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SIMEU
TORINO 6-8 NOVEMBRE 2014

SOCIETÀ ITALIANA MEDICINA D'EMERGENZA-URGENZA · SIMEU ·

"Fa Freddo" nel Post-Arresto: Pro e Contro

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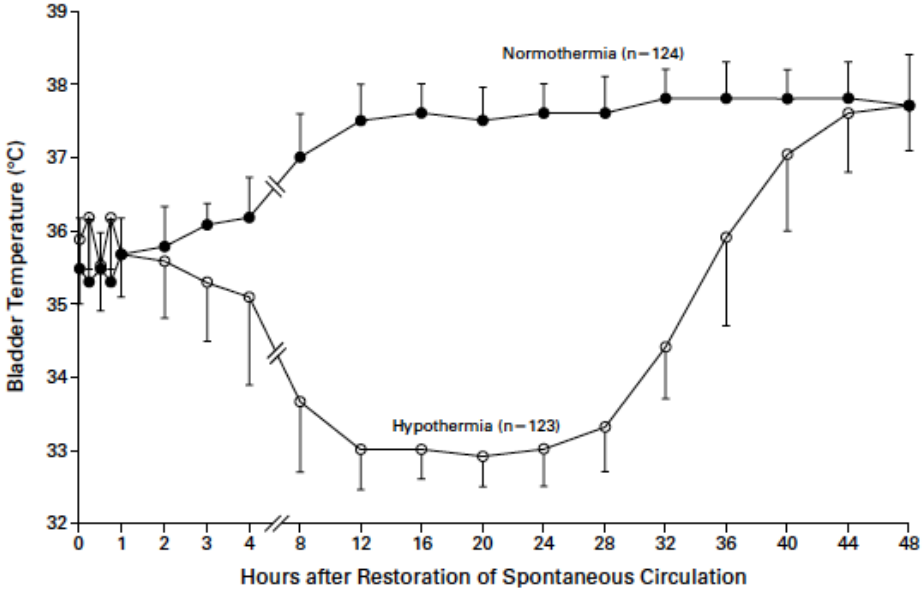
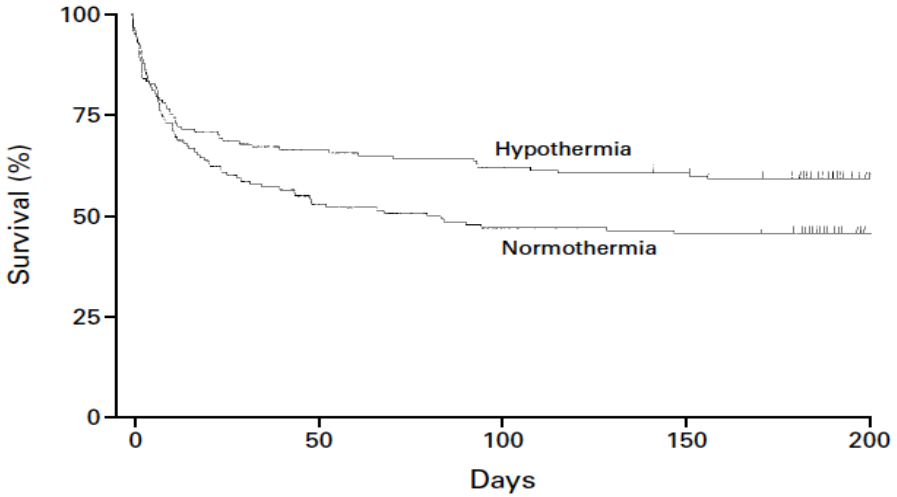
MILD THERAPEUTIC HYPOTHERMIA TO IMPROVE THE NEUROLOGIC OUTCOME AFTER CARDIAC ARREST

THE HYPOTHERMIA AFTER CARDIAC ARREST STUDY GROUP*





The target temperature in the hypothermia group was 32° C to 34° C, and the duration of cooling was 24 hours.

HACA study: N Engl J Med, 8 · Feb 21, 2002

MILD THERAPEUTIC HYPOTHERMIA TO IMPROVE THE NEUROLOGIC OUTCOME AFTER CARDIAC ARREST.

THE HYPOTHERMIA AFTER CARDIAC ARREST STUDY GROUP

TABLE 2. NEUROLOGIC OUTCOME AND MORTALITY AT SIX MONTHS.

OUTCOME	NORMOTHERMIA	HYPOTHERMIA	RISK RATIO (95% CI)*	P VALUE†
	no./total no. (%)			
Favorable neurologic outcome‡	54/137 (39)	75/136 (55)	1.40 (1.08–1.81)	0.009
Death	76/138 (55)	56/137 (41)	0.74 (0.58–0.95)	0.02

HACA study: N Engl J Med, 8 · Feb 21, 2002

MILD THERAPEUTIC HYPOTHERMIA TO IMPROVE THE NEUROLOGIC OUTCOME AFTER CARDIAC ARREST

THE HYPOTHERMIA AFTER CARDIAC ARREST STUDY GROUP*

TABLE 4. COMPLICATIONS DURING THE FIRST SEVEN DAYS AFTER CARDIAC ARREST.*

COMPLICATION	NORMOTHERMIA	HYPOTHERMIA
	no./total no. (%)	
Bleeding of any severity†	26/138 (19)	35/135 (26)
Need for platelet transfusion	0/138	2/135 (1)
Pneumonia	40/137 (29)	50/135 (37)
Sepsis	9/138 (7)	17/135 (13)
Pancreatitis	2/138 (1)	1/135 (1)
Renal failure	14/138 (10)	13/135 (10)
Hemodialysis	6/138 (4)	6/135 (4)
Pulmonary edema	5/133 (4)	9/136 (7)
Seizures	11/133 (8)	10/136 (7)
Lethal or long-lasting arrhythmia	44/138 (32)	49/135 (36)
Pressure sores	0/133	0/136

*None of the comparisons between the two groups, performed with the use of Pearson's chi-square test, indicated significant differences.

†The sites of bleeding were mucous membranes, the nose, the urinary tract, the gastrointestinal tract, subcutaneous tissue, and skin, as well as intracerebral and intraabdominal sites.

HACA study: N Engl J Med, 8 · Feb 21, 2002

TREATMENT OF COMATOSE SURVIVORS OF OUT-OF-HOSPITAL CARDIAC ARREST WITH INDUCED HYPOTHERMIA

Melbourne, Australia, Sep 96 – Jun 99.

77 pts. randomly assigned to hypoth. to 33° C within 2-hrs after the ROSC and maintained for 12 hours or normothermia.

The primary outcome measure was survival or favorable outcome to hospital discharge. **Included**: an initial cardiac rhythm of VF, successful return of spontaneous circulation, persistent coma after return.

Excluded: age <18 yrs for men, an age <50 yrs for women (because of the possibility of pregnancy), cardiogenic shock (a systolic blood pressure of less than 90 mm Hg despite epinephrine infusion), or possible causes of coma other than cardiac arrest (drug overdose, head trauma, or cerebrovascular accident). Also excluded if an intensive care bed was not available at a participating institution.

Treatment: measures in the field to initiate hypothermia by removing the patient's clothing and applying cold packs to the head and torso.

Bernard S. **N Engl J Me**d, Vol. 346, No. 8, February 21, 2002

TREATMENT OF COMATOSE SURVIVORS OF OUT-OF-HOSPITAL CARDIAC ARREST WITH INDUCED HYPOTHERMIA

OUTCOME OF PATIENTS AT DISCHARGE FROM THE HOSPITAL.

OUTCOME*	HYPOTHERMIA (N=43)	NORMOTHERMIA (N=34)
	number of patients	
Normal or minimal disability (able to care for self, discharged directly to home)	15	7
Moderate disability (discharged to a rehabilitation facility)	6	2
Severe disability, awake but completely dependent (discharged to a long-term nursing facility)	0	1
Severe disability, unconscious (discharged to a long-term nursing facility)	0	1
Death	22	23

After adjustment for age and time from collapse to the return of spontaneous circulation, the OR for a good outcome with hypothermia as compared with normothermia was 5.25 (95% CI 1.47 - 18.76; P=0.011).

