Implementation of Evidence-Based Psychological Interventions for Pediatric Needle Pain

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Needle procedures are a painful and distressing experience for many children. There is a strong evidence base that demonstrates the efficacy of psychological interventions for reducing pain and distress during needle procedures. However, actual implementation of these strategies before, during, and after a needle procedure is affected by multiple factors that increase the complexity of delivery of these interventions in clinical settings. These challenges include application of evidence-based strategies to diverse populations that tend to be excluded from the research literature (e.g., children with developmental delays, children with needle anxiety or phobia), environmental barriers (e.g., providing pain management strategies for needle procedures in different settings), and practical or logistical issues (e.g., inadequate preparation time). We discuss these issues, provide practical suggestions for increasing access to evidence-based pain management strategies, and present three illustrative case examples. Pediatric psychologists may face challenges in implementing evidence-based strategies for needle pain and distress, but important opportunities for educating families and health professionals about the management of procedural pain from needles are available.

Keywords: needle pain, acute pain, pain management, evidence-based practice implementation

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Needle procedures such as immunizations are a painful but necessary experience for healthy children as part of routine medical care. Children who are hospitalized and/or who have chronic medical conditions may require even more frequent needle procedures. Regardless of the type of procedure (e.g., blood draws, subcutaneous injections), needles are a common source of pain and distress for many children. There are numerous negative outcomes associated with poorly managed procedural pain in childhood, including sensitization to future pain and the development of needle fears (Kennedy, Luhmann, & Zempsky, 2008).

Extensive research has been conducted examining the efficacy of physical, pharmacological, and psychological interventions for needle pain and distress. Uman and colleagues (2013) provide a rigorous systematic review and meta-analysis of psychological interventions that demonstrates that distraction and hypnosis have strong evidence supporting their efficacy (Uman et al., 2013). In a companion manuscript to the present paper in the current issue of the Journal of Pediatric Psychology, Birnie and colleagues (2014) provide further support for the efficacy of distraction and hypnosis for procedure pain management in children and examine whether the type of distraction used and the age of the child are related to improved outcomes. Although randomized trials of procedural pain interventions provide a valuable and necessary contribution to the treatment literature, they are most often conducted in controlled environments with “typical” children (e.g., excluding children with significant needle anxiety or developmental delays). This does not replicate the implementation of pain management interventions for many children in real-world settings. In addition, the evidence in support of the efficacy of hypnosis was gathered from research conducted primarily in pediatric oncology settings for highly invasive needle procedures such as lumbar punctures and bone marrow aspirations in school-age children. The applicability of this strategy to other populations (e.g., a healthy child receiving a routine immunization) and age ranges not captured by these studies (e.g., young children and adolescents) is not known (Birnie et al., 2014). The clinical applicability of hypnosis is also constrained by the limited availability of psychologists trained in delivering this intervention and the time required to teach this skill.

The American Psychological Association defines evidence-based practice as involving the “integration of the best available research with clinical expertise in the context of patient characteristics, culture, and preferences” (American Psychological Association, 2005). Although the research base in the area of pediatric needle pain management has been well reviewed, to date there has been limited discussion of practical issues associated with delivering evidence-based interventions for preventing procedural pain in children, and how health professionals may apply such strategies in a clinical context appropriate for each patient. The unfortunate reality of clinical practice is that psychologists often only become involved in the preparation for needle procedures after an episode of poorly managed pain and distress that has resulted in the development of significant behavioral challenges or anxiety in response to needles. The aim of the present paper is to review the application of evidence-based psychological needle pain management in clinical situations, address practical issues that a pediatric psychologist may face in implementing interventions in various complex clinical service delivery settings, and briefly describe strategies when implementing such interventions in unique populations. We also provide recommendations for how to increase access to pain management despite practical barriers and provide examples of innovative care delivery models. Although the focus of the present paper is on strategies for pain management, many of these strategies have been found to also reduce distress and anxiety associated with the procedure, and many reviews of psychological interventions for pain include pain and distress as primary outcome measures (Birnie et al., 2014). Because these two outcomes are highly related and often have overlapping behavioral manifestations, we will be referring to both pain reduction and decreased distress throughout the present paper.

