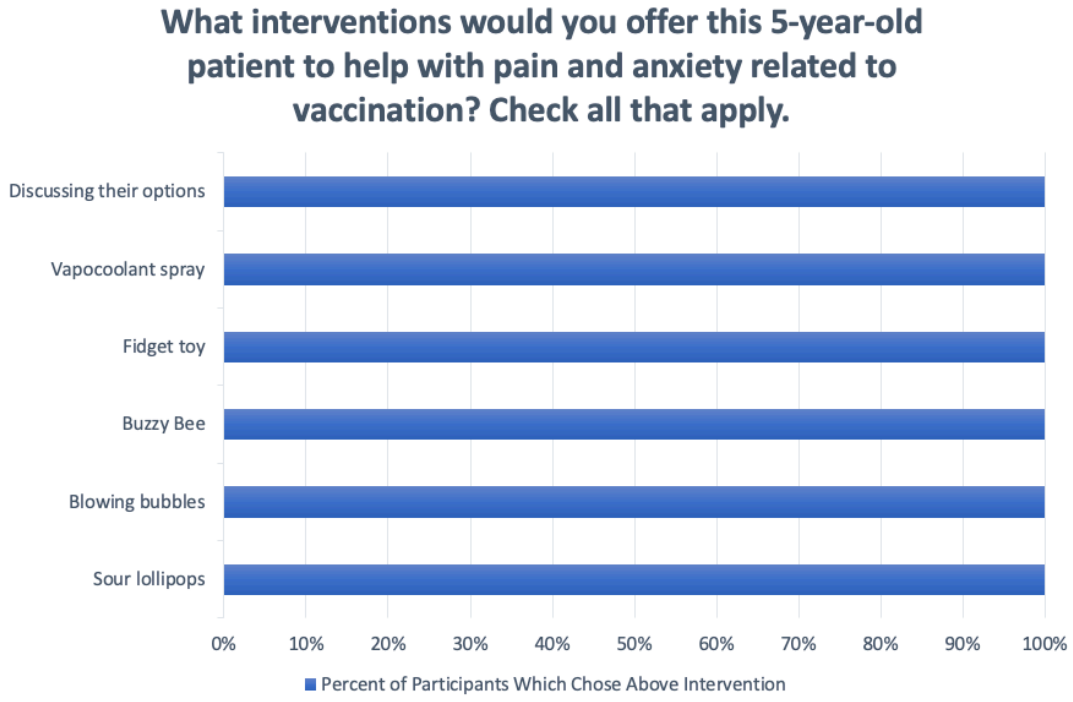
Pre & Post


A 5-year-old presents for her required school immunizations with her father. What is the best age-appropriate position for this patient to receive her vaccines?
100%
She should be given the choice to sit upright on her own, or upright on her father's lap, and no one should restrain her

