CADTH

CADTH Reference List

Topical Anesthetics for Minor Dermatological Procedures

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Summary of Abstracts

CADTH

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About CADTH: CADTH is an independent, not-for-profit organization responsible for providing Canada's health care decision-makers with objective evidence to help make informed decisions about the optimal use of drugs, medical devices, diagnostics, and procedures in our health care system.

Funding: CADTH receives funding from Canada's federal, provincial, and territorial governments, with the exception of Quebec.

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Key Messages

- Two systematic reviews (1 with a network meta-analysis) were identified regarding the clinical effectiveness of topical anesthetics for patients undergoing minor dermatological procedures.
- No evidence was identified regarding the cost-effectiveness of topical anesthetics for patients undergoing minor dermatological procedures.
- One evidence-based guideline was identified regarding the use of topical anesthetics for minor dermatological procedures.

Research Questions

1. What is the clinical effectiveness of topical anesthetics for patients undergoing minor dermatological procedures?
2. What is the cost-effectiveness of topical anesthetics for patients undergoing minor dermatological procedures?
3. What are the evidence-based guidelines regarding the use of topical anesthetics for minor dermatological procedures?

Methods

Literature Search Methods

A limited literature search was conducted by an information specialist on key resources including MEDLINE, the Cochrane Database of Systematic Reviews, the international HTA database, the websites of Canadian and major international health technology agencies, as well as a focused internet search. The search strategy comprised both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. The main search concepts were topical lidocaine, lidocaine-prilocaine, or tetracaine; and minor procedures such as vaccination, blood sampling, or IV access. No filters were applied to limit the retrieval by study type. Where possible, retrieval was limited to the human population. The search was also limited to English-language documents published between January 1, 2016 and April 12, 2021.

Selection Criteria and Summary Methods

One reviewer screened literature search results (titles and abstracts) and selected publications according to the inclusion criteria presented in Table 1. Full texts of study publications were not reviewed. The Overall Summary of Findings was based on information available in the abstracts of selected publications. Open-access full-text versions of evidence-based guidelines were reviewed when abstracts were not available and relevant recommendations were summarized.

Table 1: Selection Criteria

Criteria	Description
Population	Individuals of any age undergoing minor dermatological procedures (e.g., IV insertion, drawing blood, vaccination)
Intervention	Topical anesthetics: lidocaine-prilocaine cream, tetracaine 4% gel, or topical lidocaine 4%
Comparator	Q1and Q2: Alternative topical anesthetic (i.e., lidocaine-prilocaine cream, tetracaine 4% gel, or topical lidocaine 4%) Q3: Not applicable
Outcomes	Q1: Clinical benefits (e.g., pain, time to onset of anesthesia) and harms (e.g., skin irritation) Q2: Cost-effectiveness (e.g., cost per quality-adjusted life-years, incremental cost-effectiveness ratios, cost per patient adverse event avoided) Q3. Recommendations regarding which topical anesthetic to use for specific procedures or with specific populations
Study designs	Health technology assessments, systematic reviews, randomized controlled trials, non-randomized studies, economic evaluations, evidence-based guidelines

Results

Two systematic reviews[1,2] (one with network meta-analysis[2]) were identified regarding the clinical effectiveness of topical anesthetics for patients undergoing minor dermatological procedures. Additionally, 1 evidence-based guideline[3] was identified regarding the use of topical anesthetics for minor dermatological procedures. No relevant health technology assessments, randomized controlled trials, non-randomized studies, or economic evaluations were identified.

Additional references of potential interest that did not meet the inclusion criteria are provided in Appendix 1.