Hypothermia was associated with a lower cardiac index, higher systemic vascular resistance, and hyperglycemia, no difference in the frequency of adverse event

Bernard S. **N Engl J Me**d, Vol. 346, No. 8, February 21, 2002

Landmark Trials

Europe (HACA)

- RCT n=275, 9 centers
- OOH **witnessed VT/VF**
- ROSC < 60min
- No purposeful response
- MAP > 80 mmHg
- 24 hr cooling to 32-34°C

HACA Study Group. *NEJM* 2002.

Australia

- RCT n=77, 4 centers
- OOH **witnessed VF**
- ROSC
- GCS < 7
- Pre-hospital cooling
- 12 hr cooling to 33°C

Bernard SA, et al. *NEJM* 2002.

Therapeutic hypothermia after cardiac arrest. An advisory statement by the Advanced Life Support Task Force of the International Liaison Committee on Resuscitation

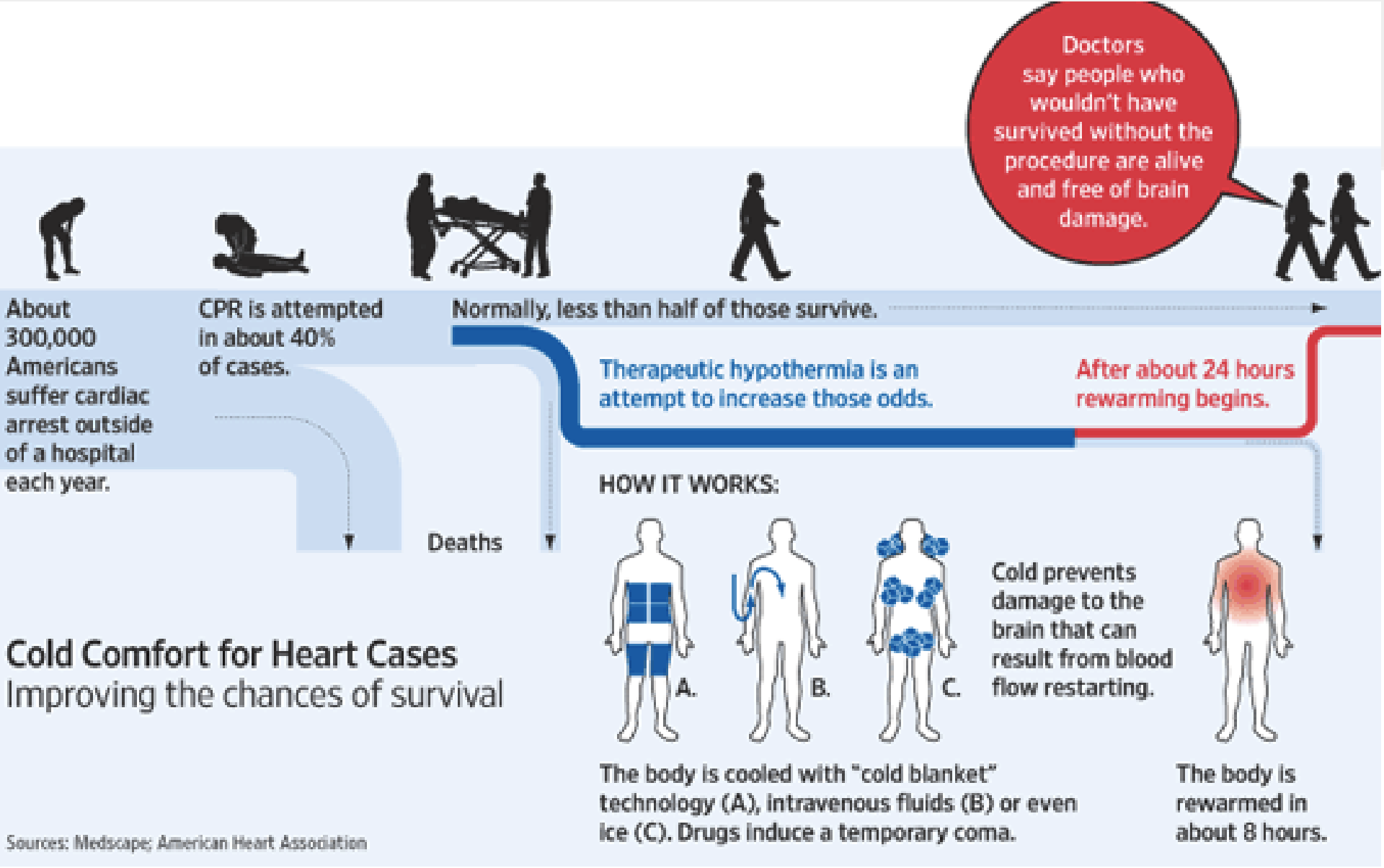
ILCOR recommendations

On the basis of the published evidence to date, the Advanced Life Support (ALS) Task Force of the International Liaison Committee on Resuscitation (ILCOR) made the following **recommendations in October 2002:**

"Unconscious adult patients with spontaneous circulation after out-cardiac arrest should be cooled to 32 – 34 ° C for 12 - 24 hrs. when the initial rhythm was ventricular fibrillation (VF). Such cooling may also be beneficial for other rhythms or in-hospital cardiac arrest"

International resuscitation GL have incorporated therapeutic hypothermia into their recommendations, and the practice has become widely adopted.

