


## Effect of a Vapocoolant Spray on Pain associated with Peripheral IV Insertion

---

SUSANNA MANNIX, BSN, RN  
 JOE DUFFY, RN  
 KELLY BLANCO, BSN, RN  
 MARGO HALM, PHD, RN, NEA-BC



### BACKGROUND

About 50% of patients undergoing peripheral IV cannulation report moderate pain and anxiety (Biro & Meier, 1997)

Topical creams, subcutaneous or intradermal lidocaine have been studied

- Onset of action too extended to be practical in fast-paced areas


Few studies have examined vapocoolant (numbing) agents in reducing such pain with mixed findings

### SPECIFIC AIMS

To assess the safety and effectiveness of a topical vapocoolant spray during peripheral intravenous cannulation

Research Questions:

- Does the use of a topical vapocoolant spray (Ethyl Chloride) reduce pain during intravenous cannulation in adults?
- Is vapocoolant safe?




### Side Effect Profile

MINIMAL	SERIOUS	VERY SERIOUS
<p><b>If spray inhaled:</b></p> <ul style="list-style-type: none"> <li><b>LIKELY</b> - Headache, dizziness, nausea, vomiting</li> <li><b>LESS LIKELY</b> - Loss of coordination and disorientation, or it may produce narcotic and anesthetic effects</li> </ul> <p><b>If spray evaporated too quickly:</b></p> <ul style="list-style-type: none"> <li><b>RARE</b> - Frostbite (blanching, cold feeling, numbness)</li> </ul> <p>Slight irritant to eyes</p>	<ul style="list-style-type: none"> <li><b>UNLIKELY</b> -                             <ul style="list-style-type: none"> <li>Changes in skin color</li> <li>Pain as skin is thawing</li> <li>Infection at site</li> <li>Delayed wound healing</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li><b>UNLIKELY</b> -                             <ul style="list-style-type: none"> <li>Severe allergic reactions</li> <li>Decreased urination</li> <li>Symptoms of liver problems</li> </ul> </li> <li><b>VERY RARE</b> -                             <ul style="list-style-type: none"> <li>CNS depression</li> <li>Respiratory paralysis or fatal coma with respiratory or cardiac arrest or dangerous heart rhythms</li> </ul> </li> </ul>

*Even though Ethyl Chloride may be absorbed through the skin and lungs, it is rapidly released from the lungs thereby, minimizing serious problems*

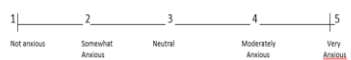
### METHODS

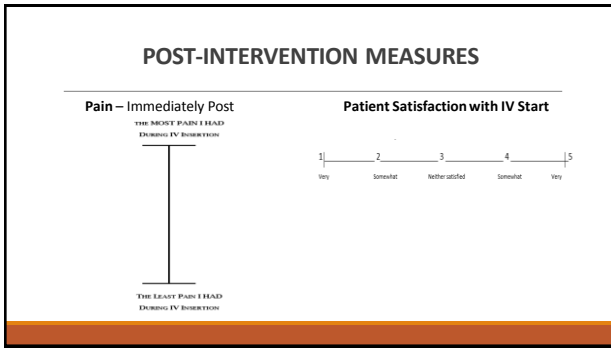
- Design:** Single-blinded randomized controlled trial
- Sample:** N=165 adult pre-surgical or pre-procedure patients per power analysis (power .80, alpha .05)
- Treatment Groups:** Patients were randomly assigned to one of following groups:
  - Control group** - Standard care
  - Vapocoolant group** - Spray applied 3-9 inches from insertion site for 3-7 seconds until skin turned white but not frosty
  - Sterile water group** - Spray applied 3-9 inches



### BASELINE MEASURES

State Anxiety - Pre





### Sample Description (N=165)

	Control Group (n=55)		Treatment Group (Vapocoolant) (n=53)		Sham Group (Sterile Water) (n=57)		p value*
	n	(%)	n	(%)	n	(%)	
<b>Gender†</b>							
- Female	30	(54.5)	28	(52.8)	24	(42.1)	.59
- Male	25	(45.5)	25	(47.2)	33	(57.9)	
<b>Ethnicity†</b>							
- English speaking	54	(98.2)	52	(98.1)	56	(98.2)	.10
- Spanish speaking	1	(1.8)	1	(1.9)	1	(1.8)	
	<b>Mean</b>	<b>(SD)</b>	<b>Mean</b>	<b>(SD)</b>	<b>Mean</b>	<b>(SD)</b>	
<b>Age*</b>	61.8	(14.0)	62.9	(13.26)	60.8	(14.68)	.74