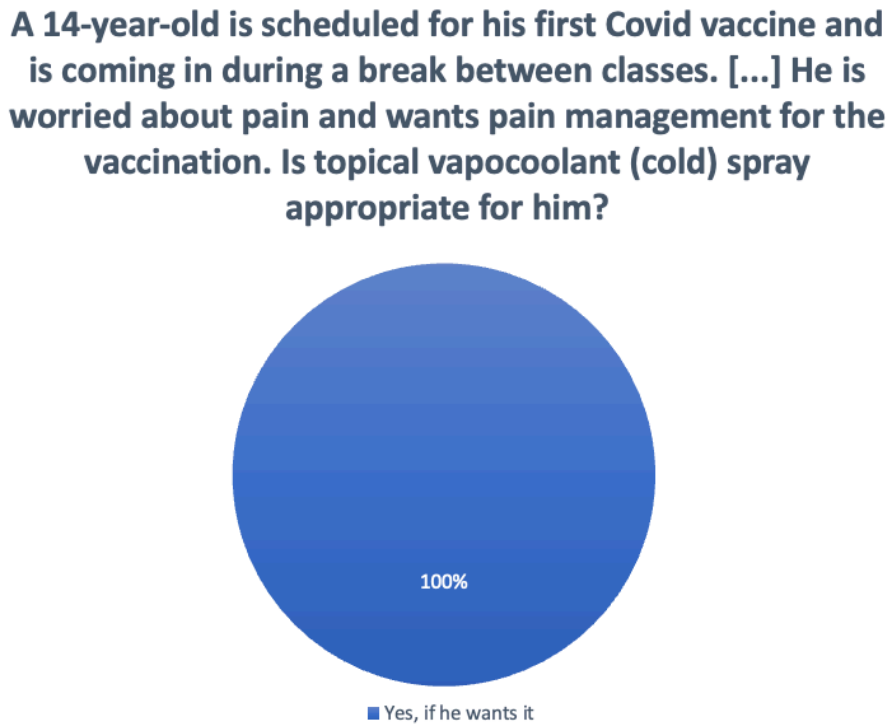
Pre


What interventions would you offer this 5-year-old patient to help with pain and anxiety related to vaccination? Check all that apply.
Discussing their options
Vapocoolant spray
Fidget toy
Buzzy Bee
Blowing bubbles
Sour lollipops
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Participants Which Chose Above Intervention