Nolan JP, Resuscitation 57**; 2003:** 231 - 235

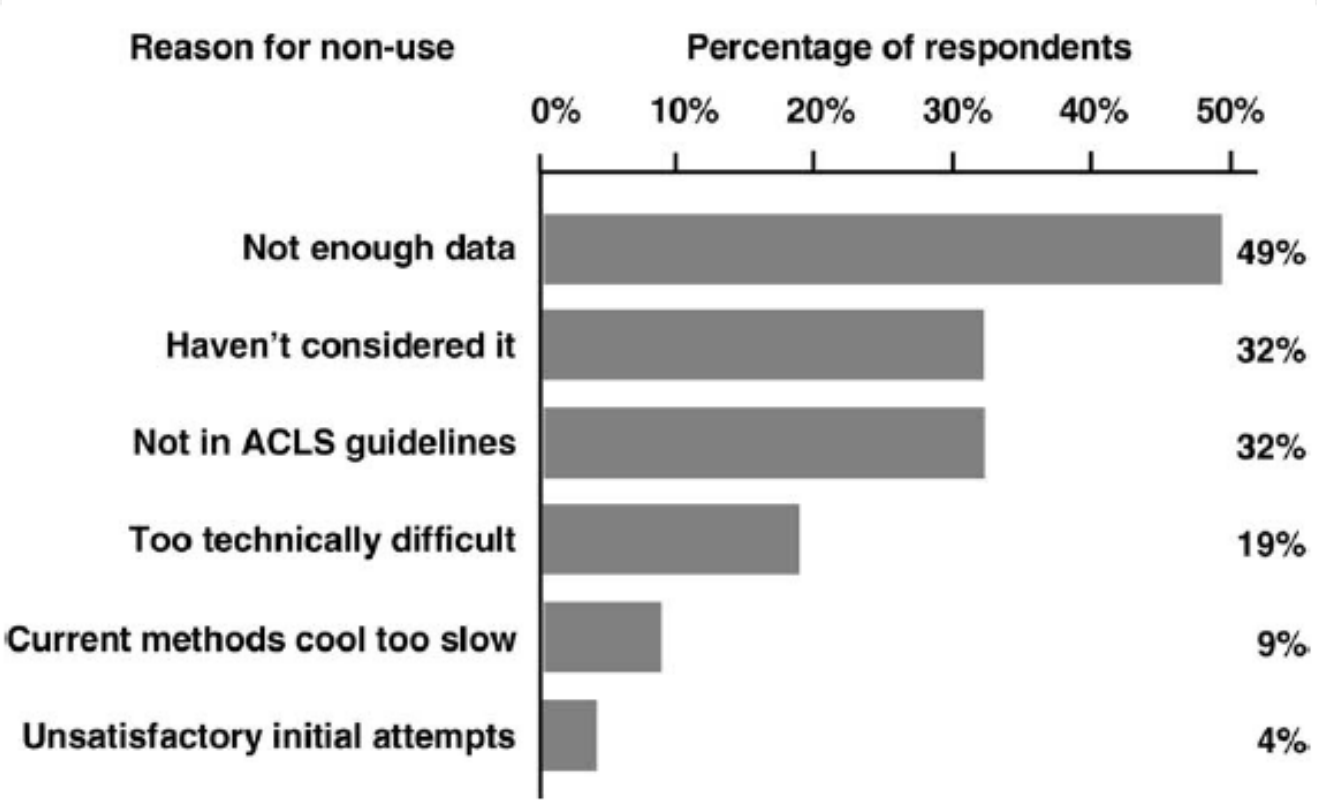


Cold Comfort for Heart Cases

Improving the chances of survival

Sources: Medscape; American Heart Association

Induced hypothermia is underused after resuscitation from cardiac arrest: a current practice survey☆

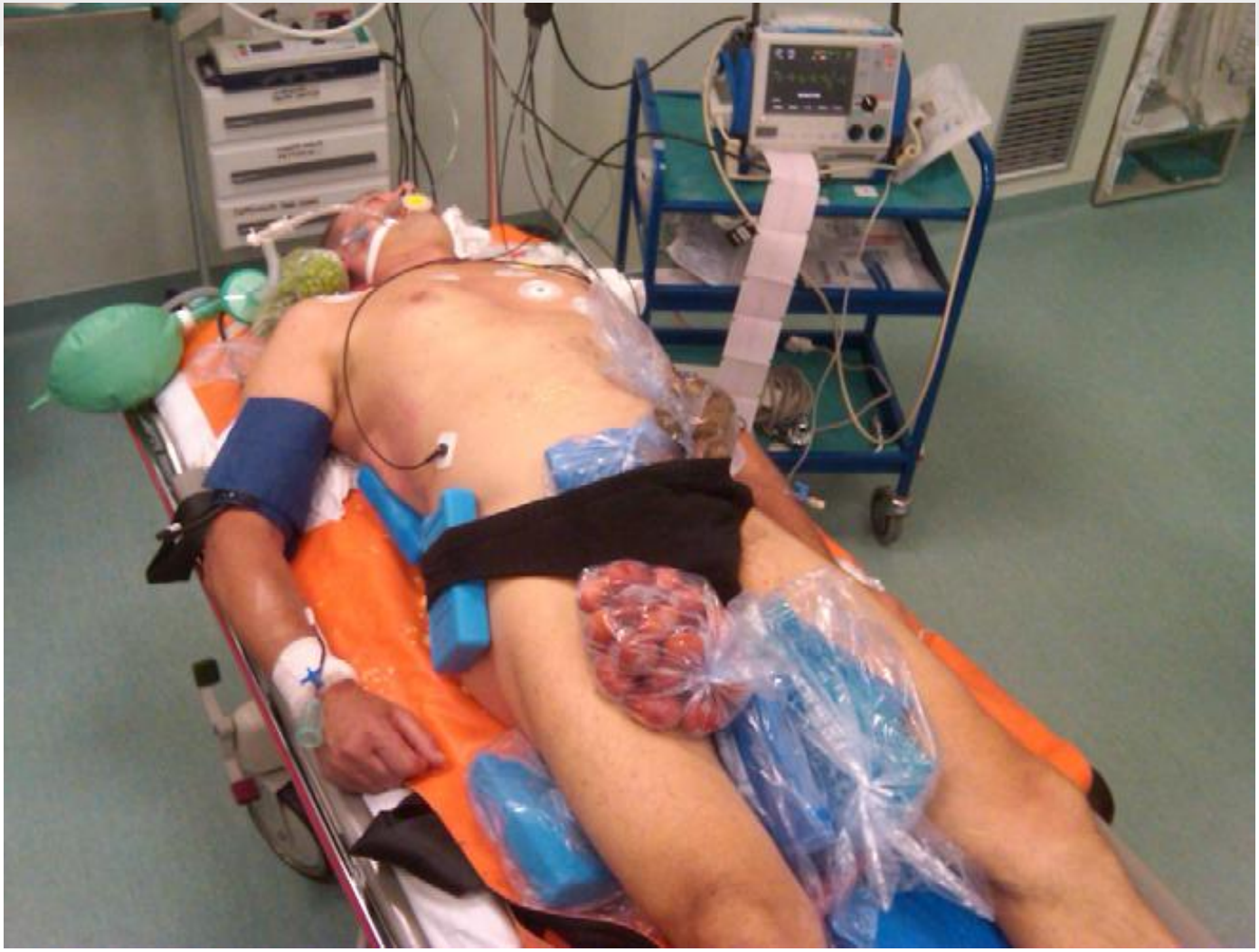


Conclusion: Hypothermia has yet to be broadly incorporated into physician practice. This highlights the need for improved awareness and education regarding this treatment option, as well as the need to consider hypothermia protocols for inclusion in future iterations of ACLS.

Abella BS, Resuscitation 64 (**2005)**

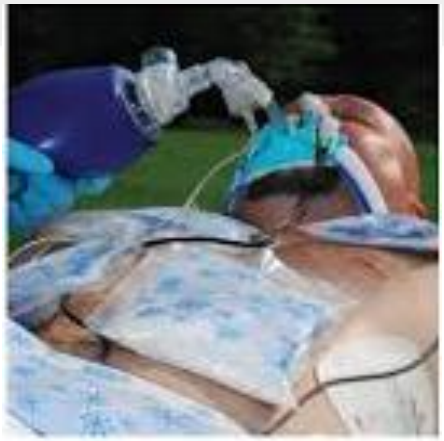
Pre-Hospital "**External**" Induction Procedures

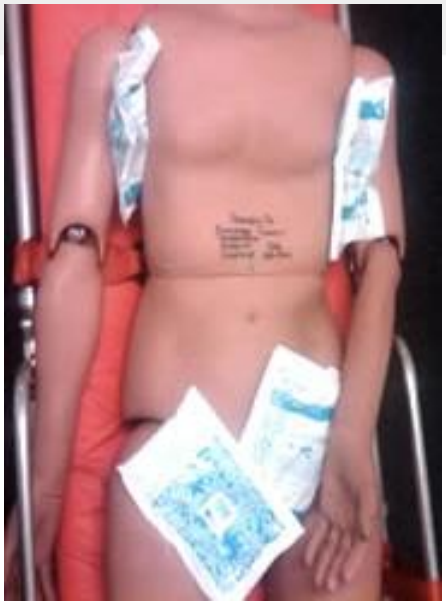
The Mediterranean-diet Italian style …

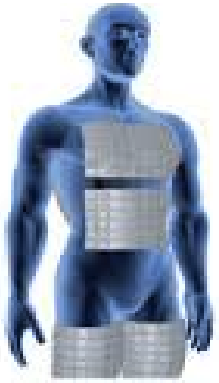


Fabbri A, ***Resuscitation*** **2011**

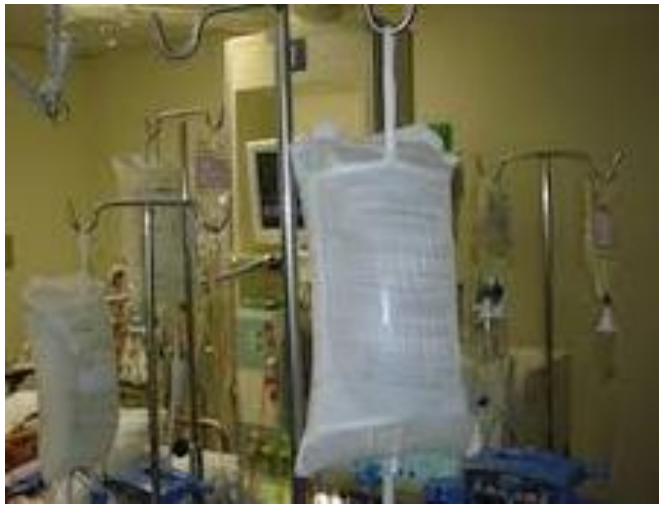
In-Hospital "**External**" Induction







In-Hospital "**Intravenous**" Cooling Induction



- Internal (invasive)
  - Zoll IVTM™ catheter
  - Quattro®, Icy®, Cool Line®

Maintenance Devices

Noninvasive Devices

- Arctic Sun® 2000 and 5000 (by CR Bard, formerly Medivance Inc.)
- Stryker (formerly Gaymar) Medi-Therm® III
- Phillips InnerCool STx Surface Pad System
- Blanketrol® III Body Temperature Regulation System (Cincinnati Sub-Zero Products)

