NEICS Spring Meeting

North of England Intensive Care Society

Tuesday 24th March 2015

Wynyard Hall, near Middlesbrough

Cardiac arrest – an update

Gavin Perkins

Professor of Critical Care Medicine

THE UNIVERSITY OF WARWICK

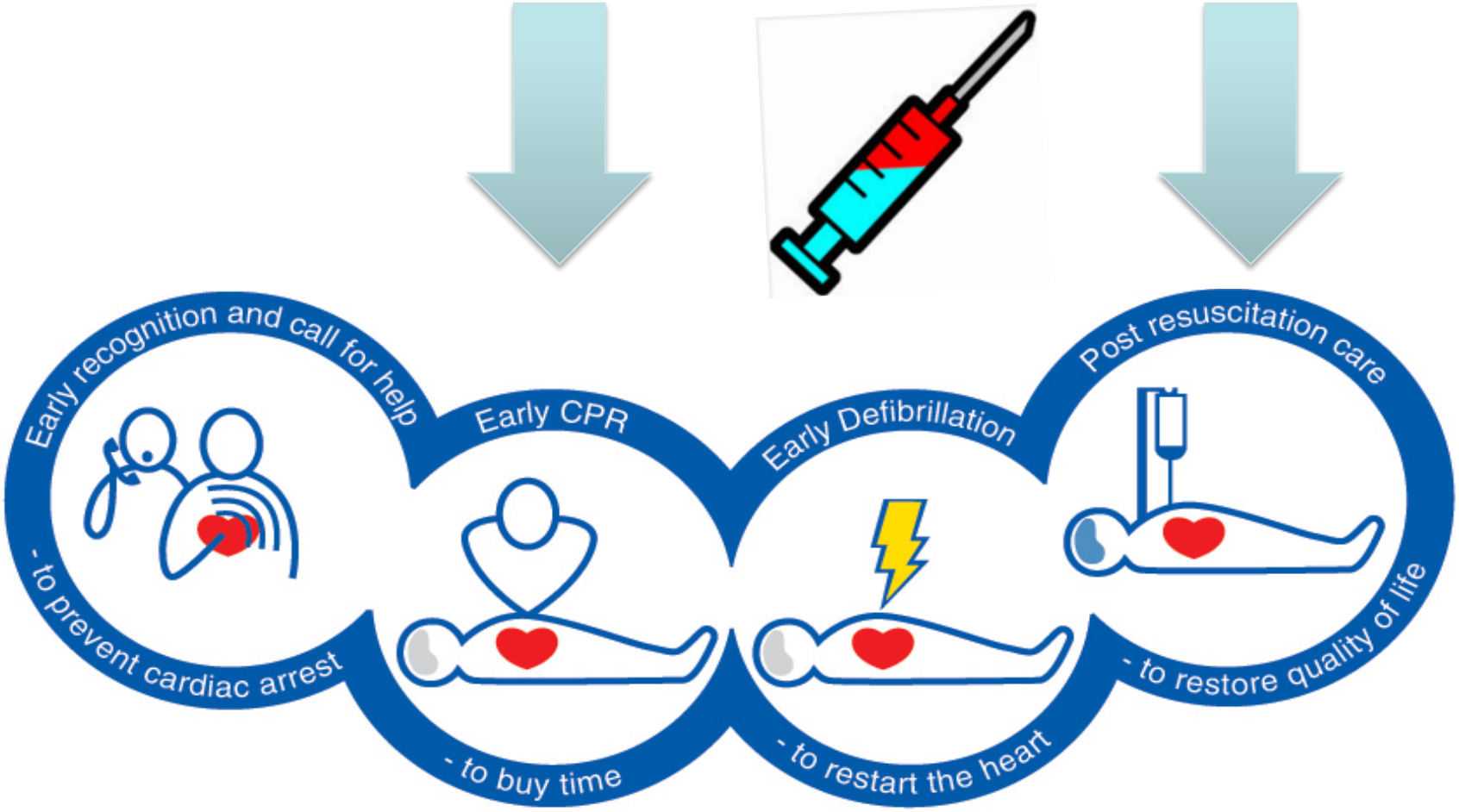
HEART of ENGLAND NHS Foundation Trust

intensive care foundation

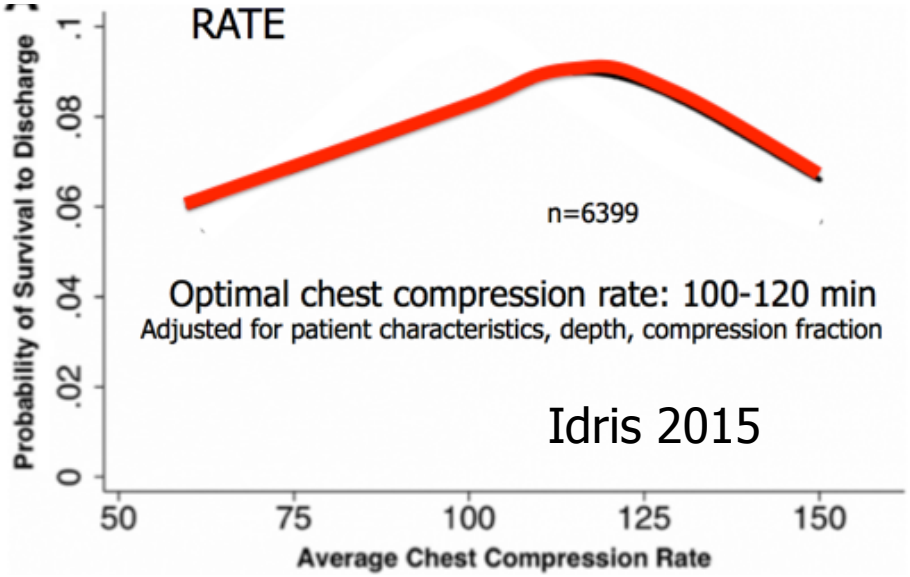
science saving life

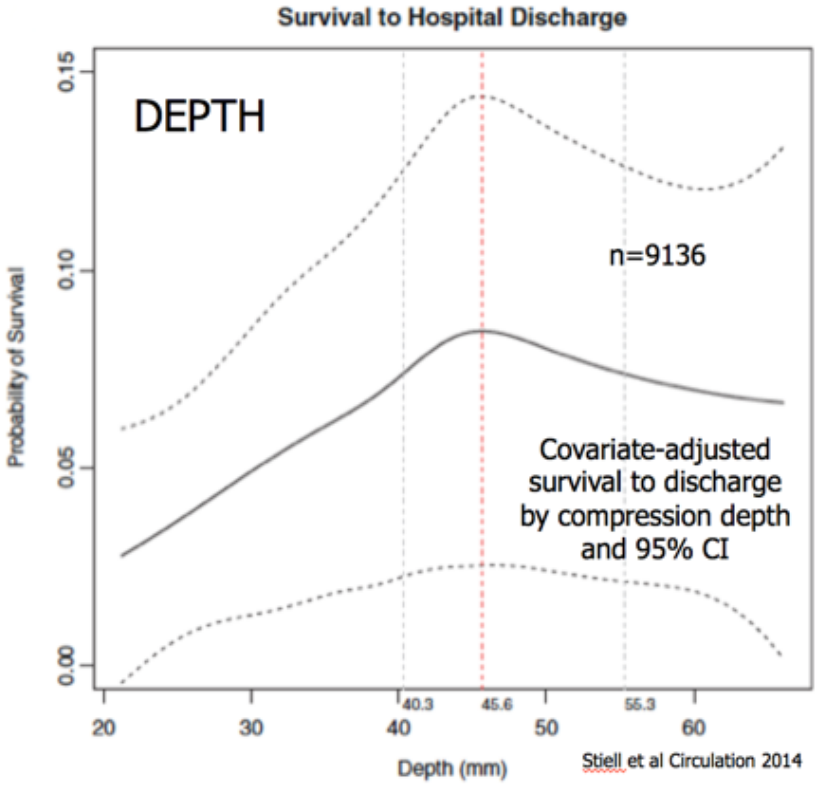
Disclaimer

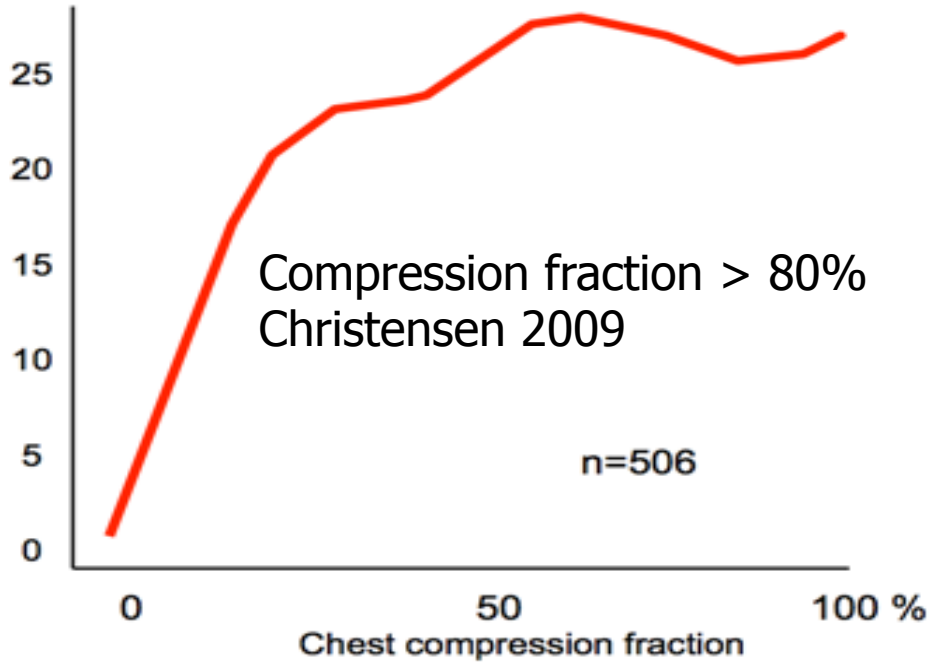
- The PARAMEDIC trials are funded by the National Institute for Health Research (NIHR) Health Technology Assessment Programme (HTA – 07/37/69 and 12/127/126).
- The views expressed are those of the author(s) and not necessarily those of the NHS, the NIHR, or the Department of Health.



