



# Post cardiac arrest care in the acute cardiac care guidelines

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# Main questions

- Hypothermia?
- Immediate angiography?

# 2010 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations

## Treatment recommendation:

“Comatose adult patients (not responding in a meaningful way to verbal commands) with spontaneous circulation after out-of hospital VF cardiac arrest should be cooled to 32–34 °C for 12–24 h”

# 2012 ESC STEMI Guidelines – Cardiac Arrest

Recommendations	Class	Level
All medical and paramedical personnel caring for a patient with suspected myocardial infarction must have access to defibrillation equipment and be trained in cardiac life support.	I	C
It is recommended to initiate ECG monitoring at the point of FMC in all patients with suspected myocardial infarction.	I	C
Therapeutic hypothermia is indicated early after resuscitation of cardiac arrest patients who are comatose or in deep sedation.	I	B
Immediate angiography with a view to primary PCI is recommended in patients with resuscitated cardiac arrest whose ECG shows STEMI.	I	B
Immediate angiography with a view to primary PCI should be considered in survivors of cardiac arrest without diagnostic ECG ST-segment elevation but with a high suspicion of ongoing infarction.	IIa	B

ECG = electrocardiogram; FMC = first medical contacts; PCI = percutaneous coronary intervention; STEMI = ST-segment elevation myocardial infarction.

# Hypothermia

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

THE HYPOTHERMIA AFTER CARDIAC ARREST STUDY GROUP\*

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INDUCED HYPOTHERMIA AFTER OUT-OF-HOSPITAL CARDIAC ARREST

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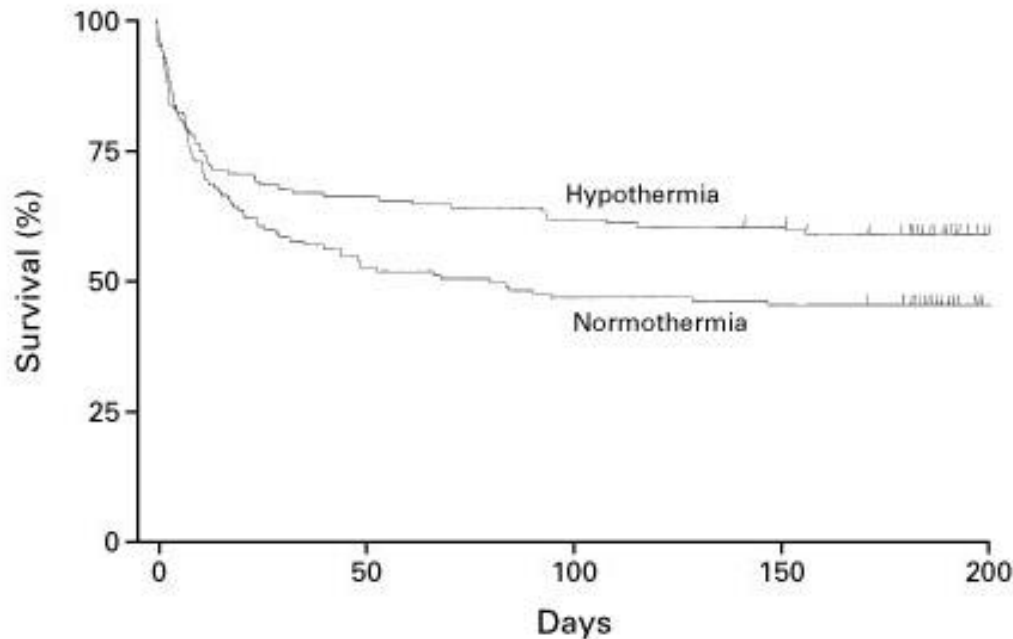
### TREATMENT OF COMATOSE SURVIVORS OF OUT-OF-HOSPITAL CARDIAC ARREST WITH INDUCED HYPOTHERMIA

STEPHEN A. BERNARD, M.B., B.S., TIMOTHY W. GRAY, M.B., B.S., MICHAEL D. BUIST, M.B., B.S.,  
BRUCE M. JONES, M.B., B.S., WILLIAM SILVESTER, M.B., B.S., GEOFF GUTTERIDGE, M.B., B.S., AND KAREN SMITH, B.Sc.