Evidence-Based Strategies for Pain Management

Distraction

Distraction, generally defined as engaging in activities to draw a child’s attention away from a painful procedure, has a strong evidence base as being effective for reducing needle pain and distress and is a flexible strategy that requires little preparation (Cohen, Cousins, & Martin, 2014; DeMore & Cohen, 2005). The review by Birnie and
colleagues (2014) examines the characteristics of distractors that contribute to their efficacy. They found no significant differences between types of distraction (e.g., interactive vs. passive, no/low vs. high technology, degree of adult involvement), although distraction in which a person other than the child selected the type of distractor used was marginally more efficacious in reducing child self-reports of pain than distraction in which the child had a choice in the type of distractor. Selecting a distractor for a child should take into consideration the developmental stage and preferences of the child as well as the feasibility of the use of the distractor in the clinical setting (Schechter et al., 2007). In addition, there was evidence that distraction was most effective for typically developing children aged 6–11 years (Birnie et al., 2014). Table 1 provides different examples of possible distractors for use with children.

Case Example

Application of distraction as a pain management strategy in a typically developing child. James is a 7-year-old boy who required an influenza vaccine. His parents told him about the vaccine a few days before their visit to the clinic, to which James responded that he was nervous that it would hurt. James’ parents consulted a pediatric psychologist, who suggested that they work together with James to make a plan for how they would manage his pain. His father uploaded a new game on his phone (which only required one hand to play) for James to use during the vaccine, and the family practiced taking slow, deep breaths by blowing a pinwheel (Taddio et al., 2010; Uman et al., 2013). The psychologist coached James’ parents on behaviors to engage in (e.g., encouraging James to use his coping strategies, talk about things other than the procedure, stay calm even if he gets upset) and behaviors to avoid (e.g., reassurance, apologizing, teasing) (Manimala, Blount, & Cohen, 2000; McMurtry, Chambers, McGrath, & Asp, 2010). Because the family was interested in pharmacological options for pain management, the psychologist consulted with the clinic to provide the family with the exact location of the vaccination so they would know where to apply a topical anesthetic patch that James’ mother purchased over-the-counter at the local pharmacy (Taddio et al., 2010). On the day of the vaccination, James and his mother applied a topical anesthetic to the spot on his arm before leaving for the clinic about an hour before the procedure. Once they arrived, James’ mother had her flu shot first, and modeled for him how she was using deep breathing to manage her pain (Gou-

Table 1
Psychological Needle Pain Management Strategies, Examples, and Considerations

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Examples</th>
<th>Considerations</th>
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<tbody>
<tr>
<td>Distraction</td>
<td>Cognitive:</td>
<td>• Will the clinic staff support the use of the distraction of choice?</td>
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<td></td>
<td>• Counting (forward/backward)</td>
<td>• Is the distraction feasible for the type of procedure? (e.g., Does it require use of the arm that blood is being drawn from?)</td>
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<td></td>
<td>• Listening to music or short stories</td>
<td>• In cases where technology is the distractor of choice, is the device available?</td>
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<td></td>
<td>• Nonprocedure-related talk</td>
<td>• Will the type of distractor selected be engaging and capture this particular child’s attention?</td>
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<tr>
<td>Behavioral</td>
<td>• Watching videos</td>
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<td></td>
<td>• Playing games</td>
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<td></td>
<td>• Interactive books</td>
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<td></td>
<td>• Virtual reality</td>
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<td></td>
<td>• Blowing a pinwheel/party blowers/bubbles</td>
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<td></td>
<td>• Kaleidoscopes</td>
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<tr>
<td>Hypnosis</td>
<td>Direct suggestions:</td>
<td>• What is the age and developmental level of the child? (younger children may require shorter inductions that are more directive, with simple and familiar language).</td>
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<td></td>
<td>• Magic glove (putting on a glove to protect the arm/hand)</td>
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<td></td>
<td>• Switchbox (turn a switch on and off to control pain messages being sent to the brain)</td>
<td>• Is the parent able and willing to be involved in the intervention? If not, are they supportive of its use? (A parent providing verbal or nonverbal cues of disbelief may impair the child’s ability to engage.)</td>
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<tr>
<td></td>
<td>• Time distortion</td>
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<td></td>
<td>Distancing/indirect suggestions:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Imagery of favorite place</td>
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<td></td>
<td>• Breathing the pain away/moving away from the pain</td>
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(Vlaeyen, Crombez, & Craig, 2011), and asked James to help distract her by talking about what they would do after the appointment. During his vaccination, James’ mother encouraged him to take deep breaths and directed his attention toward his distraction game by asking him questions about what he was doing. After, his mother and the nurse praised James for doing a great job of distracting himself. James told them that the needle hurt but “it wasn’t as bad as I thought!” James and his mom went for an ice cream cone together after the appointment, something they had planned before and were looking forward to.

