PRINCE

(Pre-ROSC Intra-Nasal Cooling Effectiveness): A Randomized Study

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RESULTS

Device-Related Adverse Events

	N = 83
Nose Discolorization[1]	13 (15.6%)
Epistaxis[2]	3 (3.6%)
Peri-oral bleed	1 (1.2%)
Periorbital emphysema[4]	1 (1.2%)

[1] Resolved spontaneously in patients achieving ROSC
[2] Coagulopathy in two; severe in one
[3] 75 minutes into cooling, resolved

Baseline Characteristics and Rhythms

	Treatment	Control	p
Age (years, mean)	66.6	64.8	0.35
Male gender (%)	71.1	77.8	0.31
Bystander CPR (%)	38.6	45.5	0.37
Cardiac Cause (%)	86.7	87.6	1.00
VF (n(%))	24 (29%)	32 (32%)	0.63
PEA (n(%))	18 (22%)	23 (23%)	0.86
Asystole (n(%))	41 (49%)	44 (44%)	0.55

Event Timing

(Time from collapse in minutes)*

	Treatment	Control	p
CPR Initiation	8.0	8.0	0.62
ALS Arrival	12.0	11.0	0.54
IV	16.0	15.0	0.34
Airway	18.0	16.0	0.10
Randomized	21.0	18.0	0.01
Cooling Start	23.0	--	--
ROSC	7.0	--	--
Cooling to ROSC	32.0	30.0	0.18
ER Arrival	58.5	60.0	0.99

*Median

Introduction

Animal studies suggest a life-saving benefit for intra-arrest cooling. No human studies to date have demonstrated an effective, practical method.Trans-nasal evaporative cooling has sufficient heat transfer capacity for effective intra-arrest cooling and improves survival in swine.

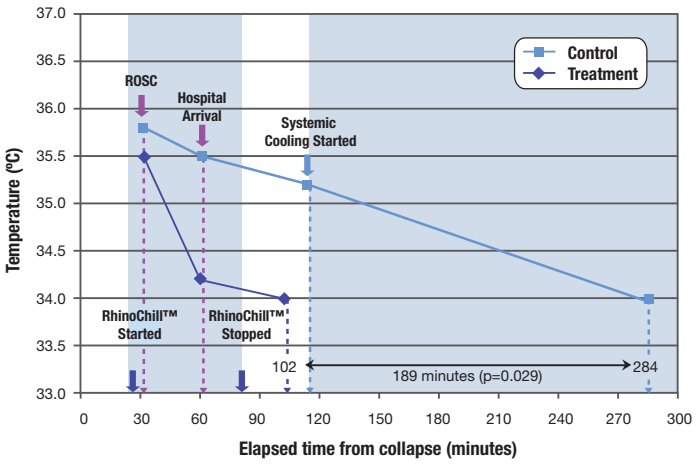
Aim

To study the safety and feasibility of trans-nasal cooling in the pre-hospital setting and determine effects on neurologically intact survival to hospital discharge from the addition of intra-arrest trans-nasal cooling compared to hospital-based cooling alone.

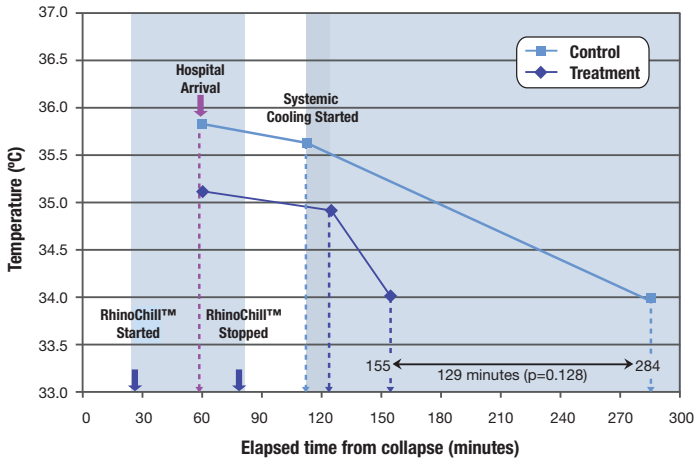
Method

200 patients in witnessed cardiac arrest with CPR ≤20 minutes were randomized to intra-arrest trans-nasal cooling (treatment) versus standard ACLS care (control) in 15 European EMS systems. Trans-nasal cooling (RhinoChill™, BeneChill Inc. San Diego, CA) was initiated using a mixture of volatile coolant plus oxygen for rapid evaporative heat transfer. In treatment patients, cooling was initiated as soon as feasible without interfering with ACLS protocols, during ongoing CPR. Patients in both groups were cooled upon hospital arrival.

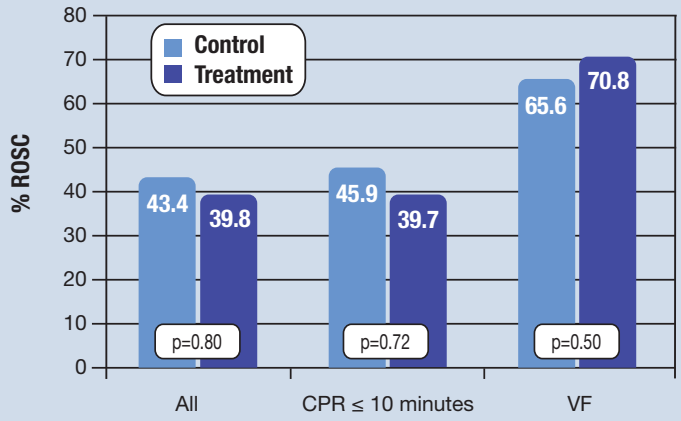
Tympanic Temperature

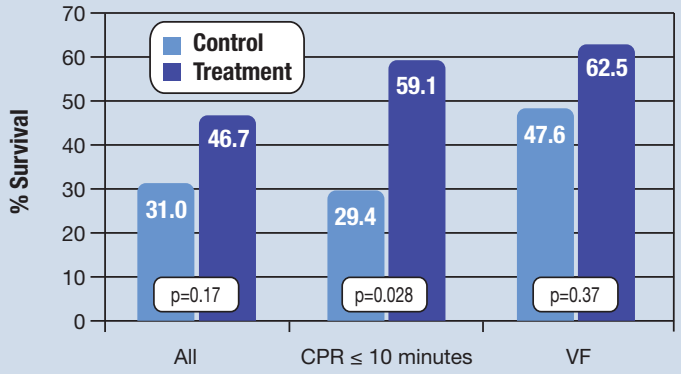


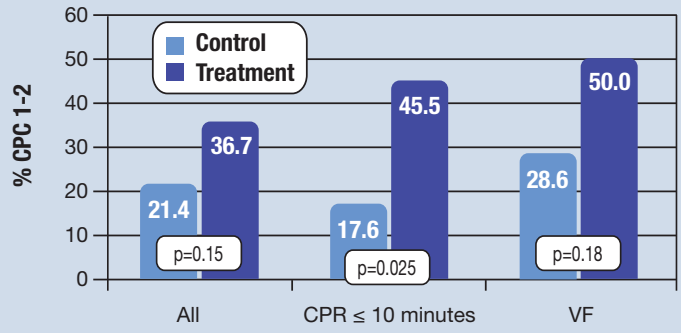
Core Temperature



OUTCOMES







Conclusions

Intra-arrest trans-nasal cooling is safe and feasible in the pre-hospital setting and significantly lowers tympanic and core temperature upon arrival at hospital. Survival to discharge and neurologically intact survival is significantly improved in witnessed arrests where CPR is initiated ≤10 minutes of collapse.

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