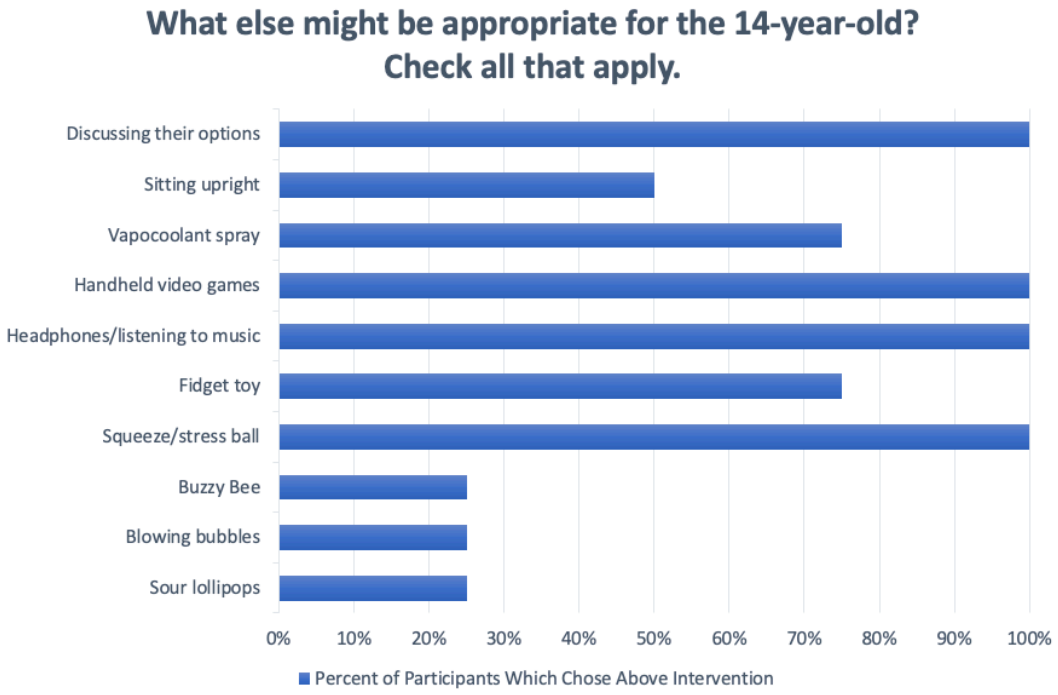
Post



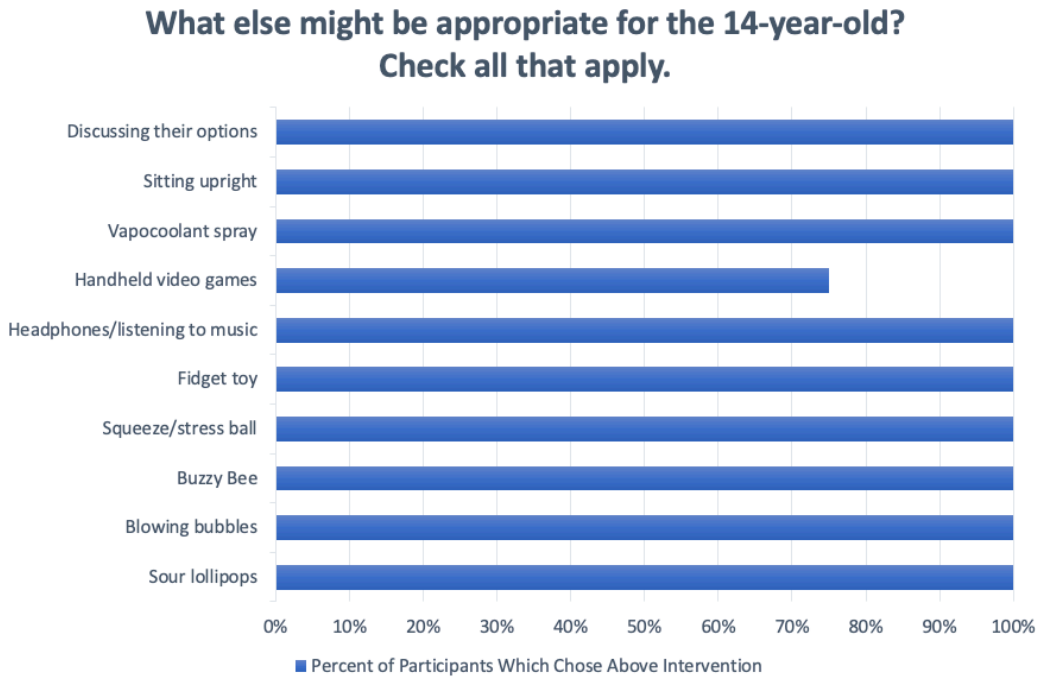
Pre & Post



Pre


What else might be appropriate for the 14-year-old? Check all that apply.
Discussing their options
Sitting upright
Vapocoolant spray
Handheld video games
Headphones/listening to music
Fidget toy
Squeeze/stress ball
Buzzy Bee
Blowing bubbles
Sour lollipops
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Participants Which Chose Above Intervention