Hypnosis

Hypnosis involves the use of some relaxation and suggestion to induce an altered state of consciousness in the child that promotes changes in sensation and perception to reduce the experience of pain during a needle procedure (Kuttner, 2012). Some hypnosis techniques have the benefit of being quick to administer and do not require any tools or equipment. There are short and long versions of hypnosis that may be chosen, depending on the length of the procedure and the distress of the child. The “Magic Glove” is an example of a hypno-anesthetical technique for pain and anxiety management for pediatric needle procedures involving the hand or arm. The therapist guides the child into an altered state of consciousness with focused attention by applying a “magic glove” on the child that will reduce the pain of the procedure. An example of the application of this technique is available online; see https://www.youtube.com/watch?v=cyApK8Z_SQQ. Appendix A in the online supplemental material provides a sample script for hypnosis, and additional examples and considerations are provided in Table 1.

Case Example

Application of hypnosis as a pain management strategy in a typically developing child. Julie is a 5-year-old girl who required insertion of an intravenous line in the emergency department for treatment of dehydration secondary to diarrhea and vomiting. She had no prior preparation and was moderately distressed about the procedure. The pediatric psychologist introduced the concept of hypnosis to the parents, who were agreeable to participating in the intervention and felt that their daughter’s vivid imagination would be an asset. The psychologist explained to Julie that she was going to show her how she could help get the needle and cope with the pain by breathing deeply and keeping nice and relaxed (Kuttner, 2012). The psychologist began by having Julie lie down and relax in a comfortable position while she concentrated on taking some deep breaths. She talked to Julie about her favorite animal, cats, and asked her to close her eyes and imagine that she was with a fluffy kitten. She then had Julie describe, using her five senses, all of the things she was experiencing in her imagination (e.g., she could feel the cat’s soft fur and hear him purring gently beside her). As the nurse continued to wipe the area clean with anesthetic and prepare to insert the needle, the psychologist talked to Julie about how the cleaning of the area was just like if the kitten licked her arm. The psychologist induced hypno-analgesia by suggesting that Julie’s arm had gone numb where the kitten had licked it and had Julie describe the feeling of tingly numbness. As the nurse inserted the needle, Julie remained in her relaxed state. When the procedure was over, the psychologist gently guided Julie out of her relaxation by touching her arm and instructing her to open her eyes. Although Julie reported having felt a small painful poke during the procedure, she was not distressed by it.

Increasing Access to Evidence-Based Pain Management

Various health professionals can be involved in needle procedures (e.g., nurses, physicians, phlebotomy technicians, pharmacists, child life specialists). Although many are aware of the evidence base for pain management strategies, this is not always the case, often leaving an opportunity for the pediatric psychologist to educate and provide guidance around managing pain and distress associated with such procedures. Increasing access to evidence-based pain management starts with education.