North East Ambulance Service NHS
NHS Foundation Trust


RATE
Probability of Survival to Discharge
0
.02
.04
.06
.08
.1
n=6399
Optimal chest compression rate: 100-120 min
Adjusted for patient characteristics, depth, compression fraction
Idris 2015
50
75
100
125
150
Average Chest Compression Rate


Survival to Hospital Discharge
DEPTH
Probability of Survival
0.00
0.05
0.10
0.15
n=9136
Covariate-adjusted
survival to discharge
by compression depth
and 95% CI
40.3
45.6
55.3
20
30
40
50
60
Depth (mm)
Stiell et al Circulation 2014


0
5
10
15
20
25
Compression fraction > 80%
Christensen 2009
n=506
0
50
100 %
Chest compression fraction


AutoPulse


LUCAS

ILCOR recommendations 2010

Resuscitation 81S (2010) e1–e25

Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Part 1: Executive summary
2010 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations☆

Jerry P. Nolan (Co-chair)*,1, Mary Fran Hazinski (Co-chair)1, John E. Billi, Bernd W. Boettiger, Leo Bossaert, Allan R. de Caen, Charles D. Deakin, Saul Drajer, Brian Eigel, Robert W. Hickey, Ian Jacobs, Monica E. Kleinman, Walter Kloeck, Rudolph W. Koster, Swee Han Lim, Mary E. Mancini, William H. Montgomery, Peter T. Morley, Laurie J. Morrison, Vinay M. Nadkarni, Robert E. O'Connor, Kazuo Okada, Jeffrey M. Perlman, Michael R. Sayre, Michael Shuster, Jasmeet Soar, Kjetil Sunde, Andrew H. Travers, Jonathan Wyllie, David Zideman