Post


What else might be appropriate for the 14-year-old? Check all that apply.
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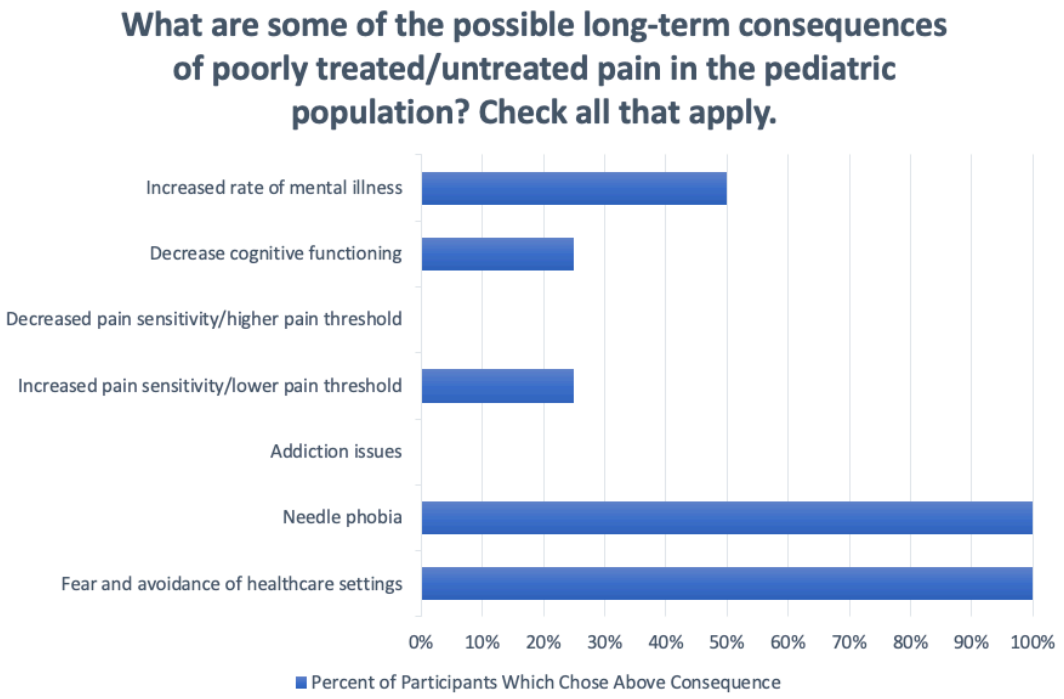
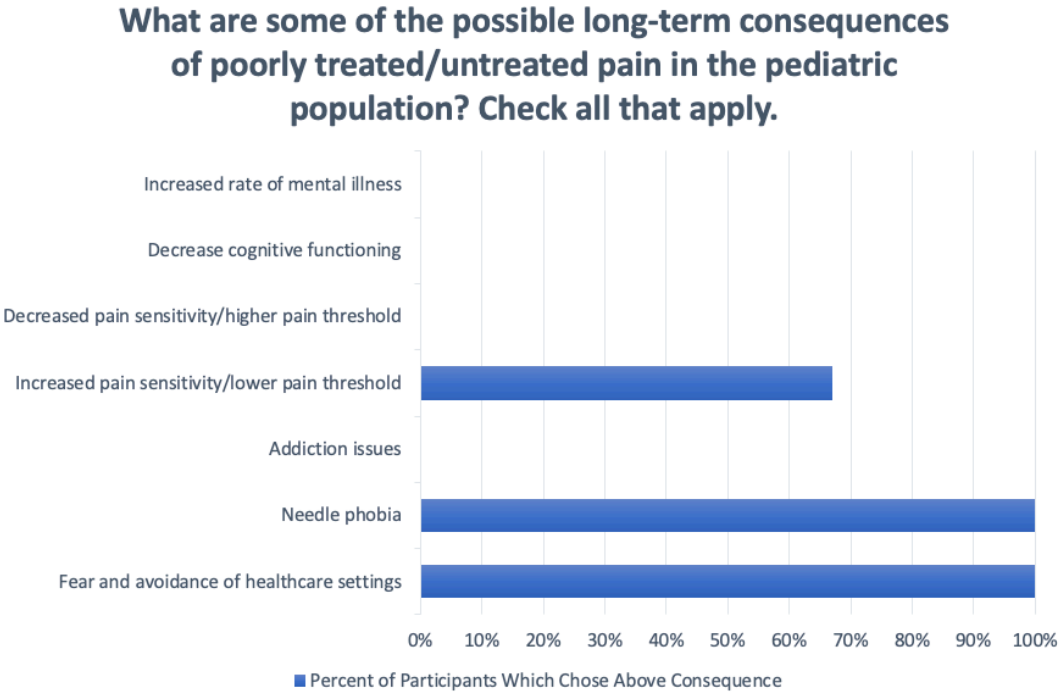
Fidget toy
Squeeze/stress ball
Buzzy Bee
Blowing bubbles
Sour lollipops
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Participants Which Chose Above Intervention