As a result of limited resources, many centers are not able to offer pediatric psychology on a preventative basis. This highlights the importance of the psychologist educating other health-care professionals about evidence-based pain management strategies that can prevent or
reduce painful and distressing experiences during procedures. This preventative approach may also reduce the need for referral because children and youth are most commonly referred for psychological intervention after a challenging procedure when there is significant anxiety or behavioral challenges that have developed.

Numerous research groups have been strong advocates for disseminating research-based conclusions in an effort to make proper pain management the standard of care for all needle procedures. Recent knowledge translation efforts have focused on disseminating this information to multiple consumers, including psychologists (McMurtry, Chambers, & Taddio, 2012), pediatric psychologists (Boerner, Noel, Birnie, McMurtry, & Chambers, 2012), and parents (McMurtry & Taddio, 2011). A national clinical practice guideline focusing on pharmacological and psychological strategies for pain management has also been developed (Taddio et al., 2010).

Social media may provide a creative way to share knowledge with parents and health providers, such as a recent 2-min YouTube video for parents (Chambers et al., 2013), in which a 4-year-old girl tells parents what they should—and should not—do to help children when they have needles (see http://pediatric-pain.ca/it-doesnt-have-to-hurt). The tips included in the video are evidence-based and include recommendations related to use of topical anesthetic creams as well as distraction and relaxation. The video had a tremendous response, with over 26,000 views in the first 2 weeks after its release. The use of social media and other innovative dissemination methods such as this to reach and inform parents and providers about children’s procedural pain management is needed.

**Environmental Barriers and Practical Issues**

The wide variety in types of needle procedures and the settings in which they occur require pediatric psychologists to use evidence-based practice in applying the research evidence in a flexible and creative way when providing support for procedures. The clinician is also required to determine the best way to generalize preparation and practice that takes place in the office to the clinic setting. Patient referrals may come from hospitalized in-patients and children receiving needle procedures in clinics as well as for children receiving needle procedures in community settings (e.g., in schools for public health immunization programs). The environmental context requires careful consideration in planning the implementation of pain management strategies to determine the feasibility of such strategies. The pediatric psychologist can often act as a liaison between the family and other health professionals, collecting information about the procedure and relaying this back to the family to assist in preparation. This knowledge better informs the psychologist so that negative cognitions and misinformation can be addressed. The psychologist would also be prudent to prepare the child in case something does not go according to plan (e.g., What would you do to help keep yourself calm if the nurse cannot get a vein on the first try? What if the needle looks different than the one you are expecting?) and help them be able to generalize the skills they have learned to any situation. Teaching caregivers about evidence-based pain and anxiety management strategies provides an additional resource so that they can help coach children in these types of unanticipated situations.

**Outpatient Clinic Settings**

Although many studies of needle pain intervention strategies are conducted in clinics, the research clinic setting may look different with regards to numerous factors, including the wait times, control over the environment, and skill level of the professional administering the needle procedure. A recent study by Taddio, Hogan, and colleagues (2012) found that the mean waiting time between arrival at an outpatient primary care clinic and a vaccine injection was approximately 40 min, but that the wait times could range from 20 min to 1 hr. The authors rightfully argue that this amount of time is sufficient for the implementation of evidence-based pain management strategies (e.g., topical anesthetics, education and preparation, selection of distraction tools). Of course, the ability to use these strategies is dependent on well-informed caregivers and/or available resources in the health-care setting. In addition, this waiting time can have a negative effect on parent and child anxiety. Distraction may be effective in preventing an escalation of anxiety during this waiting time. Previous research has suggested that addressing parental anticipatory anxiety regarding
their child’s immunizations may help reduce child pain and anxiety during the procedure (Bearden, Feinstein, & Cohen, 2012). Additional factors related to the overall atmosphere of the waiting room (e.g., child-friendly materials, noise level, the presence of crying children), requirements of the test (e.g., feeling unusual because of fasting), or to a break in routine (especially for some children with developmental disorders) may contribute to parent and child anxiety before a needle procedure.

