

Non-invasive techniques for minimizing pain with needle puncture



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Objectives

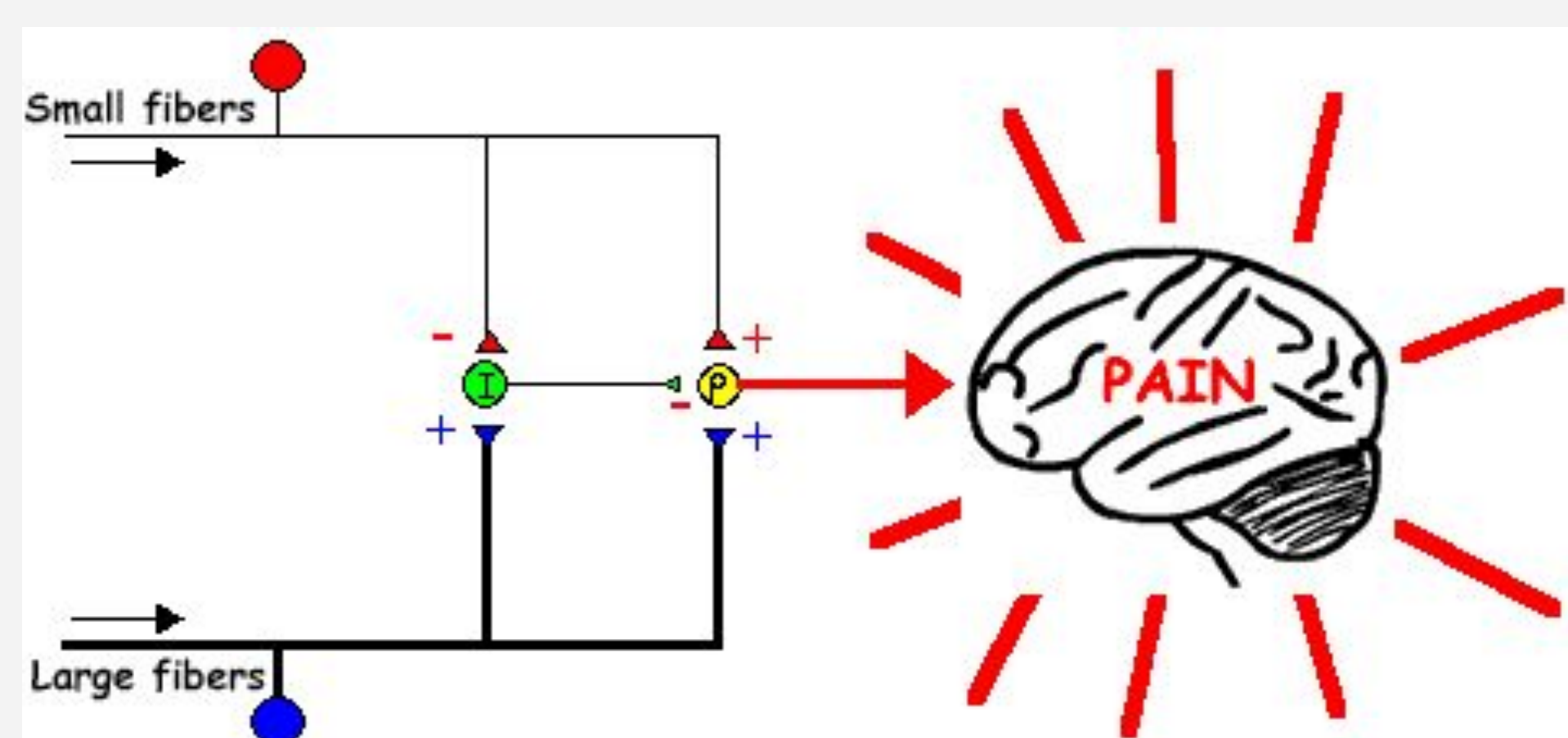
- Recognize the recent increasing need for vaccine administration and the negative impact of needle fear that contributes to vaccine uptake
- Understand common analgesic interventions available to healthcare providers during needle administration to optimize patient care
- Consider how pain minimizing techniques can be used in practice

