Vaccinations are one of the most common procedures in childhood (Uman et al., 2013). A child may have as many as 22 injected vaccinations by one year of age, eight more by four years of age, and 10 more by 11 years of age (Advisory Committee of Immunization Practices [ACIP], 2013). These needlesticks are often associated with anxiety, avoidance, somatic symptoms, and considerable distress (Taddio, Iersich, Ipp, Kikuta, & Shah, 2009). Distressing procedures can place children at risk for impaired coping mechanisms during future medical visits, vaccinations, and procedures (Cohen et al., 2006; Kennedy, Luhmann, & Zempsky, 2008; MacLaren & Cohen, 2007). Children react more intensely to vaccinations if they have had previous negative medical experiences compared to those who have had fewer negative experiences (Walco, 2008).

Parents can also feel distressed, concerned, and overwhelmed when their children receive immunizations and may be dealing with needle phobia of their own, resulting in delay or refusal of vaccinations (Gaskell, Binns, Heyhoe, & Jackson, 2005; Luthy, Beckstrand, & Peterson, 2009). Multiple surveys of parents and patients revealed that fear of pain is a contributing factor into vaccine hesitancy and refusal (Bhat-Schelbert et al., 2012; Kempe et al., 2011; Miller, Wickliffe, Jahnke, Linebarger, & Humiston, 2014).

For clinicians, procedures with children who have poor coping skills can be unpleasant, stressful, and time-consuming (Schecter et al., 2007). Although there are multiple effective cognitive behavioral and pharmacologic strategies to help families cope with needlesticks, not many of these strategies are implemented (Harrison, Elia, Royle, & Manias, 2012; Taddio, Chambers et al., 2009). Barriers to implementation of strategies include cost, effort required, lack of consistent use, and lack of staff and parent education to its effectiveness. Staff misconceptions can be the result of personal biases and inadequate knowledge or skills. Examples of common myths are that young children do not remember painful procedures and that pain-reducing measures take too long to implement (Royal Australasian College of Physicians [RACP], 2006a). In addition, adult language, tone, and doting behaviors may unknowingly increase a child’s distress (RACP, 2006a; Schecter et al., 2007).

To overcome some of these barriers, we developed two handouts summarizing evidence-based findings according to patient age groups; one is tailored for parents and the other is for staff. Our handouts recommend behavioral strategies for use in the primary care setting during routine vaccinations, with a goal of decreasing patient distress before, during, and after administration. For all age groups, teaching staff to coach parents and children through procedures can help relieve anxiety and distress (MacLaren & Cohen, 2005; RACP, 2006a). Our goal was to increase education and knowledge about coping behaviors among staff, patients, and families.

### Literature Search

A literature search of CINAH, Medline, PubMed, and the Cochrane Database was performed using combinations of the following terms: pediatric, vaccination, immunization, coping, and needlestick. Guidelines, reviews, meta-analyses, and randomized controlled trials (RCTs) were used to produce two sets of tailored handouts. Study populations ranged from newborn to 18 years, varying according to age-appropriateness of interventions. Studies used a wide variety of objective pain scales in addition to parent-reported and patient-reported subjective scales. The following is a summary of the evidence that we incorporated into the handouts.

### Findings that Impact

#### All Age Groups

**Before vaccination.** Staff are in a key position to effectively help relieve anxiety and distress through coaching. Nearly 35% of parents in one
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study reported that pain and anxiety were major concerns regarding immunizations, and a parent’s level of comfort greatly influences a child’s response; therefore, staff should assess a family’s previous experiences and expectations to help build on effective coping strategies (Luthy et al., 2009; McMurtry, McGrath, Asp, & Chambers, 2007; Riddell, Stevens, Cohen, Flora, & Greenberg, 2007) (see Figure 1). Families may want to bring familiar security and distraction items, like toys or books.