Toward International Consensus on Science

The International Liaison Committee on Resuscitation (ILCOR) was founded on November 22, 1992, and currently includes representatives from the American Heart Association (AHA), the European Resuscitation Council (ERC), the Heart and Stroke Foundation of Canada (HSFC), the Australian and New Zealand Committee on Resuscitation (ANZCOR), Resuscitation Council of Southern Africa (RCSA), the InterAmerican Heart Foundation (IAHF), and the Resuscitation Council of Asia (RCA). Its mission is to identify and review international science and knowledge relevant to cardiopulmonary resuscitation (CPR) and emergency cardiovascular care (ECC) and when there is consensus to offer treatment recommendations. Emergency cardiovascular care includes all responses necessary to treat sudden life-threatening events affecting the cardiovascular and respiratory systems, with a particular focus on sudden cardiac arrest.

In 1999, the AHA hosted the first ILCOR conference to evaluate resuscitation science and develop common resuscitation guidelines. The conference recommendations were published in the *International Guidelines 2000 for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care*.[1] Since 2000, researchers from the ILCOR member councils have evaluated resuscitation science in 5-year cycles. The conclusions and recommendations of the 2005 International Consensus Conference on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care With Treatment Recommendations were published at the end of 2005.[2,3] The most recent International Consensus Conference was held in Dallas in February 2010, and this publication contains the consensus science statements and treatment recommendations developed with input from the invited participants.

The goal of every resuscitation organisation and resuscitation expert is to prevent premature cardiovascular death. When cardiac arrest or life-threatening emergencies occur, prompt and skillful response can make the difference between life and death and between intact survival and debilitation. This document summarises the 2010 evidence evaluation of published science about the recognition and response to sudden life-threatening events, particularly sudden cardiac arrest and peri-arrest events in victims of all ages. The broad range and number of topics reviewed necessitated succinctness in the consensus science statements and brevity in treatment recommendations. This supplement is not a comprehensive review of every aspect of resuscitation medicine: not all topics reviewed in 2005 were reviewed in 2010. This executive summary highlights the evidence evaluation and treatment recommendations of the 2010 evidence evaluation process. More detailed information is available in other parts of this publication.

Evidence evaluation process

To begin the current evidence evaluation process, ILCOR representatives established 6 task forces: basic life support (BLS); advanced life support (ALS); acute coronary syndromes (ACS); paediatric life support; neonatal life support; and education, implementation, and teams (EIT). Separate writing groups were formed to coordinate evidence evaluation for defibrillation and mechan-

☆ The European Resuscitation Council requests that this document be cited as follows: Nolan JP, Hazinski MF, Billi JE, Boettiger BW, Bossaert L, de Caen AR, Deakin CD, Drajer S, Eigel B, Hickey RW, Jacobs I, Kleinman ME, Kloeck W, Koster RW, Lim SH, Mancini ME, Montgomery WH, Morley PT, Morrison LJ, Nadkarni VM, O'Connor RE, Okada K, Perlman JM, Sayre MR, Shuster M, Soar J, Sunde K, Travers AH, Wyllie J, Zideman D. Part 1: executive summary: 2010 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations. Resuscitation 2010;81:e1-e25.

* Corresponding author.
E-mail address: jerry.nolan@nhs.net (J.P. Nolan).
1 Co-chairs and equal first co-authors.