\*p<.05: †Chi-square; ‡Kruskal-Wallis; §One-way analysis of variance (ANOVA)

### IV VARIABLES

	Control Group (n=55)		Treatment Group (Vapocoolant) (n=53)		Sham Group (Sterile Water) (n=57)		p value*
	n	(%)	n	(%)	n	(%)	
<b>Cannula size*</b>							
- 18 gauge	16	(29.1)	12	(22.6)	8	(14.0)	.60
- 20 gauge	33	(60.6)	33	(62.3)	48	(84.2)	
- 22 gauge	6	(10.9)	8	(15.1)	1	(1.8)	
<b>Successful cannulation† (1st attempt)</b>	47	(85.6)	47	(88.7)	54	(94.7)	.26
<b>Pain by IV site*</b>							
- Hand	28.64	(27.31)	26.72	(26.47)	27.81	(34.83)	
- Wrist	85.00	(7.07)	35.00	(24.83)	26.82	(24.93)	.25
- Forearm	31.84	(29.12)	16.43	(12.15)	19.00	(20.46)	
- Antecubital fossa	22.50	(31.75)	11.50	(8.84)	24.67	(28.12)	

\*p<.05: †One-way analysis of variance (ANOVA)

### RESULTS

	Control Group (n=55)		Treatment Group (Vapocoolant) (n=53)		Sham Group (Sterile Water) (n=57)		p value
	n	(%)	n	(%)	n	(%)	
<b>Pain &gt; 30 mm*</b>	22	(40%)	12	(23%)	12	(21%)	.06
	<b>Mean</b>	<b>(SD)</b>	<b>Mean</b>	<b>(SD)</b>	<b>Mean</b>	<b>(SD)</b>	
<b>Anxiety*</b>	1.84	(1.21)	2.12	(1.35)	2.08	(1.30)	.60
<b>Pain*</b>	33.06	(29.09)	22.30	(23.20)	23.68	(27.30)	.04*
<b>Patient Satisfaction*</b>	4.51	(.84)	4.37	(1.04)	4.40	(1.05)	.79

\*p<.05: †One-way analysis of variance (ANOVA)

No adverse side effects were reported in the Vapocoolant group

### LIMITATIONS

- Sample**
  - Sample not diverse (99% Caucasian)
  - Selection bias – Patients who accepted or refused to enroll
- Single blinded design** – Although measures self-report
- Standard of care**
  - Includes use of warm packs to IV insertion site
  - Cooling agent in treatment group may have negated effect of warming site



### CONCLUSION/IMPLICATIONS

**Vapocoolant (Ethyl Chloride) Spray:**

- Is an effective option to lessen the pain associated with IV insertion in adults
- Did not reduce successful IV insertion rates
- Was not associated with common or serious side effects
- Requires education to ensure proper administration if incorporated into routine nursing practice

## REFERENCES

1. Ethylchloride spray. Available at: <https://www.drugs.com/cdi/ethyl-chloride-spray.html>. Accessed March 20, 2017.
2. Celik G, Ozbek O, Yilmaz M, et al. Vapocoolant spray vs. lidocaine/prilocaine cream for reducing the pain of venipuncture in hemodialysis patients: A randomized, placebo-controlled, crossover study. *International J Medical Sciences* 2011; 8: 623-627.
3. Cline M, Herman J, Shaw E, & Morton D. Standardization of the visual analogue scale. *Nursing Research* 1992; 41(6), 378-380.
4. Higazi, R., Taylor, D., & Richardson, J. (2009) Effect of topical alkane vapocoolant spray on pain with intravenous cannulation in patients in emergency departments: randomized double blind placebo controlled trial. *BMJ* 338 (b215), 1-5.
5. Page, D.E. & Taylor, D.M.D. (2010) Vapocoolant spray vs. subcutaneous Lidocaine injection for reducing the pain of intravenous cannulation: a randomized, controlled clinical trial. *BJA* 105 (4), 519-525.
6. Ramscook C, Kozinetz C & Moro-Sutherland D. Efficacy of ethyl chloride as a local anesthetic for venipuncture and intravenous cannula insertion in a pediatric emergency department. *Pediatric Emergency Care* 2001, 17(5), 341-343.
7. Waterhouse M, Liu D, Wang V. Cryotherapeutic topical analgesics for pediatric intravenous catheter placement: Ice versus vapocoolant spray. *Pediatric Emergency Care* 20(1), 9-12.



## Questions

For further information contact me:  
 Susanna Mannix, BSN, RN  
[Susanna.Mannix@salemhealth.org](mailto:Susanna.Mannix@salemhealth.org)