During vaccine administration. Simple instructions for the parent at the beginning of the encounter may be helpful to both parent and child. These instructions include how to position the child or when to take deep breaths. In addition, staff should incorporate parent and patient preferences for comfort holds and distraction techniques (Hensel, Morson, & Preuss, 2013; MacLaren & Cohen, 2007) (see Figures 2, 3, and 4). Clinicians should know that injection order and technique matter: 1) use a rapid injection technique without aspiration, 2) choose an appropriate needle size, and 3) inject multiple vaccinations simultaneously when possible (Ipp, Taddio, Sam, Goldbach, & Parkin, 2007; Schecter et al., 2007; Taddio et al., 2010). Rapid injection is pragmatic and results in a decreased pain response (Ipp et al., 2007) (see Figure 4).

After administration. After the procedure, continue distraction techniques and provide tangible rewards for younger children, as well as specific praise for things they did well, especially actions that the clinician requested, such as staying still (Gaskell et al., 2005). Teens may also respond well to specific, positive feedback. Parents, particularly anxious ones, may also benefit from positive reinforcement for their roles as coaches (Gaskell et al., 2005) (see Figure 4). Patients and families may also welcome a vaccination record that contains both vaccinations given, as well as a list of personalized coping strategies for use at future visits.

Recommendations For Vaccination Practice According to Developmental Stage

Infants. Infants and newborns benefit from comfort measures, such as oral stimulation (pacifier or breastfeeding) and swaddling, or snugly wrapping the child’s upper body in a blanket with upper thighs exposed (Cohen, 2010; RACP, 2006b). Clinicians can involve parents during the procedure with these interventions (RACP, 2006b).

Substances, such as sugar solutions, and breastfeeding have been found to be short-acting and effective options for children under six months of age (Cohen, 2008; Curry, Brown, & Wrona, 2012; Dilli, Küçük, & Dallarthe, 2009; Hatfield, Gusic, Dyer, & Polomano, 2008; Hensel et al., 2013; Shah, Taddio, & Riedel, 2009). Similarly, pacifiers and non-nutritive sucking are also options (RACP, 2006b).

Physical interventions, such as swaddling and warmth, also decrease distress (Cavender, Golf, Hollon, & Guzetta, 2004; Gray, Lang, & Porges, 2012; Harrington et al., 2012; RACP, 2006b; Taddio, Ilersich et al., 2009). Further, older infants who are in the process of learning cause/effect, and object permanence may benefit from distraction items, such as rattles, beads, or a flashlight (MacLaren & Cohen, 2007).

Toddlers. Toddlers, from one to three years old, transition from sensorimotor learning (for example, when toys with flashing lights or sounds are entertaining) to preoperational thinking, where they can engage in play, sing songs, and listen to stories (Bickley & Szliglasi, 2009). Studies did not specifically address preschool as a separate developmental stage. Some children may benefit from interventions aimed at toddlers, while others might be more receptive to school-age interventions.

Preparatory explanations should be simple and concrete, while jewelry, bubbles, pinwheels, and cartoons provide distraction (Chambers, Taddio, Uman, & McMurtry, 2009). Singing along to music, directed movie watching, and reading a story with focused questions are also effective (Chambers et al., 2009).

Comfort holds, where the parent or assistant holds the child snugly, help children feel secure and comfortable while keeping limbs accessible for intervention (Taddio et al., 2010) (see Figure 4). For children who have good head and trunk control, a sitting position nestled in a parent’s arms provides both emotional security and physical immobilization in a non-threatening manner, as opposed to supine positions (Hensel et al., 2013; Taddio et al., 2010). Either a parent or staff assistant may be the holder.

The attitude, demeanor, and language use of the parents and clinicians present at administration can greatly influence a child’s level of distress, particularly when the parent is upset or anxious (RACP, 2006a; Riddell et al., 2007; Schecter et al., 2007). Excessive reassurance, apologies, and the use of comments like “I’m sorry” and “It’ll be all right” may increase a child’s distress (Chambers et al., 2009; Luthy et al., 2009; McMurtry et al., 2007; RACP, 2006a). Positive instructions, such as “this is the time to hold still” should replace “don’t move.”

School age. School-age children are capable of more complex learning, and this wide range from preschool (3 to 4 years) to preteens (11 to 12 years) encompasses the processes of becoming more independent and engaging in goal-directed exploration (Bickley & Szliglasi, 2009). Studies recommend age-appropriate preparatory discussion, ample opportunity to ask questions, and acceptable choices for the child, such as which arm to use or the color of bandage (Chambers et al., 2009; RACP, 2006a; Schecter et al., 2007; Uman et al., 2013). Instructions and explanations should still be concrete (Bickley & Szliglasi, 2009).