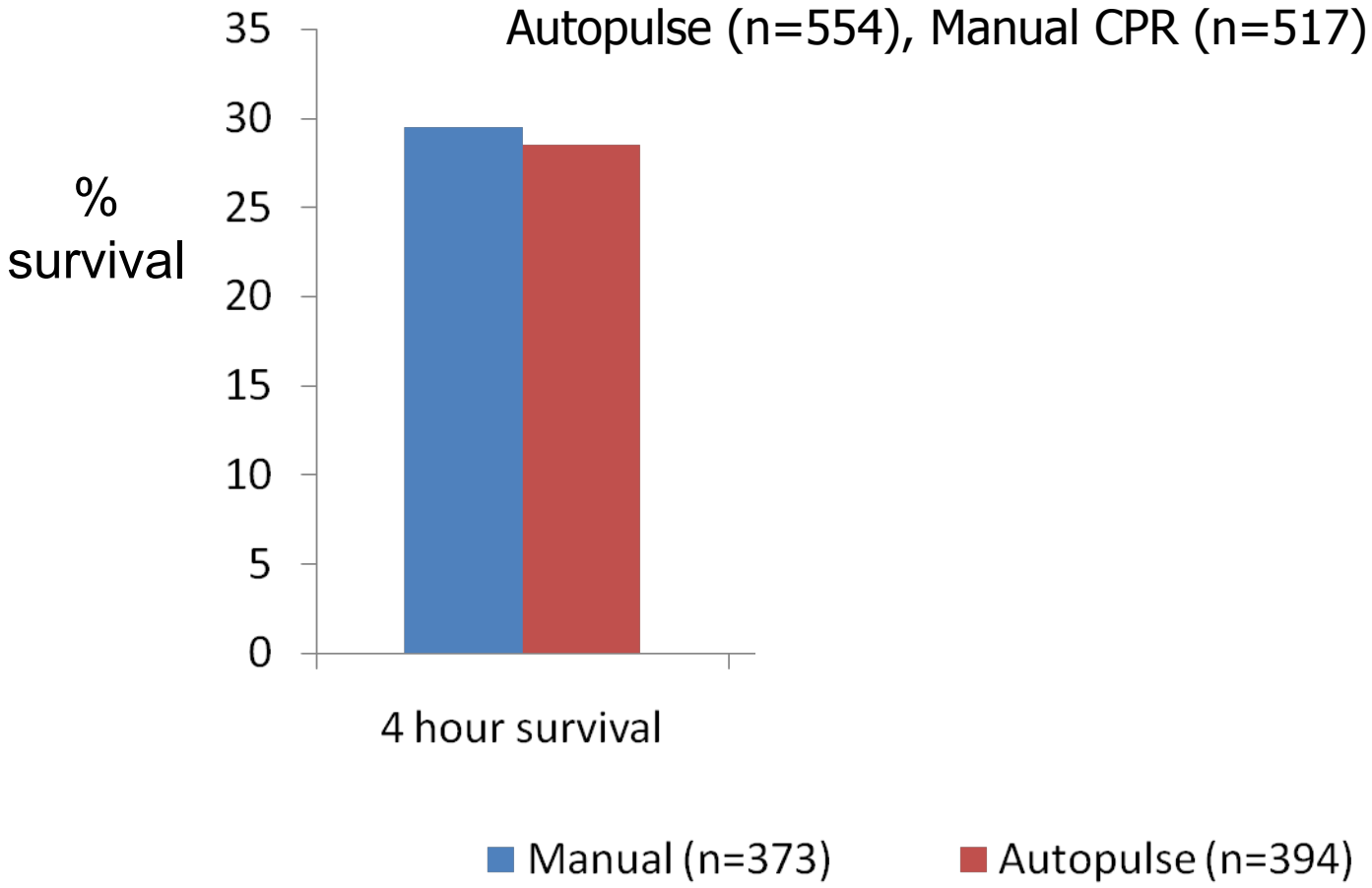
0300-9572/$ – see front matter © 2010 European Resuscitation Council, American Heart Association, Inc., and International Liaison Committee on Resuscitation. Published by Elsevier Ireland Ltd. All rights reserved.
doi:10.1016/j.resuscitation.2010.08.002

There are insufficient data to support or refute the routine use of load-distributing band CPR, LUCAS CPR, or **mechanical** piston **CPR, instead of standard CPR.**

On the basis of case reports and case series it may be reasonable to consider LDB or LUCAS CPR to maintain continuous chest compressions while the patient undergoes percutaneous coronary intervention (PCI) or computed tomography (CT) or similar diagnostic studies when provision of manual CPR would be difficult.

