Improving the vaccination experience: Reducing pain and anxiety for children and adults

Dr. Anna Taddio, University of Toronto
anna.taddio@utoronto.ca
Acknowledgements

Funding & support:

Trademark:

Partners:
Learning objectives

1. Identify the consequences of poorly managed needle pain
2. Describe evidence-based strategies to reduce needle pain
3. Apply evidence-based strategies to reduce needle pain
1. Vaccine hesitancy and pain

Delay in acceptance or refusal of vaccines despite the availability of vaccination services

- complex and context specific, varying across time, place and vaccine
- influenced by such factors as confidence, convenience and complacency
Needles

- Vaccines are the most common reason why people receive needles.
- Pain is the most common adverse event associated with immunization.
- 2/3 children and 1/4 adults are afraid of needles.
- Fear can fuel pain and lead to immunization stress-related responses (dizziness, headache, nausea, fainting).
- Negative vaccination experiences contribute to negative attitudes about vaccination and vaccine hesitancy.
- Up to 1 person in every 10 refuse vaccinations because of fear/pain.

Taddio et al. (2012); McMurtry et al. (2015); McMurtry (2020)

Selected icons made by Freepik from www.flaticon.com
Pain and fear exacerbate each other in an escalating relationship.
WHO 3C Model of Vaccine Hesitancy

- **Perceived risk is low, other priorities**
- **Trust in vaccines, their delivery and policy-makers**
- **Structural and psychological**

MacDonald (2015)
Mitigating pain is part of good immunization practices and should be embedded in national immunization policies and practices

4. Advice for national programmes

Many immunization programmes have sustained high vaccine coverage levels without addressing pain during the vaccination procedure; however, mitigating pain at vaccination should be considered as part of good immunization practice globally.

National programmes should ensure that the recommendations listed above are implemented. At health system level, related health policy should be strengthened by provision of training on the recommended policies and practices. Programmes should recommend the preferred order of injection for country-specific vaccination schedules where possible.

Education of health-care workers on pain mitigation strategies, e.g. by inclusion in training curricula, needs to be ensured in order to facilitate their implementation. Additionally, it should be ensured that caregivers and, if appropriate, vaccine recipients, are educated on vaccination pain mitigation strategies. Information could be provided during prenatal visits, breastfeeding education, or at time of vaccination. Context-specific educational methods to be utilized should include teaching of individuals or groups, or provision of written information.
People's experiences of pain from a needle injection are the same because the pain stimulus is the same.

**Fiction:** Pain is an inherently subjective experience which is influenced by biological, psychological, and social factors and does **not** simply reflect the amount of tissue damage.
Fact or Fiction?

Client anxiety is the only factor that causes negative cycles of pain and fear related to needles.

**Fiction:** Biopsychosocial factors all contribute to influence a client's experience of needles over time. Social factors include behaviours by clinicians and parents.
2. The Evidence

In 2015, we created a Canadian clinical practice guideline (CPG) – it has been incorporated into the Canadian Immunization Guide and adopted by the World Health Organization.

The CPG includes evidence-based recommendations for reducing pain, fear and fainting. There are 5 domains of recommendations (5Ps):

- Procedural
- Physical
- Pharmacologic
- Psychological
- Process

Taddio, McMurtry et al. (2015)
Selected icons made by Freepik from www.flaticon.com
The 5 P’s include interventions that are designed to break the cycle of pain and fear.
Procedural

1. **Injection method**
   - no aspiration, fast injection

2. **Order of injection**
   - most painful last

3. **Formulation**
   - physiologic pH

_Taddio, McMurtry et al. (2015)_
_Taddio et al. (2016)_
_Taddio et al. (2010)_:
4. **Vastus lateralis injection**
   (infants)
   • In the middle of the space between the greater trochanter of the femur and the top of the knee

5. **Simultaneous injections**
   if multiple vaccines given (infants)

_Taddio, McMurtry et al._ (2015)
Physical

1. Breastfeeding
   • Between 0-2 years, if not breastfeeding, sweet-tasting solution & non-nutritive sucking

2. Positioning
   • Skin-to-skin contact in neonates
   • Holding in children up to 3 years
   • Sitting upright in children >3 years and adults

3. Tactile stimulation with cold
   (children and adolescents)

Taddio, McMurtry et al. (2015)
Pharmacological

1. Topical anesthetics
   • Lidocaine-prilocaine, amethocaine, liposomal lidocaine

2. Sweet-tasting solution (0-2 years)
   • Sucrose, glucose
   • Alternatively, oral rotavirus vaccine first (2 to 4 months)