Introduction

- Painful Childhood vaccinations → distress and anxiety → noncompliance with future vaccinations
- Noncompliance compromises: individual health + vaccine preventable community outbreak
- Expertise of Physician Assistants (PA) = appropriate diagnosis + acknowledge / relieve patients' pain
- There is a reported gap between healthcare providers' and patients' perception of pain and anxiety
- Employing pain reduction techniques may improve the patient's reaction, cooperation, and perception of their healthcare experience

Select non-invasive methods to minimize pain are discussed: topical local anesthetics, cryoanesthesia, mechanical vibration, ShotBlocker, and Buzzy

Gate Control Theory of Pain



I	Inhibitory Neuron
P	Projection Neuron
-	Inhibit
+	Excite

Figure 1. Gate Control Theory¹

Pain Reduction Methods

Topical Local Anesthetics: Eutectic Mixture of Local Anesthetics (EMLA) and Lidocaine-Epinephrine- Tetracaine (LET) gel | inexpensive and often available

- EMLA: non-mucosal, intact skin | +60 min prep time
- LET: non-mucosal, non-intact skin | +15 min prep time

Tactile distraction methods:

Cryoanesthesia: Vapocoolants or topical refrigerants, or ice | inexpensive, noninvasive, easy to apply, and fast acting (≤ 30 seconds prep time)

Mechanical Vibration : medical grade device (Figure 4), or more conventional low cost, over-the-counter vibratory device | low cost/reusable, minimal additional procedural/preparation time, and easy to apply

ShotBlocker: (Figure 2) | Minimal increase in procedural / preparation time

Buzzy: (Figure 3): cryoanesthesia + vibration | Minimal increase in procedural / preparation time

Recommendation

Allergy concern: ShotBlocker, Buzzy, ice, mechanical vibration

Cost: Ice, vapocoolant, ShotBlocker, vibration device, and Buzzy requires a one-time purchase, but reusable. Topical anesthetics are more costly, but insurance may reimburse

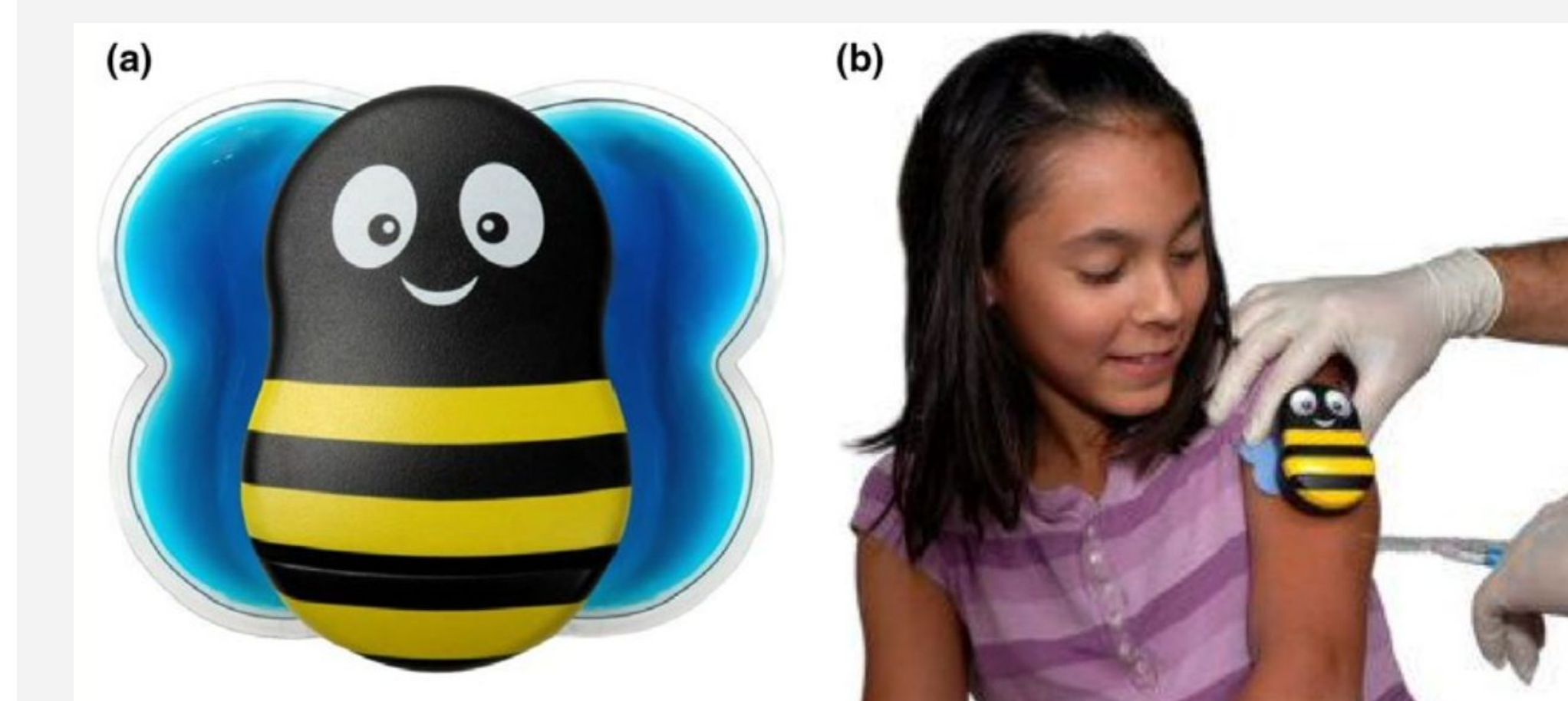
Minimize treatment time: mechanical vibration, cryoanesthesia, ShotBlocker, Buzzy