Invasive Devices

- Philips InnerCool RTx Endovascular System, Accutrol® catheter
- ZOLL (formerly Alsius) Intravascular Temperature Management (IVTM™) system CoolGard 3000®

Intra-Arrest Transnasal Evaporative Cooling

A Randomized, Prehospital, Multicenter Study (PRINCE: Pre-ROSC IntraNasal Cooling Effectiveness)

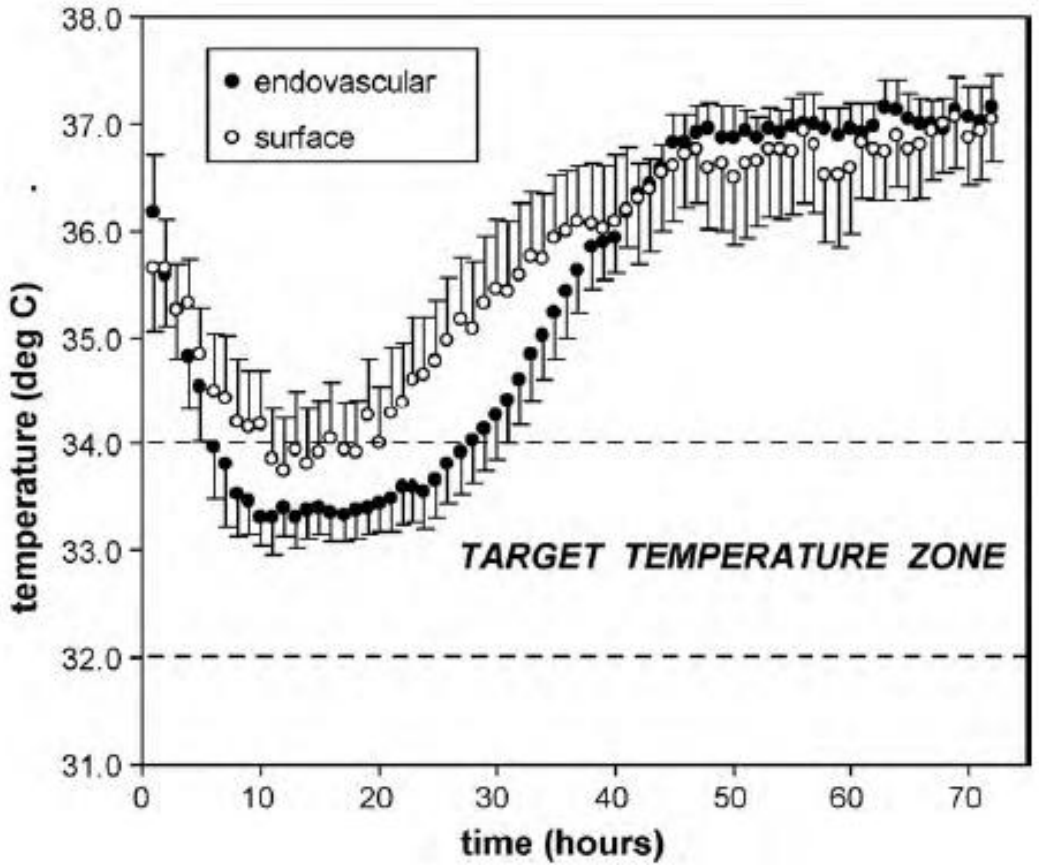
A: coolant spray
B: nasal catheter

A: nasal catheter
B: oxygen tank
C: control unit
D: coolant bottle

Figure 1. RhinoChill cooling device.

Castrèn M, *Circulation***. 2010**;122:729-736

Therapeutic hypothermia after cardiac arrest: A retrospective comparison of surface and endovascular cooling techniques☆



M.A. Gillies et al. Resuscitation 81 **(2010)**

Pilot Randomized Clinical Trial of Prehospital Induction of Mild Hypothermia in Out-of-Hospital Cardiac Arrest Patients With a Rapid Infusion of 4°C Normal Saline

Table 3 Methods of cooling

	Standard [no. ICU (%)]	In addition if required [no. ICU (%)]	Not used [no. ICU (%)]
Cold packs	56 (60.2%)	20 (21.5%)	13 (14.0%)
Cold infusions	57 (61.3%)	17 (18.3%)	16 (17.2%)
Cooling mattresses	25 (28.0%)	5 (5.4%)	57 (61.3%)
Ventilators	16 (17.2%)	14 (15.1%)	57 (61.3%)
Cooling beds	0 (0.0%)	3 (3.2%)	82 (88.2%)
Intravascular cooling devices	12 (12.9%)	1 (1.1%)	72 (77.4%)

Results of a nationwide survey on the use of mild therapeutic hypothermia (MTH) after cardiac arrest. Methods used for cooling as reported by 93 ICUs.

Table 4 Side effects of mild therapeutic hypothermia after cardiac arrest

Side effect	[No. of ICUs/MTH-users]	(%)	Therapeutic consequences (%)
Infection	60/93	64.5	21.5
Hypotension	58/93	62.4	22.6
Bleeding	45/93	48.4	10.8
Electrolyte disarrangements	8/93	8.6	62.5
Arrhythmias	6/93	6.5	33.3
Changes in glucose levels	2/93	2.1	50.0

Wolfrum S. Resuscitation (**2007**)

Therapeutic hypothermia after cardiac arrest: A retrospective comparison of surface and endovascular cooling techniques☆

Cooling-associated complications.

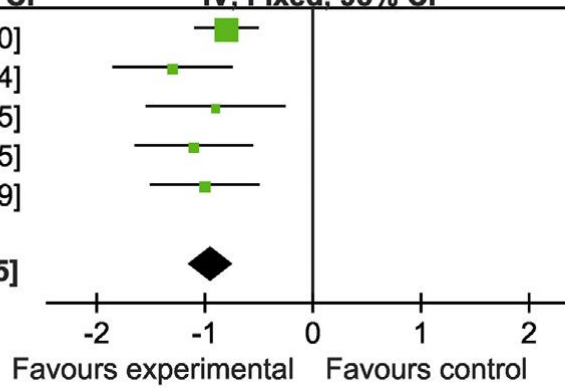
	All patients	Endovascular	Surface	*p*
N	83	42	41	
Complication				
Overcooling	15 (18%)	4 (10%)	11 (27%)	0.049
Overheat	37 (45%)	18 (43%)	19 (46%)	0.83
Target not reached	13 (16%)	3 (7%)	10 (24%)	0.04
Cooling abandoned	5 (6%)	2 (5%)	3 (7%)	0.68
Bradycardia	18 (22%)	10 (24%)	8 (20%)	0.79
Pancreatitis	0 (0%)	NA	NA	NA
Pneumonia	49 (59%)	29 (69%)	20 (49%)	0.08
Bleeding	7 (8%)	6 (14%)	1 (2%)	0.11
Platelet transfusion	3 (4%)	2 (5%)	1 (2%)	1.00
Renal replacement therapy	14 (17%)	5 (12%)	9 (22%)	0.25
Any complication	73 (88%)	38 (91)	35 (85%)	0.52