Autopulse™

ASPIRE trial (autopulse)



Hallstrom A et al JAMA 2006

Resuscitation 85 (2014) 741–748

Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Clinical Paper

Manual vs. integrated automatic load-distributing band CPR with equal survival after out of hospital cardiac arrest. The randomized CIRC trial☆,☆☆

Lars Wik[a,*], Jan-Aage Olsen[a,b], David Persse[c], Fritz Sterz[d], Michael Lozano Jr.[e,f], Marc A. Brouwer[g], Mark Westfall[h,i], Chris M. Souders[c], Reinhard Malzer[j], Pierre M. van Grunsven[k], David T. Travis[e], Anne Whitehead[l], Ulrich R. Herken[m], E. Brooke Lerner[n]

Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Clinical paper

Design of the Circulation Improving Resuscitation Care (CIRC) Trial: A new state of the art design for out-of-hospital cardiac arrest research☆,☆☆

E. Brooke Lerner[a,*], David Persse[b], Chris M. Souders[b], Fritz Sterz[c], Reinhard Malzer[d], Michael Lozano Jr.[e,f], Mark Westfall[g,h,i,j,k], Marc A. Brouwer[l], Pierre M. van Grunsven[m], Anne Whitehead[n], Jan-Aage Olsen[o], Ulrich R. Herken[p], Lars Wik[o]

(1) 4 hours training, continuous monitoring for protocol compliance.
(2) Pre-trial simulation study of provider compliance with the trial protocol.
(3) Three distinct study phases (infield training, run-in, and statistical inclusion)
(4) Monitoring of the CPR process
(5) Randomization at the subject level after the decision to resuscitate
(6) Use of the Group Sequential Double Triangular Test with sufficient power to determine superiority, inferiority, or equivalence.

Clinical Paper

Manual vs. integrated automatic load-distributing band CPR with equal survival after out of hospital cardiac arrest. The randomized CIRC trial☆,☆☆

	AutoPulse (n = 2099)	Manual (n = 2132)	P
Survival to discharge (%)	9.4	11.0	NS
24-hour survival (%)	21.8	25.0	NS
Compression fraction (%)	80.4	80.2	NS

Adjusted survival to discharge = OR 1.06 (95% CI 0.83 – 1.37)

CIRC
AutoPulse® Clinical Trial

Wik L. Resuscitation 2014;85:741-8

Results: Neurologic Endpoint

- No difference in mRS scores ≤3
  - Adjusted OR 0.80, 95% CI 0.47 - 1.37 (n.s.)

	M-CPR	iA-CPR
Discharge mRS	(n=233)	(n=196)
Score of 0 -3	48.1%	44.4%
Score of 4 -5	26.2%	25.5%
Unknown score	25.8%	30.1%

CIRC
AutoPulse® Clinical Trial

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LINC trial

A multicenter, randomized, controlled trial

designed to evaluate the efficacy and safety of:

LUCAS concept for resuscitation of OHCA including defibrillation during ongoing compressions

