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

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

Side Effect Profile

MINIMAL	SERIOUS	VERY SERIOUS
If spray inhaled: ▪ LIKELY - Headache, dizziness, nausea, vomiting ▪ LESS LIKELY - Loss of coordination and disorientation, or it may produce narcotic and anesthetic effects	▪ UNLIKELY – - Changes in skin color - Pain as skin is thawing - Infection at site - Delayed wound healing	▪ UNLIKELY – - Severe allergic reactions - Decreased urination - Symptoms of liver problems ▪ VERY RARE - - CNS depression - Respiratory paralysis or fatal coma with respiratory or cardiac arrest or dangerous heart rhythms
If spray evaporated too quickly: ▪ RARE – Frostbite (blanching, cold feeling, numbness)		
Slight irritant to eyes		

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:
  1. *Control group* – Standard care
  2. *Vapocoolant group* – Spray applied 3-9 inches from insertion site for 3-7 seconds until skin turned white but not frosty
  3. *Sterile water group* – Spray applied 3-9 inches

BASELINE MEASURES

State Anxiety – Pre

POST-INTERVENTION MEASURES

Pain – Immediately Post

Patient Satisfaction with IV Start

Sample Description (N=165)

	Control Group (n=55)		Treatment Group (Vapocoolant) (n=53)		Sham Group (Sterile Water) (n=57)		p value*
	n	*(%)*	*n*	*(%)*	*n*	*(%)*	
Gender‡							
- Female	30	(54.5)	28	(52.8)	24	(42/1)	.59
- Male	25	(45.5)	25	(47.2)	33	(57.9)	
Ethnicity*†							
- English speaking	54	(98.2)	52	(98.1)	56	(98.2)	.10
- Spanish speaking	1	(1.8)	1	(1.9)	1	(1.8)	
	Mean	*(SD)*	*Mean*	*(SD)*	*Mean*	*(SD)*	
Age*	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*	*%*	
Cannula size*							
- 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)	
Successful cannulation† (1st attempt)	47	(85.6)	47	(88.7)	54	(94.7)	.26
Pain by IV site*							
- 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*	*%*	
Pain > 30 mm†	22	(40%)	12	(23%)	12	(21%)	.06
	Mean	*(SD)*	*Mean*	*(SD)*	*Mean*	*(SD)*	
Anxiety†	1.84	(1.21)	2.12	(1.35)	2.08	(1.30)	.60
Pain†	33.06	(29.09)	22.30	(23.20)	23.68	(27.30)	**.04***
Patient Satisfaction†	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

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Questions

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