M.A. Gillies et al. Resuscitation 81 **(2010)**

Prehospital therapeutic hypothermia after cardiac arrest: A systematic review and meta-analysis of randomized controlled trials☆

Study or Subgroup	Prehosipital hypothermia Mean	SD	Total	Control Mean	SD	Total	Weight	Mean Difference IV, Fixed, 95% CI
Bernard 2010	34.6	1.3	118	35.4	1	116	46.9%	-0.80 [-1.10, -0.50]
Bernard 2012	34.4	1.6	82	35.7	2	81	13.3%	-1.30 [-1.86, -0.74]
Castren 2010	34.2	1.5	33	35.1	1.3	42	9.9%	-0.90 [-1.55, -0.25]
Kamarainen 2009	34.1	0.9	19	35.2	0.8	18	13.8%	-1.10 [-1.65, -0.55]
Kim 2007	34.7	1.2	54	35.7	1.2	36	16.1%	-1.00 [-1.51, -0.49]
Total (95% CI)			**306**			**293**	**100.0%**	**-0.95 [-1.15, -0.75]**

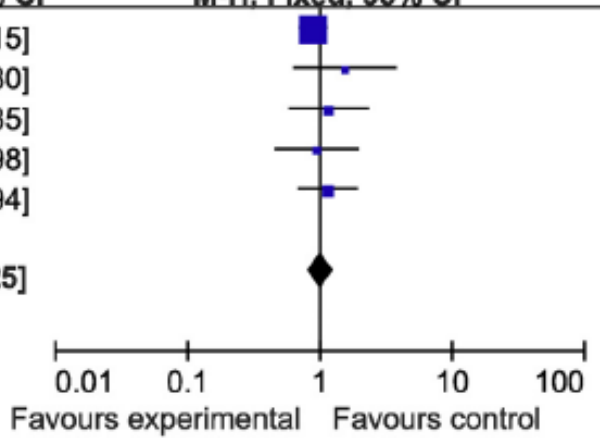
Heterogeneity: Chi² = 2.85, df = 4 (P = 0.58); I² = 0%
Test for overall effect: Z = 9.16 (P < 0.00001)



Summary of data on temperature on hospital admission for prehospital therapeutic hypothermia versus normothermia in prehospital or out-of-hospital setting.

Study or Subgroup	Prehospital hypothermia Events	Total	Control Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Bernard 2010	56	118	62	116	57.7%	0.89 [0.69, 1.15]
Bernard 2012	11	82	7	81	6.5%	1.55 [0.63, 3.80]
Castren 2010	14	96	13	104	11.5%	1.17 [0.58, 2.35]
Kamarainen 2009	8	19	8	18	7.6%	0.95 [0.45, 1.98]
Kim 2007	21	63	18	62	16.7%	1.15 [0.68, 1.94]
Total (95% CI)		**378**		**381**	**100.0%**	**1.01 [0.82, 1.25]**
Total events	110		108			

Heterogeneity: Chi² = 2.29, df = 4 (P = 0.68); I² = 0%
Test for overall effect: Z = 0.11 (P = 0.92)



Summary of data on survival to hospital discharge for prehospital therapeutic hypothermia versus in-hospital therapeutic hypothermia or normothermia.

M. Diao, Resuscitation 84 (2013) 1021–1028

Hypothermia for neuroprotection in adults after cardiopulmonary resuscitation (Review)

THE COCHRANE COLLABORATION®

Rev of 4 trials and 1 abstr. 481 pts. Quality of the included studies was good i three out of five included studies. For the three comparable studies on conventional cooling methods all authors provided individual patient data.

With conventional cooling methods patients in the hypothermia group were more likely to reach a best cerebral performance categories score of one or two (CPC, five point scale; 1= good cerebral performance, to 5 = brain death) during hospital stay (individual patient data; RR, 1.55; 95% CI 1.22 to 1.96) and were more likely to survive to hospital discharge (individual patient data; RR, 1.35; 95% CI 1.10 to 1.65) compared to standard post-resuscitation care. Across all studies there was no significant difference in reported adverse events between hypothermia and control.

Conclusions

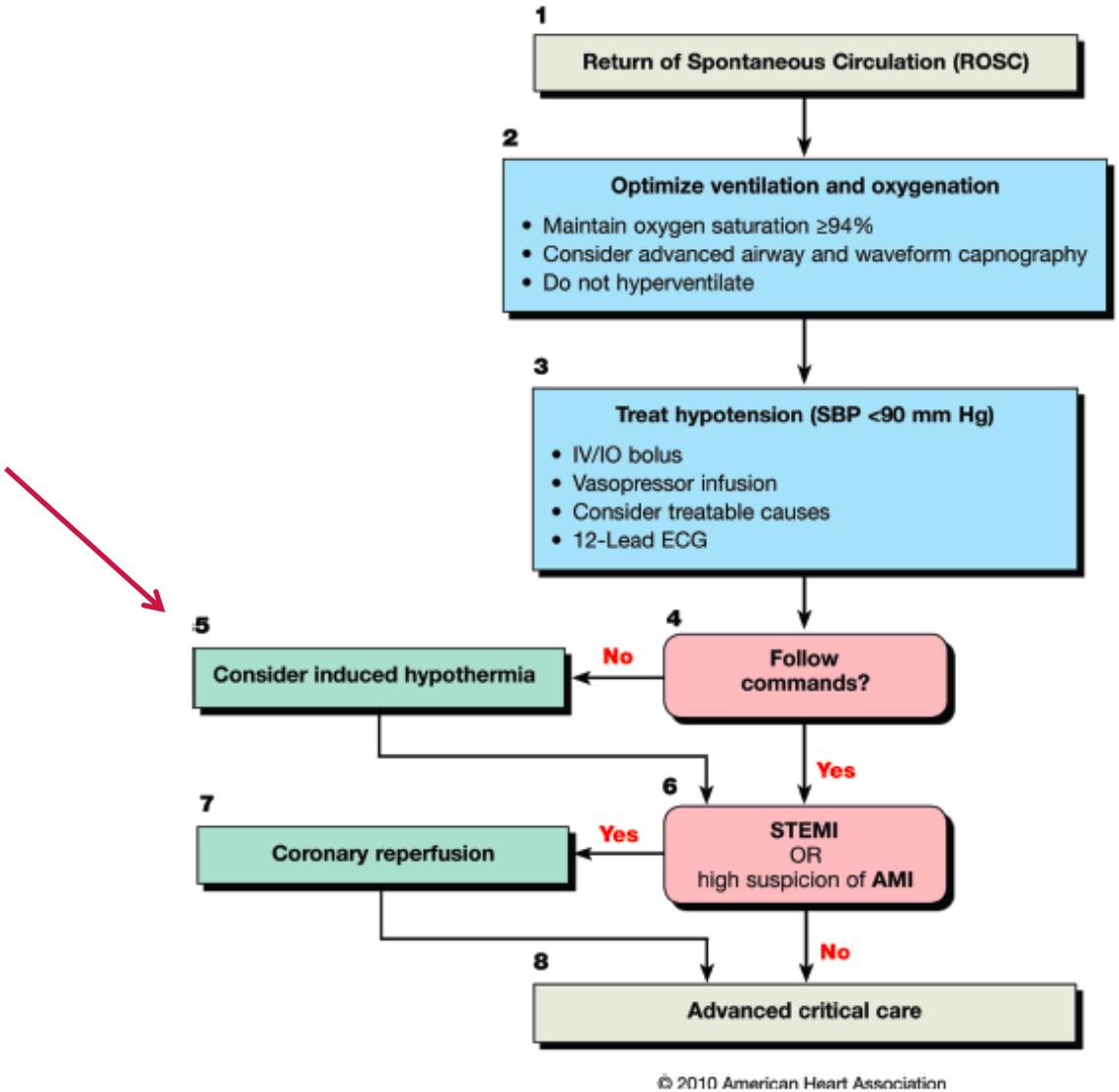
Conventional cooling methods to induce mild therapeutic hypothermia seem to improve survival and neurologic outcome after cardiac arrest.