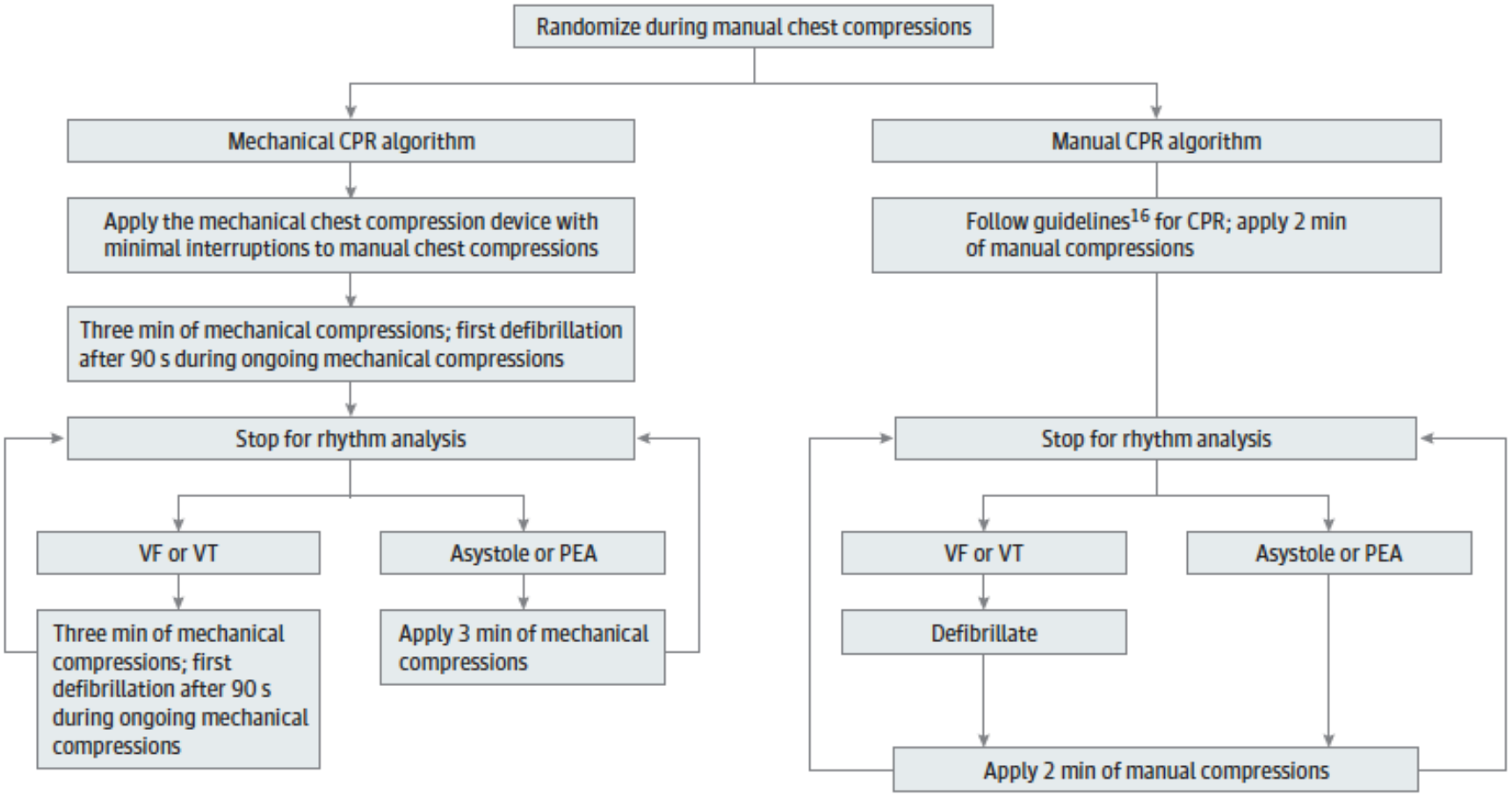
vs.

manual CPR according to 2005 guidelines

Rubertssen JAMA 2013

LINC study

LINC TRIAL


Randomize during manual chest compressions
Mechanical CPR algorithm
Apply the mechanical chest compression device with minimal interruptions to manual chest compressions
Three min of mechanical compressions; first defibrillation after 90 s during ongoing mechanical compressions
Stop for rhythm analysis
VF or VT
Asystole or PEA
Three min of mechanical compressions; first defibrillation after 90 s during ongoing mechanical compressions
Apply 3 min of mechanical compressions
Manual CPR algorithm
Follow guidelines[16] for CPR; apply 2 min of manual compressions
Stop for rhythm analysis
VF or VT
Asystole or PEA
Defibrillate
Apply 2 min of manual compressions