Overall Summary of Findings

One systematic review[1] assessed the efficacy and safety of topical anesthetics such as EMLA (the brand name for lidocaine-prilocaine cream) and amethocaine (also known as tetracaine 4% gel, or the brand name Ametop) for needle-related pain in newborn infants. The authors were only able to identify reports comparing to placebo; no studies were identified that compared EMLA and amethocaine.[1] Another systematic review with network meta-analysis[2] assessed topical anesthetics for adults requiring peripheral venous cannulation, including Ametop and EMLA. The authors indicated that none of the topical anesthetics included in the network meta-analysis had a high probability of being more effective when compared to each other.[2] The identified guideline by the Advisory Committee on Immunization Practices[3] suggests pre-treatment with a 5% topical lidocaine-prilocaine cream 30 to 60 minutes before

injection may help reduce pain from vaccination but should not be used on infants younger than 12 months who are receiving treatment with methemoglobin-inducing agents (e.g., acetaminophen, amyl nitrate, nitroprusside, dapsone), as this may lead to the development of methemoglobinemia. No economic evaluations were found regarding the cost-effectiveness of topical anesthetics for patients undergoing minor dermatological procedures; therefore, no summary can be provided.

References

Health Technology Assessments

No literature identified.

Systematic Reviews and Meta-analyses

Pediatric Patients

1. Foster JP, Taylor C, Spence K. Topical anaesthesia for needle-related pain in newborn infants. *Cochrane Database Syst Rev*. 2017 02 04;2(2):CD010331. PubMed

Adult Patients

2. Bond M, Crathorne L, Peters J, et al. First do no harm: pain relief for the peripheral venous cannulation of adults, a systematic review and network meta-analysis. *BMC Anesthesiol*. 2016 10 01;16(1):81. PubMed

Randomized Controlled Trials

No literature identified.

Non-Randomized Studies

No literature identified.

Economic Evaluations

No literature identified.

Guidelines and Recommendations

Pediatric Patients

3. Kroger A, Bahta L, Hunter P. General best practice guidelines for immunization. Atlanta (GA): Centres for Disease Control and Prevention, Best Practices Guidance of the Advisory Committee on Immunization Practices (ACIP); 2020: https://www.cdc.gov/vaccines/hcp/acip-recs/general-recs/downloads/general-recs.pdf. Accessed 2021 Apr 15.
See: Methods for Alleviating Discomfort and Pain Associated with Vaccination (p. 95)

Appendix 1: References of Potential Interest

Previous CADTH Reports

Outside of Search Time Frame

4. Lidocaine-prilocaine cream (EMLA) versus amethocaine/tetracaine gel (Ametop) and Maxeline for patients requiring local anesthetic: clinical-effectiveness, cost-effectiveness, and guidelines. *(CADTH Rapid response report: reference list)*. Ottawa (ON): CADTH; 2009. https://cadth.ca/lidocaine-prilocaine-cream-emla-versus-amethocaine tetracaine-gel-ametop-and-maxeline-patients. Accessed 2021 Apr 15.

Systematic Reviews and Meta-analyses

Unclear Comparator

5. Sridharan K, Sivaramakrishnan G. Pharmacological interventions for reducing pain related to immunization or intramuscular injection in children: A mixed treatment comparison network meta-analysis of randomized controlled clinical trials. *J Child Health Care*. 2018 09;22(3):393-405. PubMed

Alternative Comparator

6. Li M, Wang Z, Li H, et al. Local anesthesia for transrectal ultrasound-guided biopsy of the prostate: A meta-analysis. *Sci Rep*. 2017 01 12;7:40421. PubMed

Randomized Controlled Trials

Alternative Population – Healthy Volunteers

7. Illg C, Krauss S, Kersten A, Daigeler A, Wenger A. Influence of topical anesthesia on superficial sensitivity: a double-blind, randomized, placebo-controlled study on 48 healthy subjects. *Dermatol Surg*. 2020 12;46(12):1593-1598. PubMed

Alternative Comparator – Alternative Topical Anesthetics

Pediatric Patients

8. Dasarraju RK, Svsg N. Comparative efficacy of three topical anesthetics on 7-11-year-old children: a randomized clinical study. *J Dent Anesth Pain Med*. 2020 Feb;20(1):29-37. PubMed

9. Cozzi G, Borrometi F, Benini F, et al. First-time success with needle procedures was higher with a warm lidocaine and tetracaine patch than an eutectic mixture of lidocaine and prilocaine cream. *Acta Paediatr*. 2017 May;106(5):773-778. PubMed