Our review supports the current best medical practice as recommended by the International Resuscitation Guidelines.

Arrich J, **2010** The Cochrane Collaboration.

2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care

Adult Immediate Post–Cardiac Arrest Care



Doses/Details

Ventilation/Oxygenation
Avoid excessive ventilation. Start at 10-12 breaths/min and titrate to target P_{ETCO_2} of 35-40 mm Hg. When feasible, titrate F_{IO_2} to minimum necessary to achieve Spo_2 ≥94%.

IV Bolus
1-2 L normal saline or lactated Ringer's. If inducing hypothermia, may use 4°C fluid.

Epinephrine IV Infusion:
0.1-0.5 mcg/kg per minute (in 70-kg adult: 7-35 mcg per minute)

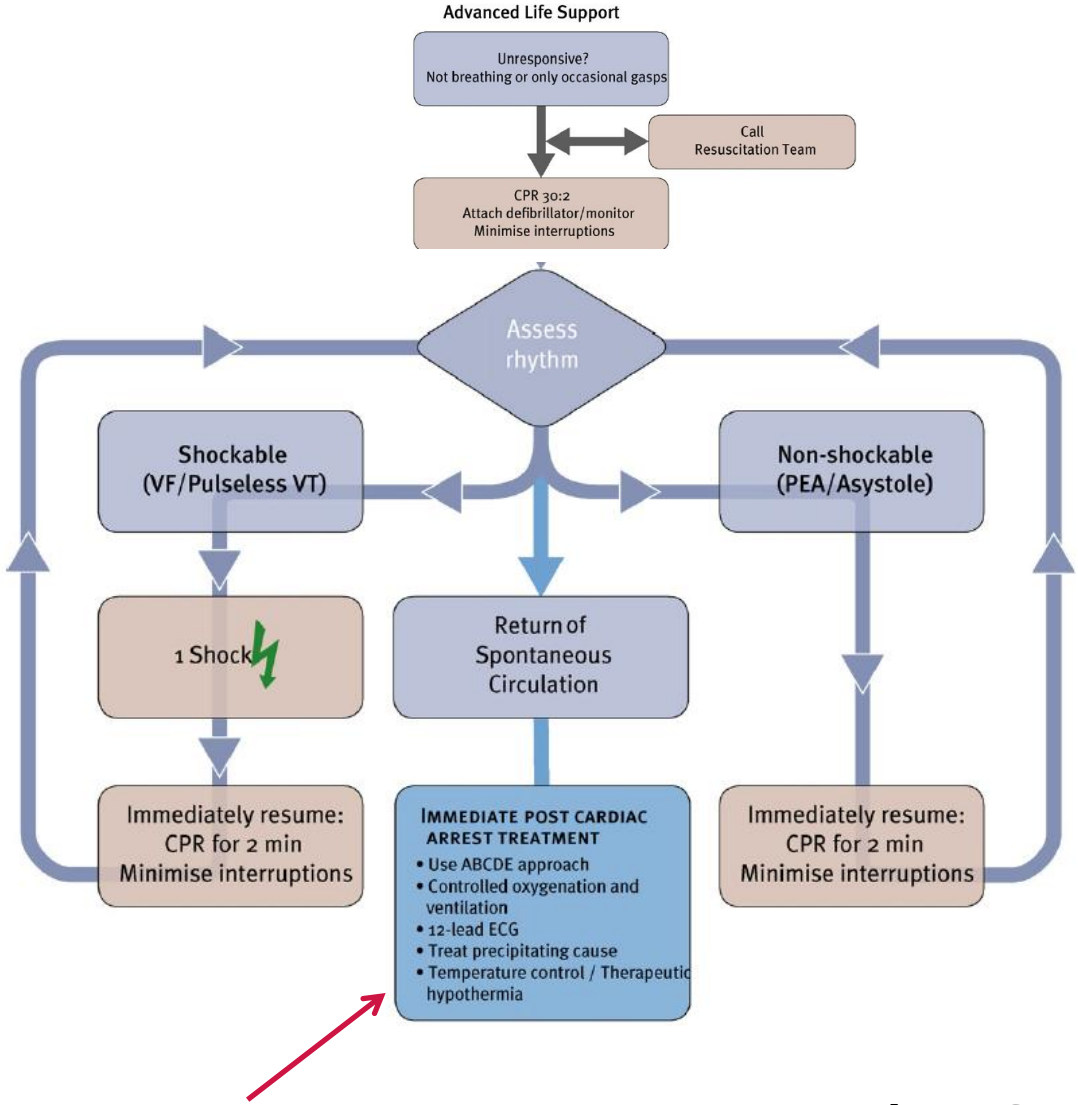
Dopamine IV Infusion:
5-10 mcg/kg per minute

Norepinephrine IV Infusion:
0.1-0.5 mcg/kg per minute (in 70-kg adult: 7-35 mcg per minute)

Reversible Causes
- **H**ypovolemia
- **H**ypoxia
- **H**ydrogen ion (acidosis)
- **H**ypo-/hyperkalemia
- **H**ypothermia
- **T**ension pneumothorax
- **T**amponade, cardiac
- **T**oxins
- **T**hrombosis, pulmonary
- **T**hrombosis, coronary

Peberdy MA, Circulation **2010**

European Resuscitation Council Guidelines for Resuscitation 2010
Section 1. Executive summary



Deakin DC Resuscitation **2010**

Review

Open Access

Out-of-hospital therapeutic hypothermia in cardiac arrest victims

…despite all the knowledge about hypothermia acquired up to day, additional studies are needed to better define … 1) the optimal depth and 2) duration of hypothermia, 3) the role of sedatives and paralytics during cooling, 4) the optimal re-warming rate after cooling, and to improve the techniques for inducing hypothermia.

We strongly encourage joining the international hypothermia network http://www.hypothermianetwork.com to enable properly powered, prospective, randomized trials to address al these issues….

Wilhelm Behringer et al. Scan J Trauma Resus Emerg Med **2009**

Hypothermia after cardiac arrest should be further evaluated—A systematic review of randomised trials with meta-analysis and trial sequential analysis

….. 5 randomised trials (478 patients). All trials had substantial risk of bias. The relative risk (RR) for death was 0.84 (95% confidence interval (CI) 0.70 to 1.01) and for poor neurological outcome 0.78 (95% CI 0.64 to 0.95). For the two trials with least risk of bias the RR for death was 0.92 (95% CI 0.56 to 1.51) and for poor neurological outcome 0.92 (95% confidence interval 0.56 to 1.50). TSA indicated lack of firm evidence for a beneficial effect. The substantial risk of bias and concerns with directness rated down the quality of the evidence to low.

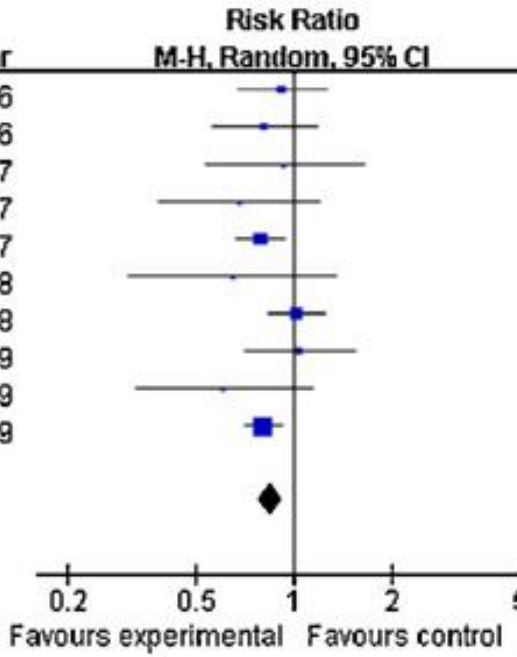
Conclusions: Evidence is still inconclusive and associated with non-negligible risks of systematic and random errors. Quality of evidence is low… and well-designed randomised trials … needed.