Reduce bleeding: Cryoanesthesia, LET gel

Visual Assessment: topical local anesthesia, cryoanesthesia



ABOVE
Figure 2. ShotBlocker (a) and its application (b)²



LEFT
Figure 3. Buzzy (a) and its application (b)³



ABOVE
Figure 4. Vibration Anesthesia Device on a patient undergoing injections for androgenetic alopecia⁴

CME Questions

1. Which of the following is the most appropriate method for reducing vaccine associated injection pain in a 15-year-old patient who is anxious toward vibration and extreme temperatures?
 - a. EMLA Cream
 - b. Vapocoolant Spray
 - c. Buzzy
 - d. Ice
2. Which of the following is the most appropriate method for reducing botulinum toxin associated injection pain in a 31-year-old patient who has to return to work before lunch break ends in 10 minutes?
 - a. EMLA Cream
 - b. LET gel
 - c. Ice
 - d. Nothing - patient's pain is not the practitioner's concern
3. Which of the methods discussed in this CME requires the longest duration between its application and injection to reach its effectiveness in preventing injection pain?
 - a. Buzzy
 - b. ShotBlocker
 - c. Vibration device
 - d. EMLA Cream

Answer Key: 1. a ; 2. c ; 3. d.

References:

- 1: Chudler EH. Pain and Why It Hurts . Neuroscience for kids - pain. <https://faculty.washington.edu/chudler/pain.html>. Accessed April 12, 2023.
 - 2, 3: Canbulat Sahiner N, Turkmen AS, Acikgoz A, Simsek E, Kirel B. Effectiveness of Two Different Methods for Pain Reduction During Insulin Injection in Children With Type 1 Diabetes: Buzzy and ShotBlocker. *Worldviews Evid Based Nurs*. 2018;15(6):464-470. doi:10.1111/wvn.12325
 - 4: Carvalho RM, Barreto TM, Weffort F, Machado CJ, Melo DF. Use of vibrating anesthetic device reduces the pain of mesotherapy injections: A randomized split-scalp study. *J Cosmet Dermatol*. 2021;20(2):425-428. doi:10.1111/jocd.13554
- See paper for full list of references