There are also systems issues that pediatric psychologists must consider depending on the setting in which one is working. For example, although the use of topical anesthetic creams is recommended in the clinical practice guidelines for pain management during childhood immunizations (Taddio et al., 2010), patient access to this pharmaceutical intervention varies. That is, some settings may have topical anesthetics available as a standing order that health-care providers can administer on site whereas other areas may require parents to bring the cream with them to an appointment or administer it before coming to the clinic. Psychologists should also consider the risks and benefits of recommending an over-the-counter medication and may suggest to caregivers that they seek further information from their physician or pharmacist about topical anesthetics. It is important that psychologists are aware of these practical issues because they may affect how one counsels and supports a family.

It has also been our experience that some caregivers are hesitant to introduce a topical anesthetic because their child is resistant to having “sticky” material (i.e., the occlusive dressing placed after the cream is applied) on their skin. This is especially true for children and youth who are described as having tactile sensitivities. There is also the possibility that the presence of a topical cream before a procedure serves as a cue that a needle is imminent. As a result, some families verbalize concern (especially for those individuals who have experienced pain and distress with procedures in the past) that this will only increase their child’s anticipatory anxiety. With an appropriate amount of time beforehand, the pediatric psychologist is in the unique position to provide evidence-based information to families and use their clinical expertise in suggesting various pain management strategies appropriate to that patient and situation so that an informed and patient-centered treatment plan can be developed.

**Acute Care (Inpatient and Emergency Settings)**

Providing treatment in inpatient settings poses numerous environmental challenges that are familiar to many pediatric psychologists. Families of a child in the hospital are often overwhelmed by the amount of information they are receiving, the number of health professionals they encounter, and a lack of adequate sleep and nutrition in addition to the general stress of being away from their home environment and overall coping with their child’s illness. Children are often tired, feeling unwell, and subject to numerous painful procedures as a result of their hospitalization. All of these factors can make it especially challenging for children and families to cope with a needle procedure in the hospital in comparison to a healthy child receiving a planned, routine needle procedure. In what can be a very emotionally charged situation, a challenge of the pediatric psychologist is to provide strategies and techniques that the family will be able to understand and implement. Meeting with the family before a procedure offers pediatric psychologists the opportunity to collect information and teach skills. Being present during the painful procedures provides a chance for the psychologist to coach the child, model appropriate responses for the caregivers, and generally support the family. In addition, the psychologist is able to collect useful observational data and may provide feedback to the child and family after the procedure to reinforce what went well and offer strategies for subsequent procedures.

A challenge for pediatric psychologists working in inpatient settings (and occasionally outpatient settings as well) is the acute nature of many referrals for needle fears or procedural pain management. For many children who require needle procedures for diagnostic purposes or for medical treatment, procedures need to occur as soon as possible. This often allows little time for the psychologist to engage in much preparatory work with the child and raises the question of which tools to prioritize if one only has a very limited time with the child to prepare. A review of preparing children for medical procedures by Jaaniste, Hayes, and von
Baeyer (2007) offers evidence-based suggestions on the content, format, and timing of providing children information regarding their upcoming procedures that could be adapted to any clinical setting. Evidence-based strategies such as distraction often require little preparation or advance planning, and parents may be able to assist in identifying a distractor that will effectively engage their child. Parents may also be quickly coached in helpful responses to their child, such as being provided a few positive coping or coaching statements they may use during the procedure. A recent study (McGrath et al., 2010) compared the efficacy of a video-based cognitive–behavioral intervention (an instructional video on distraction and deep breathing shown before venipuncture and an animated short film shown during venipuncture as a distraction tool) as compared to standard care for venipuncture in the emergency department. Investigators found that the intervention was reported to be helpful by parents and children. However, it was not associated with reduced children’s self-reports of pain and anxiety or parent proxy reports of these outcomes. It was speculated that the brevity of the intervention may not have allowed enough time for families to effectively implement the techniques. More research is needed to determine how to best deliver these interventions to families in time-limited acute care settings.