3. Vapocoolants (adults)
   • PainEase, Ethyl Chloride

Taddio, McMurtry et al. (2015)
Psychological

1. Interactions
   • Words and actions can promote coping or increase distress
   • Use coping-promoting behaviours

2. Distraction
   • Take attention away from needle

Taddio, McMurtry et al. (2015)
High levels of needle fear

Exposure therapy

• Facing fears gradually over time to overcome needle fear

Typically requires assistance by a trained provider

<table>
<thead>
<tr>
<th>Step</th>
<th>Situation</th>
<th>Fear Rating (0-10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.</td>
<td>Getting a shot in the upper arm or fleshy part of leg</td>
<td>10</td>
</tr>
<tr>
<td>9.</td>
<td>Slightly pricking one’s skin with a needle</td>
<td>9</td>
</tr>
<tr>
<td>8.</td>
<td>Watching someone else get a needle</td>
<td>8</td>
</tr>
<tr>
<td>7.</td>
<td>Resting needle against vein</td>
<td>7</td>
</tr>
<tr>
<td>6.</td>
<td>Resting the needle against one’s skin</td>
<td>7</td>
</tr>
<tr>
<td>5.</td>
<td>Rubbing an alcohol swab against one’s skin</td>
<td>6</td>
</tr>
<tr>
<td>4.</td>
<td>Holding a needle</td>
<td>5</td>
</tr>
<tr>
<td>3.</td>
<td>Watching an apple being injected</td>
<td>4</td>
</tr>
<tr>
<td>2.</td>
<td>Watching video clips of someone getting a needle</td>
<td>3</td>
</tr>
<tr>
<td>1.</td>
<td>Looking at a picture of a needle</td>
<td>2</td>
</tr>
</tbody>
</table>

Taddio, McMurtry et al. (2015)
McMurtry, Taddio et al. (2016)
Fainting or syncope during injection

Use muscle tension to raise blood pressure and help prevent fainting

If a patient feels dizzy during injection, they can do the following before, during, and after the injection:

• Squeeze or tense their leg and stomach muscles 10 to 15 seconds or until feeling flushed or warm in their face
• Release tension for 20 to 30 seconds
• Repeat in cycles until the symptoms disappear

Vaccination pain management for adults (Canada.ca)
Pediatric Pain Health and Communication Lab resources
Good practice recommendations

Minimize fear-inducing stimuli

Minimize waiting time

Provide privacy and comfort

Be observant and responsive

Taddio, McMurtry et al. (2015)
Gold et al. (2020)
McMurtry (2020)
Process

- Provider education
- Caregiver/parent education
- Individual education

Taddio, McMurtry et al. (2015)
‘Uptake’ of Clinical Practice Guideline (CPG)

AHS: https://www.albertahealthservices.ca/assets/info/hp/cdc/if-hp-cdpsm-standard-administration-immunization-06-100.pdf
Manitoba, Winnipeg Regional Health Authority: https://professionals.wrha.mb.ca/old/professionals/immunization/contents.php
Quebec: https://www.msss.gouv.qc.ca/professionnels/vaccination/protocole-d-immunisation-du-quebec-piq/
New Brunswick: https://www2.gnb.ca/content/gnb/en/departments/ocmoh/for_healthprofessionals/cdc/NBImmunizationGuide.html

Courtesy of Immunize Canada, 2021
Practice review ➡ Clinical Care Gaps

NATIONAL PERSPECTIVE, 2017
- Fear is worst part of vaccination: 59%
- Pain is worst part of vaccination: 35%
- Know how to reduce pain/fear: 50%
- Prepared ahead of time: 17%

ONTARIO PUBLIC HEALTH UNITS, 2021
- Policies on pain/fear: 58%
- Formal training on program delivery: 74%
- Formal training on pain/fear: 50%
- Incorporate coping preferences: 30%
- Document stress-related responses*: 0%

* Pain/fear/dizziness; Fainting monitored in 83%
3. Getting evidence into ‘action’ with CARD

- ‘Systems level’ approach to address the identified clinical care gap
- Targets all stakeholders involved
- Turns the evidence into ‘action’ and uses a user-friendly and intuitive tool
- Each stakeholder ‘plays their CARDs’ to improve the experience for all
- Interventions implemented ‘ahead of time’ and ‘on needle procedure day’