Nielsen Niklas et al. (Sweden) Int J Cardiol **2011**

Does therapeutic hypothermia benefit adult cardiac arrest patients presenting with non-shockable initial rhythms?: A systematic review and meta-analysis of randomized and non-randomized studies☆

Study or Subgroup	Therapeutic hypothermia Events	Total	Control Events	Total	Weight	Risk Ratio M-H, Random, 95% CI	Year
Oddo 2006	10	12	10	11	6.7%	0.92 [0.67, 1.26]	2006
Holzer 2006	14	28	311	506	4.6%	0.81 [0.56, 1.19]	2006
Heer 2007	7	10	6	8	2.0%	0.93 [0.53, 1.65]	2007
Sunde 2007	4	6	9	9	2.0%	0.68 [0.38, 1.20]	2007
Arrich, ERC-HACA 2007	79	124	59	73	21.9%	0.79 [0.66, 0.94]	2007
Storm 2008	6	18	16	31	1.2%	0.65 [0.31, 1.35]	2008
Rittenberger 2008	35	42	32	39	16.5%	1.02 [0.83, 1.24]	2008
Whitfield 2009	12	15	10	13	4.3%	1.04 [0.70, 1.54]	2009
Bro-Jeppesen 2009	6	13	16	21	1.6%	0.61 [0.32, 1.14]	2009
Don 2009	85	122	165	191	39.1%	0.81 [0.71, 0.92]	2009
Total (95% CI)		**390**		**902**	**100.0%**	**0.84 [0.78, 0.92]**	
Total events	258		634				

Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 8.43$, $df = 9$ ($P = 0.49$); $I^2 = 0\%$
Test for overall effect: $Z = 4.10$ ($P < 0.0001$)

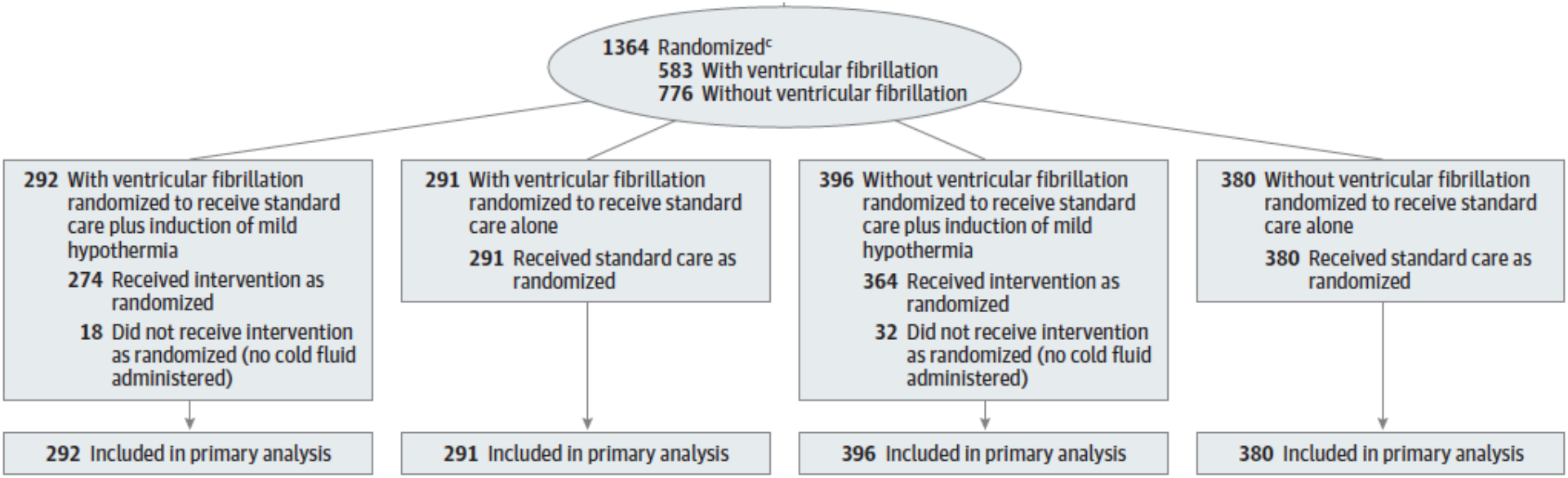


The therapeutic hypothermia is associated with reduced in-hospital mortality for adults patients resuscitated from non-shockable CA. However, most of the studies had substantial risks of bias and quality of evidence was very low.

Kim Yog-Ming, Callaway Clifton Resuscitation **2012**

Effect of Prehospital Induction of Mild Hypothermia on Survival and Neurological Status Among Adults With Cardiac Arrest

A Randomized Clinical Trial



Randomizz. 1,359 pts. rianimati dopo arresto cardiaco extra-ospedaliero (583 con FV, 776 con ritmo di presentazione non-defibrilalbile) a 2000 mL di fisiologica 4° C in spremisacca a 300 mm/Hg con obiettivo 34 ° C: oppure trattamento convenzionale. Al termine della randomizzazione dopo il ricovero il 77% dei casi sottoposti ad ipotermia.

Kim F, et al. JAMA **2014**

Effect of Prehospital Induction of Mild Hypothermia on Survival and Neurological Status Among Adults With Cardiac Arrest

A Randomized Clinical Trial

RESULTS: **Survival at discharge** pts. with VF: **62.7%** [95% CI, 57.0%-68.0%] vs. **64.3%** [95% CI, 58.6%-69.5%], respectively; P = 0.69) and among patients without VF (**19.2**% [95% CI, 15.6%-23.4%] vs **16.3**% [95% CI, 12.9%-20.4%], P = 0.30).

N**eurological status at discharge** for either pts with VF (**57.5%** [95% CI, 51.8%-63.1%] of cases had full recovery or mild impairment vs **61.9**% [95% CI, 56.2%-67.2%] of controls; *P* = 0.69) or those without VF (**14.4%** [95% CI, 11.3%-18.2%] of cases vs **13.4**% [95% CI,10.4%-17.2%] of controls; *P* = 0.30).

Recurrent arrest in the field **26**% [95% CI, 22%-29%] in treated vs **21**% [95% CI, 18%-24%], respectively; *P* = 0.008), as well as **increased diuretic use** and **pulmonary edema** on first chest x-ray, which resolved within 24 hours after admission.

CONCLUSION: Pre-hospital cooling reduced core temperature by hospital arrival and reduced the time to reach a temperature of 34° C, but did not improve survival or neurological status.

Kim F, et al. JAMA **2014**

Effect of Prehospital Induction of Mild Hypothermia on Survival and Neurological Status Among Adults With Cardiac Arrest

A Randomized Clinical Trial

Limiti

- Studio non era in cieco
- Fisiologica 2000 mL a 4 ° C solo al 50% dei soggetti randomizzati
- 4% dei casi con FV e il 7% dei soggetti senza FV non ha ricevuto affatto soluzioni a 4° C
- L'intervento comprendeva anche sedazione (Midazolam 1-2 mg) e Curaro (Pancuronio 7 mg)
- Non presentata la curva della temperatura nel corso del ricovero.

Kim F, et al. JAMA **2014**

Targeted Temperature Management at 33°C versus 36°C after Cardiac Arrest

- 950 unconscious ICU pts (Europe and Australia) after OHCA randomly assigned to targeted 33° C ("induced hypothermia") or 36° C ("near-normal temp.") for 36 hours.
- Shockable and non-shockable rhythms.
- Fever prevention measures used to keep all pts <37.5° C until 72 hs after cardiac arrest.
- **Primary outcome measures:** all-cause mortality, neurologic function and death at 180 days.
- Clear protocol for when life-sustaining therapy should be withdrawn.
- A physician blinded to the intervention assignments performed neurological evaluations 72 hours after the intervention period ended and recommended either continuing or withdrawing life-sustaining therapy, according to pre-specified criteria.