Of note, acute care settings may involve more different types of needle procedures than immunization clinics or blood laboratories, such as allergy testing, insulin injections, injections for local anesthetic, insertion of intravenous lines, lumbar punctures, bone marrow aspiration, sutures, venous port access, and so forth. Because of the small size of the literature on needle pain management, meta-analyses and reviews tend to combine across all types of needle procedures (Birnie et al., 2014; Uman et al., 2013), although there are significant differences between these procedures on numerous factors such as the intensity of the pain, duration of procedure, and type of population receiving the procedure. However, there is one recent systematic review specific to psychological approaches for routine immunization pain (Chambers, Taddio, Uman, & McMurtry, 2009) and an early review of cognitive–behavioral approaches specifically for bone marrow aspiration/lumbar puncture pain in children (Ellis & Spanos, 1994). In addition, a recent chapter on distraction for pediatric procedural pain summarizes the evidence separately for different types of procedures (Cohen et al., 2014). This will be an important direction for future research—to examine whether there are differences in the effectiveness and ease of implementation of various pain management strategies between types of needle procedures.

**School-Based Immunization Programs**

Compared with outpatient clinics, school-based immunization programs have been established as a cost-effective and efficient method for vaccinating large numbers of children (Krahn, Guasparini, Sherman, & Detsky, 1998). However, these settings provide a unique challenge for the implementation of procedural pain management and strategies to decrease anxiety. Children and adolescents in this environment are generally experiencing needle procedures without their parents and in the company of their teachers and peers. In these cases, careful planning and encouraging the child’s autonomy in using their pain management strategies is recommended (Cooper Robbins, Bernard, McCaffery, & Skinner, 2010).

An analysis of public health nurse perceptions of the school-based immunization process revealed that although they had generally not received any educational material or professional development training in needle pain management, they reported commonly using nonpharmacological pain management interventions such as distraction to manage vaccine pain (strategies that they acquired informally or learned through personal experience) (Kikuta, Gardezi, Dubey, & Taddio, 2011). To our knowledge, only one study to date has directly examined the implementation of a pain management strategy in a school immunization setting, finding that music distraction without headphones resulted in decreases in self-reported adolescent pain during polio vaccination (Kristjánsdóttir & Kristjánsdóttir, 2011).

“Fear contagion,” or the vicarious acquisition of fear by observational learning, is a significant concern in the school immunization environment. Social learning theory (Bandura, 1977) provides an explanation for the phenomenon by which a child becomes fearful after observing the fear response of others (e.g., observing another child providing...
ing anxiety-provoking information such as “the needle really hurts”). This is of concern in a school immunization clinic because an extreme or overtly obvious fear response of a child or small group of children may quickly spread to other students (Kikuta et al., 2011). Previous research on school vaccination clinics has described fear as being extremely prevalent in a school immunization context, and fear was linked to increased vaccination pain (Bernard, Cooper Robbins, McCaffery, Scott, & Skinner, 2011). In addition to fear of the needle, there is the potential added stress of having publicly observable signs of anxiety or pain in front of peers at a developmental period when social acceptance is often an important priority.

Pediatric psychologists can have an effect on the pain and fear experienced by students in school clinics by collaborating with public health nurses to help them to adapt evidence-based strategies to the school/group setting. At our institution, we have conducted observations at several school-based immunization clinics, provided tip sheets of evidence-based practices for public health nurses administering the immunizations and teachers supporting students receiving the injections, and revised existing information that is distributed to parents and students in advance about preparing for their upcoming procedure (see Appendix B in the online supplemental material for an example of a letter sent to teachers and school personnel). Even when pediatric psychologists do not work directly with those receiving the needles, there are many opportunities for them to affect care by providing education to multiple stakeholders, including school administration, teachers, parents, students, and public health employees.