Taddio et al. (2019)
# Studies with CARD

<table>
<thead>
<tr>
<th>Study</th>
<th>Target</th>
<th>Setting</th>
<th>Design</th>
<th>Sample size</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freedman et al.</td>
<td>Providers, children 12 years, parents, educators</td>
<td>Schools</td>
<td>Controlled Clinical Trial</td>
<td>323</td>
<td>↓ fear, dizziness</td>
</tr>
<tr>
<td>(2019)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taddio et al.</td>
<td>Providers, children 12 years, parents, educators</td>
<td>Schools</td>
<td>Randomized Controlled Trial</td>
<td>1919</td>
<td>↓ fear, pain, fainting</td>
</tr>
<tr>
<td>(2022)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tetui et al.</td>
<td>Providers, patients &gt;12 years</td>
<td>Mass vaccination clinics</td>
<td>Before and After Trial</td>
<td>2488</td>
<td>↓ fear, pain, dizziness</td>
</tr>
<tr>
<td>(2022)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taddio et al.</td>
<td>Providers, parents, children 5-11 years</td>
<td>Pharmacies</td>
<td>Before and After Trial</td>
<td>153</td>
<td>↓ fear</td>
</tr>
<tr>
<td>(2022)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taddio et al.</td>
<td>Providers, adults ≥18 years</td>
<td>University vaccination pop-up clinics</td>
<td>Before and After Trial</td>
<td>476</td>
<td>↓ fear</td>
</tr>
<tr>
<td>(in prep’n)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CARD Model

- Health care providers
- Vaccine clients
- Parents/caregivers

**Ahead of time**
- Vaccination day

- Health care providers
- Vaccine clients
- Parents/caregivers

**Environment**
- Seating available (everyone)
- Space for support person
- Privacy
- Distractions
- Minimize fear cues (visual and auditory)

**Engagement**
- Be calm, positive, promote coping
- Assess symptoms (fear, pain, fainting)
- Invite participation, answer questions
- Support CARD (coping) choices
- Minimize injection pain

**Education**
- Assess symptoms (fear, pain, fainting)
- Support CARD (coping) choices
- Minimize injection pain
Education (Providers)
Education (Clients)

**IMPROVING THE VACCINATION EXPERIENCE:**
Learn how to play your CARDS

**COMFORT**
Find ways to get comfortable.

**ASK**
Ask questions to be prepared.

**RELAX**
Keep yourself calm.

**DISTRACT**
Shift your attention to something else.

The CARD system (Comfort, Ask, Relax, Distract) provides groups of strategies that can be used to make your vaccination experience a more positive one. Choose what CARDS you want to play to reduce the stress and pain associated with vaccinations. There’s no wrong move. Look on the back for ideas.

To learn more about CARD, go to CardSystem.ca.
Education (Clients)

CARD game:
https://immunize.ca/card-game-kids

CARD posters and activities
**Education (Caregivers)**

**Improving the Vaccination Experience:**

**What is CARD for parents and caregivers?**

The CARD acronym (Calm, Ask, Distract) provides guidance for strategies that can be used before, during, and after vaccinations to reduce anxiety and pain for your child. Learn more about CARD go to [CARD.org](http://CARD.org).

**Comfort**

Encourage your child to prepare for the vaccination. They can use the CARD acronym to think about coping strategies they want to use. Some things they can do to help themselves include:

- **Write a Comfort Plan** to bring along as a reminder.
- **Count or focus on a fun activity** they enjoy during their visit.
- **Think about their worries** they would like to be in getting up or falling down and how they can help it.

**Ask**

Create a plan to ask questions to keep them informed about what is happening. Ask questions about any concerns you or your child may have. It is important to take your time and make sure the answers are clear and easy to understand.

- **What will happen next?**
- **Can I ask questions?**
- **Can pain be avoided?**

**Relax**

Your child’s anxiety can help you relax. Do not rush the process. Take the time to speak to your child and calm them down. It is important to make sure your child is calm and comfortable. You can help them relax by:

- **Practicing breathing techniques** that help you reduce stress.
- **Using music and other relaxation techniques** to manage pain.

**Distract**

Involving your child in the vaccination can make them feel more comfortable. Try to use the words of your child, so they feel they are in control of the situation.

- **Does not matter which the vaccination site will be**. It should be a gentle stroke of a arm or a forearm.
- **Keep the environment calm** and avoid distractions. You should speak in a gentle tone and avoid any loud noises.