# Hypothermia

## Neurological outcome and mortality at 6 months

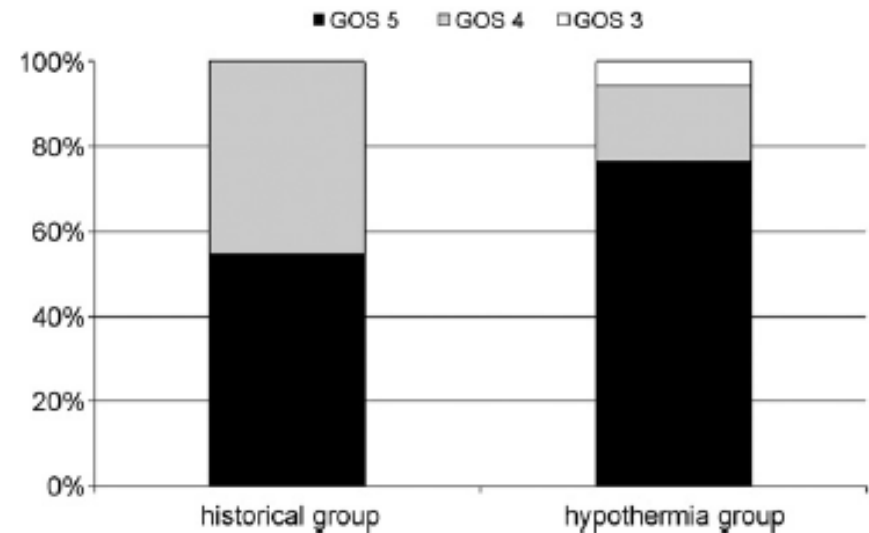
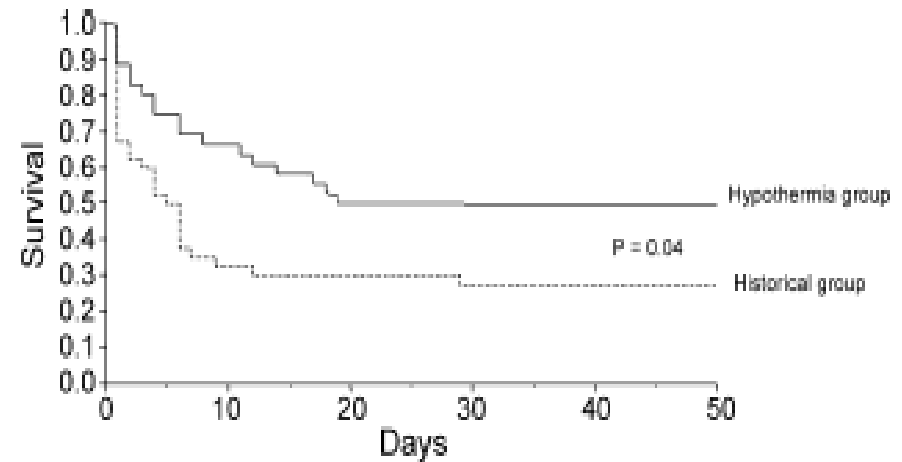
OUTCOME	NORMOTHERMIA	HYPOTHERMIA	RISK RATIO (95% CI)*	P VALUE†
	no./total no. (%)	no./total no. (%)		
Favorable neurologic outcome‡	54/137 (39)	75/136 (55)	1.40 (1.08–1.81)	0.009
Death	76/138 (55)	56/137 (41)	0.74 (0.58–0.95)	0.02



# Hypothermia

	Historical group	Hypothermia group
Age (years)		
Mean $\pm$ S.D. [range]	61.5 $\pm$ 17.6 [22–80]	54.2 $\pm$ 13.7 [29–80]
Male sex (%)	88.9	81.2
Medical history, n (%)		
Hypertension	18/36 (50)	12/32 (37.5)
Coronary heart disease	14/36 (38.8)*	4/32 (12.5)
NYHA III or IV	11/36 (30.5)	5/32 (15.6)
Location of arrest, n (%)		
Home	13/36 (36.1)	10/32 (31.2)
Place of work	3/36 (8.3)	6/32 (18.7)
Public place	12/36 (33.3)	15/32 (46.8)
Time from collapse to return of spontaneous circulation (min)	20 [15–45]	20 [12–43]
Total epinephrine dose (mg)	3.6 $\pm$ 5	1.9 $\pm$ 3
Number of DC shocks	3.7 $\pm$ 3	4.5 $\pm$ 3
Electrocardiographic changes after return to sinus rhythm, n (%)		
ST-elevation	19 (52.7)	20 (62.5)
ST-depression	7 (19.4)	4 (12.5)
Left bundle-branch block	13 (36.1)	2 (6.2)
Normal ST segment or T wave	3 (8.3)	0 (0)
Hypotension after resuscitation, n (%)	8/36 (22)	11/32 (34)
Thrombolysis after resuscitation, n (%)	4/36 (11.1)	4/32 (12.5)

Data are expressed as mean  $\pm$  S.D., except for time from collapse to ROSC expressed in median time  $\pm$  interquartile range. \* $p < 0.05$ .



# Hypothermia – How?

Rapid infusion of ice-cold IV fluid at 30mL/kg is a safe, feasible, and simple method for initially lowering core temperature by up to 1.5 °C

Maintain hypothermia:

- Intravascular heat exchanger (13)
- Ice packs and either water- or air-circulating blankets (12)
- Ice packs combined with wet towels (7)
- Ice packs alone (4)
- Cooling blankets or pads (7)
- Water-circulating, gel-coated pads (8)
- Cold-air tent (1RCT)
- Cooling helmet (1)



# Main questions

- Hypothermia?
- Immediate angiography?