**Special Populations**

**Children With Needle Anxiety/Phobia**

Needle anxiety is a common fear among children, with one study reporting that 63% of 6- to 17-year-old children self-reported a fear of needles (Taddio, Ipp, et al., 2012). Children with significant needle anxiety present a unique challenge to the implementation of pain management strategies during needle procedures (Willemsen, Chowdhury, & Briscall, 2002). For example, a child who is highly distressed and anxious about an upcoming needle procedure may be more difficult to engage in pain management strategies. An investigation of public health nurse perceptions of immunizations found that nurses viewed needle fear as being a bigger problem than the pain inflicted by the needle (Kikuta et al., 2011).

The treatment for needle anxiety, which typically follows a cognitive–behavioral exposure-based approach similar to the treatment of other specific phobias, is briefly described in the upcoming case study “Maria.” Pediatric psychologists should be aware that early intervention (and prevention efforts) for needle fears is critical because the consequences of needle fears include health-care avoidance, an effect on travel/work because of the avoidance of immunizations, and concerns regarding public health. In addition, individuals with needle fear may transmit their fear to others, as discussed previously. The use of general cognitive–behavioral strategies in this population has the benefit of targeting the umbrella of distress that many children experience around needle procedures that involves a mix of anxiety and pain.

**Children With Developmental Delays**

Pain management in children with developmental delays has historically been fraught with misinformation regarding the capability of these children to feel pain. Particularly with children who have limited verbal skills, obtaining a self-report of the pain experience can be challenging and requires a reliance on behavioral manifestations of the pain experience. This method can be especially challenging because children with developmental delays have been shown to have a diminished observable response to painful events and engage in less attention- or help-seeking behaviors when they experience pain (Gilbert-MacLeod, Craig, Rocha, & Mathias, 2000; Oberlander, Gilbert, Chambers, O’Donnell, & Craig, 1999). Aspects of developmental delays may make the implementation of procedural pain management strategies more challenging, but they also offer a window of opportunity for the involvement of a pediatric psychologist. There is evidence that psychological interventions are effective in reducing pain from needles in children with developmental delays, although to date research has only been conducted in small sample sizes or presented in the form of case studies (Slifer et al., 2011).
Parents may provide an invaluable source of information regarding identification of appropriate forms of reinforcement and techniques that work for managing their child’s anxiety and behavior in other challenging situations. Toolkits of strategies, visual supports, social stories, and other materials are available for parents and health providers working with children with autism spectrum disorder who require bloodwork (Autism Treatment Network, 2014).

Case Example

Management of needle pain and anxiety in a child with a developmental delay. Maria is a 13-year-old girl who was referred for assistance with venipuncture. She presented with diagnoses of autism spectrum disorder, attention deficit hyperactivity disorder, combined type, and a moderate intellectual disability. Maria’s pediatrician indicated that bloodwork was necessary as soon as possible because Maria had recently started a new medication that required frequent monitoring of her liver enzymes. At the initial appointment, the psychologist collected background information about previous medical procedures. Bloodwork had only been required one time several years prior and was successfully completed after adult restraint. More recent attempts at routine vaccinations and dental fillings had met with significant resistance by Maria and could not be completed because of aggressive behavior. Shortly before the referral to psychology, Maria’s parents attempted to complete the bloodwork requested by her pediatrician. Although they used a handheld tablet to provide distraction, Maria became very upset, refused to sit still, and attempted to hit her mother; the venipuncture could not be completed. Since that time, Maria’s parents indicated that she had started to demonstrate increased agitation upon hearing the word “needle” or seeing medical equipment, and she asked repeatedly about whether or not she would be receiving a needle before coming to the psychology appointment.