**Where to Apply Numbing Cream**

Most vaccinations take place in the muscles of the arm, below the shoulder. Some vaccines may also be given to the arm, such as the upper arm. Even if the vaccine is given in a different area, a gentle application is still recommended.

**How to Apply Numbing Cream**

1. Check the label of the cream to ensure it is safe for your child’s skin.
2. Apply the cream onto the area of skin that will receive the vaccine. Make sure the cream is evenly spread over the area.
3. Allow the cream to dry for a few minutes before applying the vaccine.
4. When applying the vaccine, make sure the needle is clean and sterile.
5. Use a gentle, slow motion to apply the vaccine to the area.
6. After the vaccine is given, wash your hands thoroughly.

**Additional Resources**

For more information, visit [CARD.org](http://CARD.org) or contact your local health department.

[Source: CBC, Health Canada]
The difference of having this piece of paper in front of me prior to giving the vaccination - it gives me perspective already as to what this child would prefer.

We use the CARD (Comfort Ask Relax Distract) system to help make you more comfortable during your vaccination. Fill in the CARD survey below to tell us how we can make your vaccination a more positive experience. If you would like to use a strategy that is not listed, let us know and we will try to do it.

To learn more about CARD, visit CardSystem.ca.

<table>
<thead>
<tr>
<th>CARD System</th>
<th>Choose all options you want for your vaccination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comfort</td>
<td>☐ Privacy (separate room with closed door)</td>
</tr>
<tr>
<td></td>
<td>☐ Sit upright on a chair</td>
</tr>
<tr>
<td></td>
<td>☐ Sit on a parent’s or caregiver’s lap</td>
</tr>
<tr>
<td></td>
<td>☐ Lay down</td>
</tr>
<tr>
<td></td>
<td>☐ Eat a snack or treat</td>
</tr>
<tr>
<td></td>
<td>☐ Arm the needle goes in (left or right): ______________________________________________________________________</td>
</tr>
<tr>
<td></td>
<td>☐ Other: ________________________________________________________________________________________________</td>
</tr>
<tr>
<td>Ask</td>
<td>☐ I have questions about the vaccine</td>
</tr>
<tr>
<td></td>
<td>☐ I have questions about what will happen during my appointment</td>
</tr>
<tr>
<td></td>
<td>☐ I have questions about using a medicine on the skin (topical anesthetic) to make the pain from the needle hurt less</td>
</tr>
<tr>
<td></td>
<td>☐ Other: ________________________________________________________________________________________________</td>
</tr>
<tr>
<td>Relax</td>
<td>☐ No or low levels of noise</td>
</tr>
<tr>
<td></td>
<td>☐ People want to be with me (nobody or give names): __________________________________________________________________</td>
</tr>
<tr>
<td></td>
<td>☐ No extra people around that can see me</td>
</tr>
<tr>
<td></td>
<td>☐ Take deep belly breaths (like blowing up a balloon)</td>
</tr>
<tr>
<td></td>
<td>☐ No alcohol wipe beforehand</td>
</tr>
<tr>
<td></td>
<td>☐ Other: ________________________________________________________________________________________________</td>
</tr>
<tr>
<td>Distract</td>
<td>☐ Tell me when it will happen</td>
</tr>
<tr>
<td></td>
<td>☐ Do not tell me when it will happen</td>
</tr>
<tr>
<td></td>
<td>☐ No conversation with me while I am distracting myself</td>
</tr>
<tr>
<td></td>
<td>☐ Keep my eyes closed or look away</td>
</tr>
<tr>
<td></td>
<td>☐ Play with a toy or comfort item from home</td>
</tr>
<tr>
<td></td>
<td>☐ Use my cell phone to listen to music or watch a video</td>
</tr>
<tr>
<td></td>
<td>☐ Use a distraction toy or activity provided by the clinic</td>
</tr>
<tr>
<td></td>
<td>☐ Other: ________________________________________________________________________________________________</td>
</tr>
</tbody>
</table>

Did you review information about CARD before coming today?
☐ No. Please explain: ____________________________________________________________________________
☒ Yes. Please explain: __________________________________________________________________________

For children: Did you play the CARD online game? ☐ Yes ☐ No

How old are you? ________________________________________________________________________________

Some people are afraid of needles. How afraid are you? ☐ Not at all ☐ A little bit ☐ Medium amount ☐ A lot

Do you ever feel dizzy or faint during needles? ☐ Yes ☐ No

Tell us about anything else you want us to know: ____________________________________________________________________________________________
**Environment**