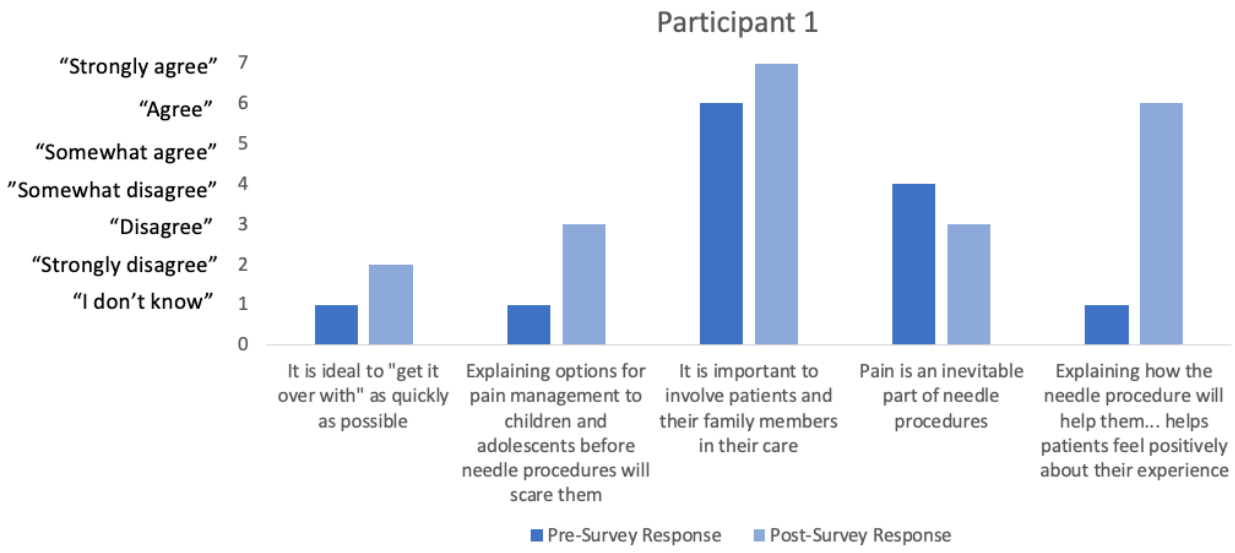
Pre



Post



Matched Comparison: Participant 1


Participant 1
“Strongly agree”
“Agree”
“Somewhat agree”
”Somewhat disagree”
“Disagree”
“Strongly disagree”
“I don’t know”
7
6
5
4
3
2
1
0
It is ideal to "get it over with" as quickly as possible
Explaining options for pain management to children and adolescents before needle procedures will scare them
It is important to involve patients and their family members in their care
Pain is an inevitable part of needle procedures
Explaining how the needle procedure will help them... helps patients feel positively about their experience
Pre-Survey Response
Post-Survey Response

Appendix E: Letter of Support from Clinical Agency

Letter of Support from Clinical Agency

Date: *July 23, 2023*

Dear *Lauren Lo Bue*,

This letter confirms that I, *Tamra Kehoe*, allow *Lauren Lo Bue* (OHSU Doctor of Nursing Practice Student), access to complete her DNP Final Project at our clinical site. The project will take place from approximately *September 2023* to *February 2024*.

This letter summarizes the core elements of the project proposal, already reviewed by the DNP Project Preceptor and clinical liaison (if applicable):

- **Project Site(s)**:
  Multnomah County School-Based Health Center (SBHC) at Centennial High School
  3505 SE 182nd Ave, Gresham, OR 97030
- **Project Plan:**
  - **Identified Clinical Problem:** Pain, anxiety, and fear of pain or needles have been reported by both parents and children as major deterrents to immunizations, phlebotomy, and other needle procedures in the outpatient setting and can contribute negative associations with health care. Routine childhood immunizations significantly reduce morbidity and mortality related to infectious diseases, helping to lay a foundation for a long, healthy life. Parental concern regarding potential fear, pain, and discomfort in their child's experience with needles is one modifiable factor in the complex social problem of vaccine hesitancy. Making needle procedures as comfortable, demystified, and pain-free as possible is a simple and achievable change that can improve vaccine uptake and create a positive association with health care in children of all ages. This can be done by utilizing age-appropriate nonpharmacological and pharmacological interventions to reduce pain and fear in a standardized approach for needle procedures.
  - **Rationale:** There is a robust body of knowledge on pharmacological and nonpharmacological interventions for pediatric pain management and the benefits of their use during painful medical procedures. There is also ample high-quality evidence that medical procedures like immunizations are a significant source of distress for both parents and children. Despite what is known about this topic, healthcare providers often fail to discuss pain management options with parents and children ahead of time, or to provide interventions to mitigate pain and fear during procedures. This knowledge-to-practice gap can be successfully addressed by a standardized approach to needle procedures. This has been demonstrated in numerous real-world examples, such as at the Pediatric Pain Management Program of Children's Hospitals and Clinics of Minnesota, which implemented the first successful hospital-based, system-wide approach of its kind, known as "Comfort Promise" (CP). There is currently no such standardized approach in place at the Centennial High SBHC. The development of the standardized approach, workflow, and scripts will be guided by concepts from successful pediatric pain management programs such as the CP program above. To create such an approach, it is first necessary to assess the knowledge base of the staff and providers at the SBHC. Clinic staff and providers require a deeper understanding of pediatric developmental stages as well as current pain science and evidence-based methods of addressing pain and anxiety surrounding needle procedures. It is also necessary to assess their willingness to change the current standard of care. The educational component of the project will utilize the Kirkpatrick Model to help ensure the educational intervention will be successful and effective.
  - **Specific Aims:** This project aims to: (1) create a standardized workflow, including scripts for staff and providers, using pain and fear management modalities before, during, and after needle procedures at a SBHC by November, 2023; and (2) provide staff and providers with an educational intervention using evidence-based knowledge about pediatric pain management via a live, formal in-service provided to all staff on November 24, 2023.
  - **Methods/Interventions/Measures:** This project will be conducted in four phases. The first will be the creation of a standardized program for needle procedures, including a workflow and scripts for staff and providers, and survey assessments for the intervention. The second will be the development of an educational intervention for staff and providers on the program. The third will be the administering of the educational intervention to staff and providers to prepare them with current evidence for best practices in mitigating pediatric pain and fear during needle procedures as well as practicing the scripts and workflow. Lastly, the fourth will

