Evaluating the Use of a Topical Vapocoolant to Reduce Pain during Intravenous Insertions: The Patients’ and Nurses’ Perspectives

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E 06 Pain Reduction and Management
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Learning objectives

• Describe and discuss the literature on topical vapocoolant and how it is related to evidence-based practice

• Evaluate and discuss the use of a vapocoolant during intravenous (IV) insertions in terms of patient’s pain experience and nurse’s perspective related to patient safety and application procedure

Disclosure

• There was no conflict of interest or financial gain for this project
Quick Poll:

1) How many of you use a topical vapocoolant for intravenous insertions in your current practice?

2) How many of you are familiar with topical vapocoolant?
Background

- Intravenous catheter insertion, a common procedure performed by health-care providers, can cause pain, anxiety, and stress for the patient resulting in dissatisfaction.
- From a nursing perspective stress and anxiety may increase the unsuccessful attempts necessary to gain peripheral venous access (Page & Taylor, 2010).
- A topical vapocoolant, when applied to a procedure site, evaporates rapidly, decreasing the skin temperature, resulting in temporary interruption of the pain sensation (Page & Taylor, 2010).
# Overview of the Literature

Table 1. Appraisal of the available literature and Level/Strength of Evidence

<table>
<thead>
<tr>
<th>Author</th>
<th>Setting and sample size</th>
<th>Study design</th>
<th>Intervention</th>
<th>Results</th>
<th>Usefulness to practice</th>
<th>Strength of Evidence*</th>
</tr>
</thead>
</table>
| Celik *et al.* (2011) International Journal of Medical Sciences | 41 adult patients Age >18 Hemodialysis center | RCT          | 1) Vapocoolant topical spray 2) Lidocaine/Prilocaine (EMLA cream) 3) Placebo cream 4) Control | Group 2 sig decreased pain compared to groups 1,3, and 4  
Group 1 and 2 sig decreased pain compared to groups 3 and 4  
• Comparable effectiveness between group 1 and 2 in preventing mild to moderate pain | Strengths: Placebo-controlled  
Weaknesses: Wide variability between group 3 and 4 pain scores | II |
| Page & Taylor (2010) British Journal of Anesthesia | 220 adults Age >18 Metropolitan emergency department | RCT | 1) Vapocoolent topical spray 2) Lidocaine SC | Vapocoolent compared to lidocaine subcutaneously resulted in:  
• Sig improved IV start success rate  
• Sig < administration pain scores  
• Group 2 sig < cannulation pain  
• Group 2 administration pain comparable to group 1 cannulation pain  
• No difference in patient satisfaction | Strengths: Power analysis (110 per group)  
Weaknesses: Unblinded? bias Variable application techniques | II |
| Armstrong, Young, & McKeown (1990) Canadian Journal of Anesthesia | 120 adults Gynecological day-surgical center | RCT | 1) Vapocoolent spray 2) No treatment 3) Lidocaine SC | • Group 3 sig decrease in vein visibility compared to groups 1 and 2  
• Group 1 and 2 sig ease of cannulating IV compared to group 3  
• Group 1 and 3 sig decreased cannulation pain compared to group 2 | Strengths: Cannulation and assessment by one administrator  
Weaknesses: No power analysis Unblinded | II |

*Fineout-Overholt, Melnyk, & Schultz (2005)
Appraisal and Gaps in the Literature

• When compared to EMLA and Lidocaine, vapocoolants were significantly inferior in reducing pain on IV insertion
• Vapocoolant spray significantly reduces mild to moderate pain when compared to no treatment
• Clinical indications that the vapocoolent’s easy application and no administration pain is a product advantage.
• Strengths & Weakness: Randomized control studies; unblinded
• Insufficient evidence supporting the use of topical vapocoolants in the adult population
• Nursing perspective of using a topical vapocoolant absent from literature
Purpose

• Compare the patient’s perception of pain and the nurse’s experience during the IV insertion process, with and without the use of a topical vapocoolant
Methods

Study Design and Data collection

• De-identified adult patient and nurse surveys were collected between March and September 2014

• Patients’ and nurses’ perceptions of the IV catheter insertion process were compared with (n=51) and without (N=50) application of a topical vapocoolant

• Data collection tools were created to describe and compare:
  • Patient perceptions related to pain level, nurse’s skill level, satisfaction of IV insertion process
  • Nurse perceptions of patient's pain level and satisfaction with IV catheter insertion process

Data Analysis

• Descriptive statistical analysis was used to analyze data
Methods

Intervention

• Institutional protocol for initiating an IV insertion was followed.