Nielsen N, NEJM **2013** (publ online 17 nov 13)

Targeted Temperature Management at 33°C versus 36°C after Cardiac Arrest

Outcome	33°C Group	36°C Group	Hazard Ratio or Risk Ratio (95% CI)*	P Value
	no./total no. (%)			
Primary outcome: deaths at end of trial	235/473 (50)	225/466 (48)	1.06 (0.89–1.28)	0.51
Secondary outcomes				
Neurologic function at follow-up†				
CPC of 3–5	251/469 (54)	242/464 (52)	1.02 (0.88–1.16)	0.78
Modified Rankin scale score of 4–6	245/469 (52)	239/464 (52)	1.01 (0.89–1.14)	0.87
Deaths at 180 days	226/473 (48)	220/466 (47)	1.01 (0.87–1.15)	0.92

Conclusions: In unconscious survivors of out-of-hospital cardiac arrest of presumed cardiac cause, hypothermia at a targeted temperature of 33° C did not confer a benef it as compared with a targeted temperature of 36° C.
Nevertheless, ….. it is important to acknowledge that there may be a clinically relevant benefit of controlling the body temperature at 36° C, instead of allowing fever….

Nielsen N, NEJM **2013** (publ online 17 nov 13)

Targeted Temperature Management at 33°C Versus 36°C and Impact on Systemic Vascular Resistance and Myocardial Function After Out-of-Hospital Cardiac Arrest

A Sub-Study of the Target Temperature Management Trial

What this study adds:

1.A lower level of target temperature after cardiac arrest was associated with increased systemic vascular tone, decreased cardiac output because of lower heart rate with unchanged myocardial contractility, and increased levels of lactate compared with a higher actively controlled tar- get temperature.

2.These hemodynamic findings may be clinically relevant when choosing the optimal level of target temperature in future patients.

Jeppesen JB, *Circ Cardiovasc Interv* (Oct) **2014**

The association of targeted temperature management at 33 and 36 °C with outcome in patients with moderate shock on admission after out-of-hospital cardiac arrest: a post hoc analysis of the Target Temperature Management trial

Conclusions: in comatose OHCA pts with shock at admission there was no benefit in survival or severity of circulatory shock with a targeted temperature management at 33 ° C as compared to 36 ° C. …

Annbor Martin, et al. Crit Care Med **2014**

The NEW ENGLAND JOURNAL of MEDICINE EDITORIALS

Targeted Temperature Management after Cardiac Arrest

- …The exceptional rates of good outcomes in both the 33° C and 36° C groups in TTM trial reflect the active prevention of hyperthermia..
- Whatever the mechanisms, it seems clear that we should not regress to a pre-2002 style of care that does not manage temperature at all."
- "The most important message to take from this trial is that modern, aggressive care that includes attention to temperature works, making survival more likely than death."

Jon C. Rittenberger, M.D., and Clifton W. Callaway, M.D., Ph.D. (Pittsburg)

The NEW ENGLAND JOURNAL of MEDICINE EDITORIALS

Targeted Temperature Management after Cardiac Arrest

We should not conclude that hypothermia is simply an anti-hyperthermic strategy.

Not all cardiac arrests are equal in terms of the time to return of sponta- neous circulation.

We should identify the sub-groups of patients who can benefit from this form of therapy.

Gaetano Perchiazzi, Nicola D'Onghia, Tommaso Fiore, Italy

BMJ

EDITORIALS

Inducing hypothermia after out of hospital cardiac arrest

Latest large trials provide no support for this intervention

Differences between TTM trial and the 2002 trial are uncertain: Age, Sex, and Duration of cardiac arrest, Temp. at admission approx 35.5° in all 3 studies, Treatments —such as interventional cardiology, ventilator management, and glucose control – similar.

The compelling evidence from the TTM trial is that pts resuscitated not receive therapeutic hypothermia (32-34° C) after admission to hospital. A temperature target of 36° C is appropriate and much more easily achieved.

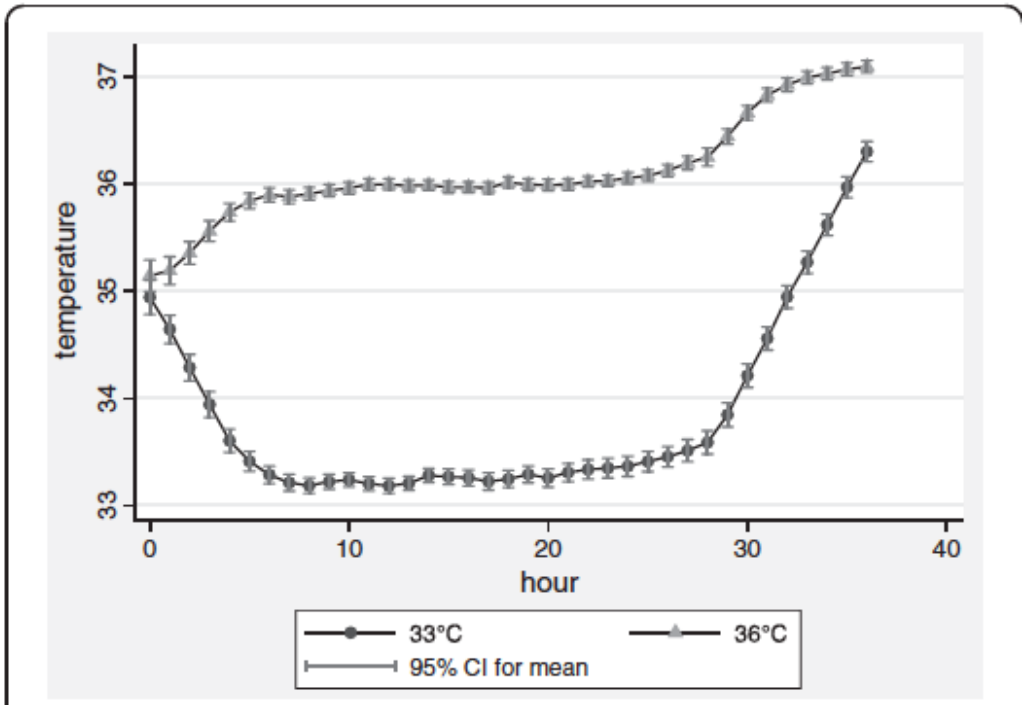
Evidence for active cooling using ice cold intravenous fluid bolus in the prehospital setting is not proved.

Attention to other aspects of care: **1)** avoidance of hyperoxia**, 2)** vigorous support of blood pressure**, 3)** early cardiac catheterisation of cases without ST elevation myocardial infarction

Bernard Steven, Melbourne, (Ed) **2014**

Targeted temperature management after out-of-hospital cardiac arrest: certainties and uncertainties

CRITICAL CARE
EDITORIAL



The most interesting aspect of the TTM trial may be that it indicates substantial knowledge gaps in post-cardiac arrest fever and temperature management. The optimal temperature, duration of temperature management, and target population remain to be defined.

Matt Wise et al. Critical Care **2014**

Conclusioni …

- Mancano prove di efficacia che l'ipotermia sia utile…
- Resta un gap fra ipotermia e mancato controllo dell'ipertermia.
- Resta da chiarire quanto incidono altri fattori (ipossia, iperossia, ipotensione, rivascolarizzazione coronarica, ???)
- L'induzione dell'ipotermia dovrebbe essere successiva o precedere la TC cerebrale ? E il timing per la coronarografia?
- Se un paziente ha un arresto cardiaco secondario ad un'emorragia o alla sepsi qual'è la temperatura target??

Questions