**(Providers)**

**Pre-vaccination area**

**Before**

**After**

**Waiting area 1:** The waiting area has been made more inviting and comfortable for vaccine clients. This was done by including signage, education about CARD (via poster), and distraction items (posters and activities) that are easily accessible via a moveable cart, that can be used while waiting.
**Environment (Providers)**

**Vaccine injection area**

**Injection area 1:** In this example, furniture has been re-arranged to facilitate seating of the client, a support person and the vaccinator. Clients are facing a visually engaging poster and distraction items are available for use beside them (on the desk attached to the client chair). The client does not face equipment.
Injection area 2: In this example, the original room used for vaccinations has been changed to a different room with more space and the ability to provide privacy. Posters provide distraction and obscure equipment. The client’s chair has been positioned to face a poster. The vaccinator uses a stool (tucked under the desk) to sit beside the client. Distraction items are provided on the examination table (not in view).
Engagement (Providers)

CARD 4E MODEL:
A Guide for Providers of Vaccination Services

The CARD 4E system of client, task, action, and reflection is a framework that can be used to plan and deliver effective vaccination services. The framework involves four key steps: Education, Engagement, Empowerment, and Evaluation. Each step is designed to ensure that vaccination services are delivered effectively and efficiently.

EDUCATION:

- REVIEW VACCINATION GUIDELINES
- SHARE information about CARD and other Helpful tools
- Encourage parents to participate in discussions about vaccination
- Provide a summary of the benefits and risks of vaccination

ENGAGEMENT:

- Ask parents about their concerns
- Listen and provide support
- Help parents make informed decisions about vaccination

EMPOWERMENT:

- Encourage parents to make their own decisions
- Provide resources and information
- Help parents find the best vaccination services

EVALUATION:

- Evaluate the vaccination services
- Identify areas for improvement
- Share feedback with caregivers

Be Calm

- Try saying this
  - Let’s work together to make your child as comfortable as possible.

- Instead of this
  - There are so many people here today.

- Try saying this
  - Thank you for coming today to get your child vaccinated.

- Instead of this
  - Your child is a little bit nervous.

- Try saying this
  - I will help you to find the best time.

- Instead of this
  - Your child is happy.

To learn more about CARD, go to https://www.childrenswell.ca/card/

Everything is OK.
Evaluation (Clients)

Tell us about what happened so we can help to make needles a better experience for you if you ever need to get another needle. It’s ok if you don’t know or don’t want to answer any of these questions.

1. Tell us how much the needle hurt.
   Pick a number from 0 to 10, where 0 is no pain at all and 10 is the most pain possible.
   □ 0 □ 1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7 □ 8 □ 9 □ 10

2. Tell us how scared/worried you were about the needle.
   Pick a number from 0 to 10, where 0 is not scared/worried at all and 10 is the most scared/worried possible.
   □ 0 □ 1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7 □ 8 □ 9 □ 10

3. Tell us how dizzy you were before, during and after the needle.
   Pick a number from 0 to 10, where 0 is not dizzy at all and 10 is most dizzy possible.
   □ 0 □ 1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7 □ 8 □ 9 □ 10 □ I fainted

4. Compared to the last time you got a needle, tell us if today’s needle was better, worse, or the same.
   □ Better □ The same □ Worse □ I don’t know □ I don’t remember

Please explain. ____________________________________________

“I almost cried reading the CARD checklist because I felt so cared for. Thank you!”

“It made a big difference!”
“Everything was just a little more strategic. It’s just building on the skills we already have.”

“CARD made the entire process less stressful, for myself, as a vaccinator, for the child, and also the parents.”

“All around positive reviews! I mean, you’d have to really be out of your mind as a parent or child to have a negative review about this, right?”
Summary

- Pain and fear *hurt* vaccination
- Evidence-based strategies exist to reduce pain and fear
- The CARD framework helps integrate the evidence into practice

“I love my job and this made it better”
Resources

- Aboutkidshealth (SickKids): cardsystem.ca
- Immunize Canada: CARD resources
  - New: CARD Game for Kids (mobile web game)
- HELPinKids&Adults (University of Toronto) and resources
- Pediatric Pain, Health and Communication Lab and resources
- Government of Canada: Vaccination pain management for children: Guidance for health care providers
- Government of Canada: Vaccination pain management for adults: Guidance for health care providers
- Canadian Paediatric Society's statement on COVID-19 vaccinations
- World Health Organization 2015 guideline on pain mitigation during vaccination
- Immunization stress-related responses: full manual, synopsis, summary for clinicians