Review studies endorsed clinician-coached distraction (Chambers et al., 2009; Schecter et al., 2007; Uman et al., 2013). Distraction was particularly effective; studies used a variety of cognitive, visual, and auditory distractions that included deep breathing, guided imagery, interactive toys (pinwheels, wands, and bubbles), and coached activities, like picture books and movies (Birnie et al., 2014, Boivin et al., 2008; RACP, 2006a; Taddio et al., 2010). Similarly, non-procedural talk, such as asking about pets or school, is recommended (Cohen, 2008; Gaskell et al., 2005; RACP, 2006a) (see Figure 3). Search games and interactive toys can help distract children from fixating on the procedure (Boivin et al., 2008).

From a practical perspective, providers may encourage willing parents to take on a supportive coaching role after they receive instructions, role modeling, and information about the vaccination (Boivin et al., 2008). It is worthwhile to give parents a few instructions about non-procedural talk rather than “soothing” words or saying, “It won’t hurt” (MacLaren & Cohen, 2007; RACP, 2006a; Taddio et al., 2010). Studies also investigated physical
Figure 1.
Tips for Parents and Families – Front of Handout

**BEFORE + DURING + AFTER**

At home, after your shots...
There may be redness, mild swelling, or soreness where the shot was given. A clean, wet, cool washcloth may help. If the redness or tenderness increases after 24 hours, call your health care provider.

Your child may also have a slight fever and be fussy. You may give acetaminophen (Tylenol®) or ibuprofen (Advil® or Motrin®) for comfort and encourage drinking liquids.

Do not give aspirin.

Serious reactions, such as a high fever or trouble breathing, are rare. Call your health care provider if your child's temperature rises above 104.5°F (40.3°C) or if he or she has trouble breathing. For newborns, call if the temperature rises above 100.4°F (38°C).

**BEFORE + DURING + AFTER**

Tips for parents and families to make shots and procedures less scary

Before you come to the office or clinic...

- According to your child’s age, tell him or her about the visit:
  - why and where the procedure will take place
  - who will be there
- Give older children a chance to ask questions about the visit.
- Bring special items, like a stuffed animal or blanket
- Think of ways to distract your child, for example
  - bring a portable DVD player with a favorite cartoon
  - bring a storybook or comic book
- If more than one vaccination is due, decide if they will be given at the same time or one at a time
- Find out if your teen wants you to be present in the exam room or the waiting room
- Be calm and confident: children respond to your emotions and behaviors
- Tell your provider what helped your child stay calm during previous visits

Helpful Internet Resources:
Centers for Disease Control: www.cdc.gov
Immunization Action Coalition: www.immunize.org
MedlinePlus: www.medlineplus.gov
American Academy of Pediatrics: www.healthychildren.org
Strategies for during the procedure...

Distraction can be just as good or better than medications for reducing pain. Multiple strategies at the same time may work better than one at a time (holding + talking + toys). Asking distraction questions and talking about a story or toy works better than reassurance or apologies.

INFANTS
- Give a sugar solution, pacifier, or breastfeed
- Swaddle, snuggle in your arms

TOPPLERS
- Distract with songs, stories, movies
- Use comfort holds to help your child feel secure + stay still
  “Now it’s time to hold still.”
- Play with toys, bubbles, or finger puppets

SCHOOL-AGE
- Give your child acceptable choices
  “Which arm should we use?”
  “Should we count 1, 2, 3?”
- Distract with questions about movies, games & books
  “What do you think will happen next in the movie?”
  “What is that person trying to do?”
- Distract with toys
  - pinwheel: “How fast can you make it spin?”
  - bubbles: “How many can you make with one breath?”
  - magic wand, squeeze balls, etc
- Ask non-medical questions
  “What did you do at school today?”
  “What was your favorite part of school today?”
  “What did we/you do last weekend?”
  “Tell me about one of your favorite books.”