• Nursing education was provided to:
  • Ensure proper application of the vapocoolant
  • Address safety considerations that were implemented during the application process
  • Ensure objectivity and clear criteria were applied to data collection tools
Results: Patient Demographics

Table 2. Patients’ Demographic Variable

<table>
<thead>
<tr>
<th>Patient Age</th>
<th>No Vapocoolant (N=51)</th>
<th>Vapocoolant (N=50)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>66.16</td>
<td>62.70</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>10.783</td>
<td>9.919</td>
</tr>
<tr>
<td>Minimum</td>
<td>41</td>
<td>35</td>
</tr>
<tr>
<td>Maximum</td>
<td>89</td>
<td>87</td>
</tr>
</tbody>
</table>

• The age of patients in the Vapocoolant group were (Mean 62.70, SD 9.92) not significantly different compared to patients in the control group (Mean 66.16, SD 10.78, p<0.068)
Results: Nursing Practice

Regardless of an administration of a topical vapocoolant patients rated:

• The nurses skill level as very high

  *Q:* “How skillful was a nurse performing the IV insertion?”
  No vapocoolant (Mean 9.12, SD 1.83) vs. Vapocoolant (Mean 9.7, SD 0.61)

• An overall satisfaction with the IV insertion process.

  *Q:* “How would you rate your satisfaction with IV insertion?”
  No vapocoolant (Mean 8.43, SD 2.59) vs. Vapocoolant (Mean 8.68, SD 2.31)

Results were unaffected by the:

• Size of the IV cannula (Mean=20.7, SD 1.0 vs. 20.5, SD 1.0)

• Number of attempts to establish IV access (Mean=1.7, SD 1.3 vs. 1.4, SD 0.8)

• Number of nurses attempting IV insertion (Mean=1.3, SD 1.0 vs. 1.2, SD 0.7)
Results: Patient Perception

Table 3. Comparison of Patients’ Perceptions of Pain/Discomfort

<table>
<thead>
<tr>
<th>Pain/discomfort (0-10 rating scale with 0 = very comfortable, 10 = not comfortable)</th>
<th>No Vapocoolant (N=51)</th>
<th>Vapocoolant (N=50)</th>
<th>Test Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>3.8</td>
<td>2.21</td>
<td>P &lt; 0.024</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>3.203</td>
<td>2.123</td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>10</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

- Patients who did not receive the vapocoolant prior to the IV insertion reported higher levels of pain/discomfort compared to patients who received the vapocoolant
Nursing Considerations

• The nurses experiences and feedback included:

  • Application and safety concerns:
    • Stream unexpectedly diverts from intended site causing potential risk getting into a patient’s and/or nurse’s eye(s)
    • Non-localized spray unnecessarily numbs wide area of skin
    • Flammability of product in presence of oxygen
  
  • Nurses reported that IV insertions were generally successful (96% to 98%) in both groups
  
  • Therapy was delayed 20% of the time in the no vapocoolant group and 4% of the time in the vapocoolant group
Conclusions/Implications

- This project demonstrates the importance of clinical experts’ perspectives and feedback from a safety and satisfaction standpoint when implementing evidence-based practice.
- The learnings from this initiative are also demonstrating how staff nurses can make evidence-based decisions and practice changes by integrating evidence from literature with patient experience, and their own expertise.

Figure 1. Evidence-based practice in clinical settings (Fineout-Overholt, Melyn, & Schultz, 2005)
Conclusions/Implications (cont.)

• The findings of this project are confirming the benefits of a topical vapocoolent for IV insertions in adult patients

• The next steps include a re-assessment of use of this vapocoolant product and exploration of alternative solutions to resolve identified nursing concerns

• We continue using the tools for patients and nurses; collecting and analyzing data; comparing the findings, and strengthening our practices based on the evidence.
Reference


Questions?

Thank You!

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