be assessment of the results. Participants will complete a knowledge assessment survey both before and after this intervention. The pre-and post-surveys will include areas to write-in concerns regarding barriers to the success of the program as well as multiple choice questions. The post-survey will include an assessment of staff readiness for program implementation. All patient-facing staff members and providers will be stakeholders in this project.

- **Data Management:** The study of this intervention includes de-identified pre- and post-intervention analyses of knowledge acquisition and readiness among staff and providers, evaluating the quantitative total increase in the number of questions answered correctly between the participant-completed pre- and the post-intervention surveys. There will be an anonymous comments and concerns survey administered to participants in the educational workshop to assess readiness and allow for addressing potential barriers. Quantitative response data from the pre- and post-intervention surveys will be compiled and analyzed by Qualtrics software and presented in a graph; qualitative survey data from open-ended and Likert scale questions will be analyzed manually and presented in a graph.
- **Site(s) Support:** Support required will entail a physical space to provide the educational in-service to staff as well as funds to procure the tools necessary for pediatric pain management (additional Buzzy Bees if needed, topical anesthetic, Shot Blockers, etc.). Staff will also need to be authorized to attend the in-service and take time from their shift to do so.
- **Other:** None currently.

During the project implementation and evaluation, *Lauren Lo Bue* will provide regular updates and communicate any necessary changes to the DNP Project Preceptor.

Our organization looks forward to working with this student to complete their DNP project. If we have any concerns related to this project, we will contact *Lauren Lo Bue* and *Rebecca Martinez* (student's DNP Project Chairperson).

Regards,

Katie Strawn, DNP, CPNP-PC, FNP-C - Site Medical Director for Multnomah County Student Health Centers

DNP Project Preceptor (Name, Job Title, Email, Phone):

8/29/2023

Signature

Date Signed

Appendix F: IRB Exemption Letter

NOT HUMAN RESEARCH

September 5, 2023

Dear Investigator:

On 9/5/2023, the IRB reviewed the following submission:

Title of Study:	Creating an Intervention for Pediatric Pain Management in a School-Based Health Clinic
Investigator:	Rebecca Martinez
IRB ID:	STUDY00026214
Funding:	None

The IRB determined that the proposed activity is not research involving human subjects. IRB review and approval is not required.

Certain changes to the research plan may affect this determination. Contact the IRB Office if your project changes and you have questions regarding the need for IRB oversight.

If this project involves the collection, use, or disclosure of Protected Health Information (PHI), you must comply with all applicable requirements under HIPAA. See the HIPAA and Research website and the Information Privacy and Security website for more information.

Sincerely,

The OHSU IRB Office

Appendix G: Project Timeline

Timeline: Creating an Intervention for Pediatric Pain Management in a School-Based Health Clinic

	Aug	Early Sept	Sep 23 to Oct 23	Nov	Dec	Jan	Feb	March
Finalize project design and approach	X		Hiatus due to 1-month intensive rural rotation					
Complete IRB determination or approval	X							
Create, trial-run, review, edit pre- and post-intervention surveys		X		X	X			
Create interventions (in-service presentation, clinic workflow, staff scripts, etc.)		X		X	X	X		
Create educational materials for parents				X	X			
Present live educational in-service to staff (incl. admin of pre- and post-surveys)						X		
Share survey results with staff						X		
Final data analysis							X	X
Write sections 13-17 of final paper						X	X	X
Prepare for project presentation and dissemination							X	X

Appendix H: Fishbone Diagram

Before filling out this template, first save the file on your computer. Then open and use that version of the tool. Otherwise, your changes will not be saved.

Template: Cause and Effect Diagram

Team: Lauren Lo Bue - SBHC **Project:** Pediatric Pain Mgmt Education in a SBHC

1) Input the effect you'd like to influence.
2) Input categories of causes for the effect (or keep the classic five).
3) Input causes within each category.