PRE-TEENS & TEENS
- Help your child voice his or her preferences and questions
  “Which arm do you want to use?”
  “Do you want to hold my hand?”
  “Do you want to watch?”
- For more than one shot:
  “Do you want both shots in one arm?”
  “Do you want two at once or one at a time?”
- Suggest deep breathing together, imagine a favorite place
- Ask non-medical questions

NOTE:
The goal of distraction is not to surprise your child when the poke happens. The provider will verbalize the steps. Having your child pay attention to more than one thing can help him or her be less upset.

After it’s over...
- Praise the child for doing a good job holding still
- Write down strategies that worked at this visit for future use
Figure 3.
Tips for Clinical Staff – Front of Handout

**Tips for clinical staff**

to make shots and procedures less scary

**BEFORE**

- Ask about past procedures: what worked? what didn’t?
- Prepare the parent and child with age-appropriate information and rationales.
  - Include what to expect, especially sensory information:
    - “You’ll feel me rub your arm”
    - “The alcohol swab for cleaning might smell funny and feel cold.”
  - If EMLA used, point out that it still works after the cream has been wiped off.
- Give an opportunity to ask questions. Answer with nonthreatening vocabulary.
  - “Some kids tell me that it stings or pinches. Others tell me that they feel warm.”
  - “Kids tell me different things about shots; when we’re done, you can tell me how it felt to you.”
- Be a coach: give the child the job of holding still, give the parent the job of also being a coach
  - Emphasize that **distraction can be as good or better than medications for reducing pain and distress**
  - Direct the parent toward distracting questions rather than reassurances or apologies
- Demonstrate comfort holds help the parent and child sit securely.
  - Include security objects (stuffed animal, blanket)
- Give the child developmentally-appropriate reasonable choices
  - “Which arm should we use?”
  - “Do you want to sit up or lie down?”
  - “Which toy do you want to play with? (pinwheel, I spy, magic wand)”
  - “Do you want me to count 1, 2, 3?”
  - “Do you want to watch?”

**DURING**

- Talk the patients and parents through what you are doing.
  - Ask non-medical questions.
    - “Tell me how it feels (alcohol, massage, etc)”
    - “What are you studying in school right now?”
    - “What do you like to do on weekends?”
- Infants: use sucrose solutions, pacifiers, breastfeeding, and swaddling
- Toddler: offer multiple distractions: song, story, DVD movie, bubbles, finger puppets
- School-age: give specific directions and ask distraction questions:
  - use distraction items: Spy books, squeeze balls, movies or cartoons
    - “This is the time to hold still.”
    - “What was your favorite part of school today?”
    - “What will happen next in the movie? What is that person trying to do?”
- Pre-teens/teens: encourage cognitive self-coaching
  - Answer patient questions and follow through on patient preferences
  - Encourage guided imagery, progressive muscle relaxation, deep breathing, listening to music

**NOTE:**

With distraction techniques, the point is not to surprise the child when the needlestick happens. Verbalize the steps that you are taking. Having the child’s attention split can reduce distress and anxiety.
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Figure 4.
Tips for Clinical Staff – Back of Handout

**Injection technique notes:**
Select an appropriate-sized needle and plan ahead for multiple injections
(body location, timing, number of staff).
Stroke the skin or apply pressure close to the injection site before and during injection.
Inject the least painful vaccine first if multiple vaccines are due during a single visit.
Perform rapid injection without aspiration.

**After**
- Praise the child for doing a good job
  - Be specific: holding still, playing the game, deep breathing
- Praise the parents and thank him/her for helping
- Continue distraction techniques
- Encourage parents to remember for next time what worked and what didn’t

**SAMPLE COMFORT HOLDS**
with 2 health care providers

References

distractions. Pressure near the injection site to relieve pain was effective in two studies, (Taddio, Hershich et al; 2009; Taddio et al., 2010). A vibrating toy was part of an effective multimodal approach (Berberich & Landman, 2009).

For school-age children, the strongest evidence supports multimodal interventions that incorporate cognitive-behavioral techniques (Berberich & Landman, 2009; Boivin et al, 2008; RACP, 2006a; Shah et al., 2009; Taddio et al., 2010; Uman et al., 2013) (see Figure 3). Most interventions combine a form of distraction with pharmacologic therapy. However, a wide variety of non-pharmacologic interventions was used in multimodal approaches, some using up to three simultaneous techniques. Given various child temperaments, a multimodal intervention may be the most effective approach for each patient.