## 2010 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations (ILCOR-

“Immediate angiography and PCI should be considered in patients with OHCA and ROSC. It is reasonable to perform immediate angiography and PCI in selected patients, despite the absence of ST-segment elevation on the ECG or prior clinical findings such as chest pain”

# 2012 ESC STEMI Guidelines – Cardiac Arrest

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ECG = electrocardiogram; FMC = first medical contacts; PCI = percutaneous coronary intervention; STEMI = ST-segment elevation myocardial infarction.

# Suspicion of ongoing infarction:

- Presence of chest pain before arrest
- History of established CAD
- Abnormal or uncertain ECG results

# Immediate angiography

Coronary angiography was performed in 84 consecutive patients between the ages of 30 and 75 years who had no obvious non-cardiac cause of cardiac arrest.

VARIABLE	VALUE
Normal coronary arteries — no. (%)	17 (20)
Clinically insignificant coronary artery disease (≤50 percent stenosis) — no. (%)	7 (8)
Clinically significant coronary artery disease — no. (%)	60 (71)
Single-vessel disease	22
Two-vessel disease	13
Three-vessel disease	24
Isolated left main coronary artery disease	1
Left ventricular ejection fraction — %	33.9±10.5
Left ventricular end-diastolic pressure — mm Hg	25.3±9.5

\*Plus-minus values are means ±SD. Because of rounding, the percentages do not total 100.

VARIABLE	No. OF PATIENTS	No. WITH RECENT CORONARY-ARTERY OCCLUSION (%)
ST-segment elevation and chest pain		
Present	15	13 (87)
Absent	69	27 (39)
ST-segment elevation or chest pain		
Present	49	31 (63)
Absent	35	9 (26)

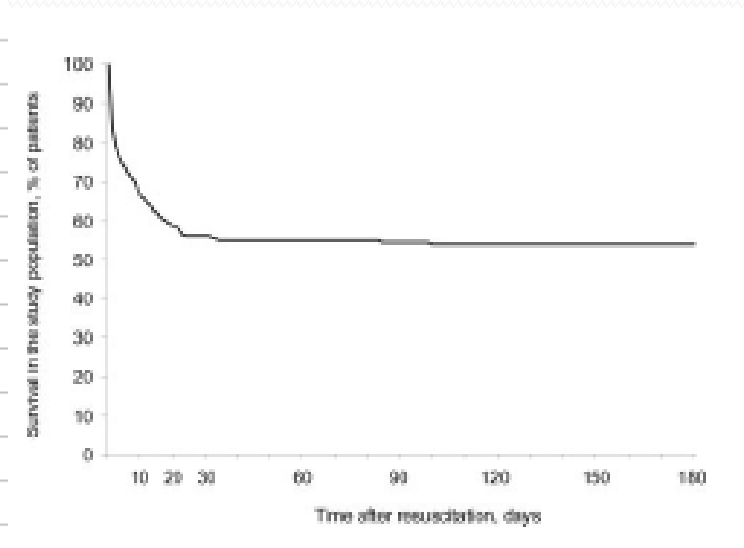
\*ST-segment elevation was defined as an elevation of more than 1 mm in two contiguous leads.

# Immediate angiography – is it safe?

Nonrandomized, observational registry assessing outcome of emergency PCI in resuscitated patients after cardiac arrest complicating STEMI

Variable	Study Population (N=186)
Stenting	168 (90)
Direct stenting	72 (43)
Stents per patient, mean±SD	1.4±1.0
Mean stent length, mm, mean±SD	26±18
Mean stent diameter, mm, mean±SD	3.3±0.5
Intra-aortic balloon pump	80 (43)
IIb/IIIa inhibitors	31 (17)
No reflow	10 (5)
Final TIMI grade 3 flow	164 (88)
Residual stenosis <50%	171 (92)
Thrombus distal emboli	7 (4)
Side branch occlusion	2 (1)
PCI success	161 (87)
Attempted PCI >1 vessel	34 (18)
Post-PCI CK peak value, UI/L (range)	2072 (692–24882)
Post-PCI troponin Ic peak value, µg/L (range)	62 (3–1197)
In-hospital stay, d, mean±SD	13.1±14.3

Values are expressed as mean number with percentages of the total in parentheses, except where indicated otherwise. CK indicates creatine kinase.



# Angiography and Hypothermia

## PCI Combined with Therapeutic Hypothermia for STEMI After Resuscitation

Author/year	<i>n</i>	Survival to hosp DC	Survivors with intact CNS
Hovdenes et al., 2007 [23]	50	41/50 (82%)	34/41 (83%)
Knafelj et al., 2007 [24]	40	30/40 (75%)	22/30 (73%)
Wolfrum et al., 2008 [25]	16	12/16 (75%)	11/12 (92%)
Peels et al., 2008 [26]	44	22/44 (50%)	NA
Total	<i>n</i> = 150	105/150 (70%)	67/83 (81%) <sup>a</sup>

**Emergent coronary angiography/PCI combined with rapid induction of mild therapeutic hypothermia (32–34C) should be strongly considered for all comatose post-resuscitation victims (VF without non cardiac cause) regardless of whether their post-resuscitation electrocardiogram manifests ST elevation**



**Thank You!**