At this initial session, the psychologist also informally assessed Maria’s learning style and preferred activities to determine an appropriate reinforcement strategy to be used during further treatment. Maria was taught diaphragmatic breathing and given several short coping statements (e.g., “I can do it”). Her parents were provided with psychoeducation about shaping and exposure as well as information about parent-led distraction, differential attention, and coping-promoting behaviors (Slifer et al., 2011). During subsequent sessions, a shaping procedure was used to gradually expose Maria to the procedure involved in a blood draw (Shabani & Fisher, 2006). Rather than working with Maria to develop a formal hierarchy, the steps presented to her were based on the psychologist’s knowledge of the evidence-based literature and clinical experience in tailoring such evidence-based approaches on the basis of the particular situation and individual factors relevant to Maria (e.g., her temperament, history, illness, parental behaviors) as well as Maria’s behavioral responses. For example, Maria readily rolled up her sleeve, held her arm out, and accepted a tourniquet. However, the application of an alcohol swab was very distressing for Maria and required very gradual movement toward her arm in a sequence of eight steps that began with touching the unopened package to her fingertip. Exposure initially occurred in the psychologist’s office and then moved to the on-site blood laboratory. Protests and refusal behaviors were ignored and cooperation was praised. After each phase of the exposure, Maria was given access to preferred toys (e.g., puzzles) for a predetermined length of time (10 min). Although at home exposure was not feasible, Maria’s parents frequently read a social story that had been written especially for Maria that reviewed the steps of the bloodwork. The story also included photographs that were taken during previous psychology appointments that showed Maria engaged in each of the necessary steps (thereby providing indirect exposure to the medical equipment and venipuncture process).

After four psychology sessions, Maria and her parents, accompanied by the psychologist, presented to the laboratory to have the bloodwork completed. Arrangements had been made beforehand with the medical staff so that Maria was permitted to wait at the back of the clinic (to avoid the busy waiting room) and was taken into a room shortly after her arrival. The psychologist assisted the parents with coaching Maria through the procedure, using distraction with a smartphone, coaching to use her breathing exercises, and praise for each of her successes (Slifer et al., 2011; Uman et al., 2013). A
topical cream was not used because Maria’s parents reported that she was very resistant to using bandages and they felt she would refuse to leave the patch covering the cream on her arm. After a brief episode of stalling and appropriate limit-setting by the parents, Maria was able to sit cooperatively in the clinic chair, hold her arm still, and accept a tourniquet. Maria was able to proceed to have her blood drawn successfully without adult restraint. Consistent with the literature on the treatment of specific phobias (Garland & Clark, 2009; Rapee et al., 2006), graduated exposure to anxiety-provoking stimuli provided Maria with the skills and structure necessary to address her needle fear and successfully complete her bloodwork.

Summary and Recommendations

Although there is substantial evidence for managing needle pain in children, multiple factors may provide barriers to the implementation of evidence-based pain management strategies for needle procedures. Increased research is needed to elucidate these barriers to the application of pain management strategies and on modifications to these strategies to fit the complex clinical settings that pediatric psychologists regularly encounter. Although evidence-based practice suggests that a certain degree of clinical expertise is required to adapt research-based interventions to the particular patient context, further research that targets common clinical application issues would facilitate this process. In addition, even within typically developing populations in highly controlled environments (e.g., as described in Birnie et al., 2014, and other systematic reviews), there still remains many unanswered questions regarding issues such as the appropriate length of time required to prepare children for procedures. And noted by Birnie et al. (2014), the existing evidence in support of psychological interventions for needle pain in children is based on generally poor quality trials. Pediatric psychologists need to apply more rigorous methodologies to improve the quality of work in the area to improve our knowledge about the efficacy and effectiveness of these interventions.

It is important for psychologists to be more frequently involved in consultation at the front lines of clinical practice (e.g., in the design and implementation of clinics, educating staff) to allow for the implementation of evidence-based pain management strategies that can assist with prevention of negative outcomes. Too often pediatric psychologists only become involved when a negative outcome has already occurred, such as a challenging experience that led to the development of a needle phobia. To assist with this increased dissemination of pain prevention measures, it is critically important for pediatric psychologists to be involved in the development and implementation of innovative knowledge translation initiatives for procedural pain management to help prevent challenging and negative experiences for many children and their families.

References


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