The following sample scenario incorporates physical, cognitive, and behavioral distractions: a parent holds the child in a “bear hug” (see Figure 4) while the clinician coaches the child using a movie for distraction and gives cues about what the child might feel (“I’m going to wash your arm, and it’s going to feel cold”). To further engage the child, the parent asks questions about the movie plot and characters (“What do you think will happen next?”)

Adolescents. Adolescents may also respond well to verbal, auditory, cognitive, and physical distractions. For example, playing music on speakers and non-procedural talk, such as “What did you do this summer?” are useful distraction techniques (Chambers et al., 2009; Kristjásdóttir & Kristjánssdóttir, 2011). Adolescents are expected to be developing a sense of identity and establishing independence; therefore, clinicians should allow adolescents the opportunity to take control by offering choices (Bickley & Szilagi, 2009). For example, clinicians may allow the patient to decide if he or she wants a parent present. Other options include preference to watch or not watch the preparation of the vaccine and the injection, in addition to and offering multiple injections to be given either one at a time or at the same time. An important consideration is determining how much explanation the patient may want about the vaccine. In addition, distraction questions may still be useful in reducing anxiety and to reveal potential topics for discussion with a healthcare provider.

Handout Development

Our goal in developing these handouts was to educate staff and families about practical coping strategies that are quick and easy to implement. The readability is aimed to address a broad range of literacy levels. We have included many ideas for inspiration about distraction techniques because parents and clinicians may want or need to try several strategies before finding the best approach for a particular child.

Topical Local Anesthetics And Sucrose

Many studies evaluated topical local anesthetics, both alone and in combination with other therapies. To increase use across a variety of practice sites that have varying pharmacologic availability, we omitted topical anesthetics from the handouts. Rather, we chose to emphasize the effectiveness and ease of distraction techniques to make the handouts more generalizable. A similar thought process resulted in the inclusion of breastfeeding and pacifier use, but not the inclusion of sucrose.

Comfort Holds

We have also included photos of suggested comfort holds that provide a sense of security for the child coupled with physical safety and immobility of the limb to be vaccinated. The goal of providing photos on both handouts is to remind staff to encourage these positions and inspire parents to ask about alternatives to the child lying supine and alone on the exam table.

Scripts

Most articles did not include ways to verbally introduce or implement distraction techniques. Rather, a typical description dryly describes a method as “uses toy” or “adult makes comments about toy.” Short scripts give staff and parents a starting point for directions to the child and age-appropriate word choices. Some suggestions for verbal instructions around vaccination, such as anxiety and lack of staff and parent education. For example, reduced patient distress may help increase adherence to vaccine schedules. More information about timing and amount of educational interventions (how far in advance according to developmental age) would be useful, in addition to clarification of the adult coaching role (Birnie et al., 2014). Additionally, research into combination vaccines and less painful formulations (like intranasal or transdermal) may also assist adherence rates by reducing the number of needlesticks (Dodd, 2003; Gildengil et al., 2009).

References


Conclusion and Future Directions

Vaccinations at a primary care office can be a stressful experience for children and parents. Patient-centered care requires that patients and families are knowledgeable about both what vaccinations the child will receive, and about strategies to manage pain and anxiety. Frequent and consistent implementation of evidence-based recommendations is a pressing challenge. Printed patient education material, written at the appropriate reading level, can empower parents and families to become active and engaged partners in their healthcare. Regarding these educational materials, evaluation of implementation, family and staff satisfaction, and continued use are next steps.

More broadly, further research should address the relationship between coping skills and barriers to vaccination, such as anxiety and lack of staff and parent education. For example, reduced patient distress may help increase adherence to vaccine schedules. More information about timing and amount of educational interventions (how far in advance according to developmental age) would be useful, in addition to clarification of the adult coaching role (Birnie et al., 2014). Additionally, research into combination vaccines and less painful formulations (like intranasal or transdermal) may also assist adherence rates by reducing the number of needlesticks (Dodd, 2003; Gildengil et al., 2009).
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