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Topical Analgesics for Preventing Venipuncture Pain in Children

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Purpose:

Venipuncture (VP) is a common nursing procedure that causes fear in children (Hogan, Smart, Shah, & Taddio, 2014; Schreiber et al., 2016). There is a wide variety of pharmacological strategies to prevent this type of pain (Bice, Gunther, & Wyatt, 2014). Ideal analgesics should be highly effective in relieving pain, have a quick and lasting effect and a good safety profile, and be easy to use, cost-effective, and well-accepted by children, parents, and health professionals (Spillman, 2012). Ethyl chloride is one of the options available today due to its low cost, ease of use, and rapid effect, which makes it ideal for outpatient settings. However, its use is controversial because of the conflicting findings on its efficacy and the availability of new and safer topical analgesics (Waterhouse, Liu & Wang, 2013).

In light of this controversy, this study aimed to compare the efficacy of five topical analgesics for preventing VP pain in an outpatient unit of a pediatric hospital.

Methods:

A randomized controlled trial was conducted with 350 children aged 6 to 17 (median age of 11 years) who were submitted to VP when attending an outpatient unit of a pediatric hospital. The following exclusion criteria were applied: children who were unable to self-assess pain using the visual analogue scale (VAS), who were unable to answer a questionnaire for clinical characterization, and who had a history of atopic skin or any other skin barrier impairment. A computer software was used to randomly allocate children to five groups of 70 children. A different topical analgesic was used in each group: lidocaine 10% spray; lidocaine hydrochloride 2% gel; eutectic mixture of local analgesics (EMLA) cream; ethyl chloride spray; and lidocaine 4% cream.

Pain was assessed using the VAS, which is scored from zero (no pain) to 10 (worst pain) (Reed & Van Nostran, 2014). The questionnaire for demographic and clinical characterization included the variable of fear as assessed by the child through a dichotomous item (yes or no). The variables of ease of VP, vein visibility and/or palpation, and the child’s collaboration during the procedure were assessed by nurses through dichotomous items (bad or good). After the study protocol was explained and doubts were clarified, data were collected by fifteen nurses who received prior training on topical analgesia and pain assessment using the VAS.

Statistical analysis was performed using IBM® SPSS® Statistics, version 23 for Windows®. The normality of distribution was assessed by the Shapiro-Wilk test and histogram analysis. The assumption of normality was not met. Descriptive data analysis was performed using absolute and relative frequency for categorical variables and the median, the interquartile range, and in some cases the maximum and minimum limits, the mean, and the standard deviation to facilitate interpretation for continuous variables. The results from each group were compared using the Chi-square test for categorical variables, the Kruskal-Wallis one-way ANOVA for independent samples (inter-group), and the Friedman’s two-way ANOVA for paired samples (intra-group, pre- and post-VP) for continuous variables. In all tests, differences were considered statistically significant at $p < 0.05$.

Results:
The results showed that all topical analgesics were effective (p<0.001) for preventing pain, with a median post-VP pain intensity below two points. There was no statistically significant difference between groups (p>0.05). Ease of VP, vein visibility and/or palpation, number of VP attempts, and the child’s collaboration during the procedure were rated as good. Similar results were obtained in all groups (p>0.05).

The method of administration and cost were the only differences found between the topical analgesics under analysis. Ethyl chloride does not require a waiting period between its application and the VP or the use of an occlusive dressing. In addition, it is significantly less expensive than other topical analgesics.

**Conclusion:**

Without prejudice to the study of other pharmacological and non-pharmacological analgesic strategies for preventing VP pain in children, the use of ethyl chloride should be reconsidered and even recommended, particularly in pediatric outpatient settings.

**Title:**

Topical Analgesics for Preventing Venipuncture Pain in Children

**Keywords:**

Pain, Topical analgesics and Venipuncture

**References:**


Abstract Summary:

Ethyl chloride is a cheap option among several options available to prevent pain in venipuncture. However, its use is controversial. A randomized controlled trial was conducted to compare the efficacy of five topical analgesics in children. The results showed that all topical analgesics were effective (p <0.001) to prevent pain.

Content Outline:

Venipuncture (VP) is a common nursing procedure that causes fear in children (Hogan, Smart, Shah, & Taddio, 2014; Schreiber et al., 2016). There is a wide variety of pharmacological strategies to prevent this type of pain (Bice, Gunther, & Wyatt, 2014). Ideal analgesics should be highly effective in relieving pain, have a quick and lasting effect and a good safety profile, and be easy to use, cost-effective, and well-accepted by children, parents, and health professionals (Spillman, 2012). Ethyl chloride is one of the options available today due to its low cost, ease of use, and rapid effect, which makes it ideal for outpatient settings. However, its use is controversial because of the conflicting findings on its efficacy and the availability of new and safer topical analgesics (Waterhouse, Liu & Wang, 2013).

In light of this controversy, this study aimed to compare the efficacy of five topical analgesics for preventing VP pain in an outpatient unit of a pediatric hospital.

A randomized controlled trial was conducted with 350 children aged 6 to 17 (median age of 11 years) who were submitted to VP when attending an outpatient unit of a pediatric hospital. The following exclusion criteria were applied: children who were unable to self-assess pain using the visual analogue scale (VAS), who were unable to answer a questionnaire for clinical characterization, and who had a history of atopic skin or any other skin barrier impairment. A computer software was used to randomly allocate children to five groups of 70 children. A different topical analgesic was used in each group: lidocaine 10% spray; lidocaine hydrochloride 2% gel; eutectic mixture of local analgesics (EMLA) cream; ethyl chloride spray; and lidocaine 4% cream.

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The results showed that all topical analgesics were effective (p<0.001) for preventing pain, with a median post-VP pain intensity below two points. There was no statistically significant difference between groups.
Ease of VP, vein visibility and/or palpation, number of VP attempts, and the child’s collaboration during the procedure were rated as good. Similar results were obtained in all groups (p>0.05).

The method of administration and cost were the only differences found between the topical analgesics under analysis. Ethyl chloride does not require a waiting period between its application and the VP or the use of an occlusive dressing. In addition, it is significantly less expensive than other topical analgesics.

Without prejudice to the study of other pharmacological and non-pharmacological analgesic strategies for preventing VP pain in children, the use of ethyl chloride should be reconsidered and even recommended, particularly in pediatric outpatient settings.

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