Adult Patients

10. Fujimoto K, Adachi H, Yamazaki K, et al. Comparison of the pain-reducing effects of EMLA cream and of lidocaine tape during arteriovenous fistula puncture in patients undergoing hemodialysis: A multi-center, open-label, randomized crossover trial. *PLoS One*. 2020;15(3):e0230372. PubMed

11. Matsumoto T, Chaki T, Hirata N, Yamakage M. The eutectic mixture local anesthetics (EMLA) cream is more effective on venipuncture pain compared with lidocaine tape in the same patients. *JA Clin Rep*. 2018 Oct 08;4(1):73. PubMed

12. Metry AA, Kamal MM, Ragaei MZ, Nakhla GM, Wahba RM. Transdermal ketoprofen patch in comparison to eutectic mixture of local anesthetic cream and subcutaneous lidocaine to control pain due to venous cannulation. *Anesth Essays Res*. 2018 Oct-Dec;12(4):914-918. PubMed

Unclear Comparator

13. Batalha L, Correia M. Prevention of venipuncture pain in children: a comparative study of topical anesthetics. *Revista de Enfermagem Referência.* 2018;IV(18):93-102. https://rr.esenfc.pt/rr/index.php?module=rr&target=publicationDetails&pesquisa=&id_artigo=2942&id_revista=24&id_edicao=138. Accessed 2021 Apr 15.

Non-Randomized Studies

Alternative Population – Healthy Participants

14. Khodari SNK, Noordin MI, Chan L, Chik Z. In vitro and in vivo evaluation of new topical anaesthetic cream formulated with palm oil base. *Curr Drug Deliv*. 2017;14(5):690-695. PubMed

Alternative Comparator – Alternative Topical Anesthetics

Pediatric Patients

15. Konigs I, Wenskus J, Boettcher J, Reinshagen K, Boettcher M. Lidocaine-epinephrine-tetracaine gel is more efficient than eutectic mixture of local anesthetics and mepivacaine injection for pain control during skin repair in children: a prospective, propensity score matched two-center study. *Eur J Pediatr Surg*. 2020 Dec;30(6):512-516. PubMed

Guidelines and Recommendations

Unclear Methodology

16. Friedrichsdorf SJ, Goubert L. Pediatric pain treatment and prevention for hospitalized children. *Pain Rep*. 2020 Jan-Feb;5(1):e804. PubMed

17. Trottier ED, Dore-Bergeron MJ, Chauvin-Kimoff L, et al. Managing pain and distress in children undergoing brief diagnostic and therapeutic procedures. Ottawa (ON): Canadian Paediatric Society; 2019: https://www.cps.ca/en/documents/position/managing-pain-and-distress. Accessed 2021 Apr 14.
See: Pharmacological interventions – Needle procedures

18. Use of topical anaesthetics to ease cannulation pain. Vancouver (BC): BC Provincial Renal Agency; 2017: http://www.bcrenal.ca/resource-gallery/Documents/VA-Use_of_Topical_Anaesthetic_Cann_Pain.pdf. Accessed 2021 Apr 15.
See: 2.0 Recommendations & Rationale (p.1)

Review Articles

19. Cherobin ACFP, Tavares GT. Safety of local anesthetics. *An Bras Dermatol*. 2020 Jan-Feb;95(1):82-90. https://www.scielo.br/scielo.php?script=sci_arttext&pid=S0365-05962020000100082. Accessed 2021 Apr 14.
See: Types of local anesthetics – Topical anesthetics (p.85-86); Adverse reactions – Topical anesthetics (p. 87)

20. Leppert W, Malec-Milewska M, Zajaczkowska R, Wordliczek J. Transdermal and topical drug administration in the treatment of pain. *Molecules*. 2018 Mar 17;23(3):681. PubMed

21. Martin HA. The power of topical anesthetics and distraction for peripheral intravenous catheter placement in the pediatric perianesthesia area. *J Perianesth Nurs*. 2018 Dec;33(6):880-886. PubMed

Additional References

22. Shepherd M, Aickin R, Quay K. Local anaesthetic for minor procedures. Auckland (NZ): Starship New Zealand; 2019: https://www.starship.org.nz/guidelines/local-anaesthetic-for-minor-procedures/. Accessed 2021 Apr 15.
See: Topical anesthetics