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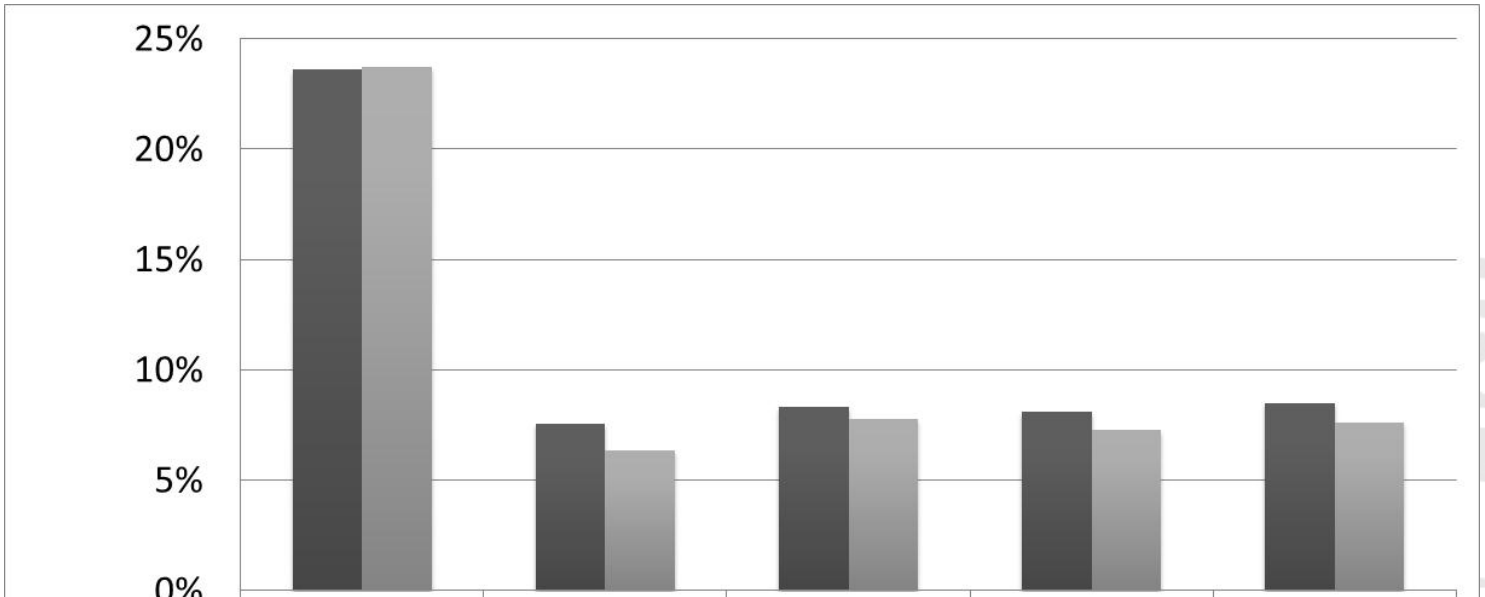
Outcome

4-hour survival:
Risk difference -0.05%
95% C.I. -3.32 – 3.23, p=1.00



	4-hour survival	ICU discharge (CPC 1-2)	Hospital discharge (CPC 1-2)	At 1 month (CPC 1-2)	At 6 months (CPC 1-2)
L-CPR (N=1300)	**23.6%**	7.5%	8.3%	8.1%	8.5%
M-CPR (N=1289)	**23.7%**	6.4%	7.8%	7.3%	7.6%

LINC study

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Authors conclusion

In clinical practice, mechanical CPR using the presented algorithm did not result in improved effectiveness compared with manual CPR

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PARAMEDIC

Pre-hospital Randomised Assessment of a Mechanical Compression Device In Cardiac Arrest (PARAMEDIC) Study

THE UNIVERSITY OF WARWICK

Study design

Pragmatic, multi-centre, cluster randomised, clinical effectiveness trial

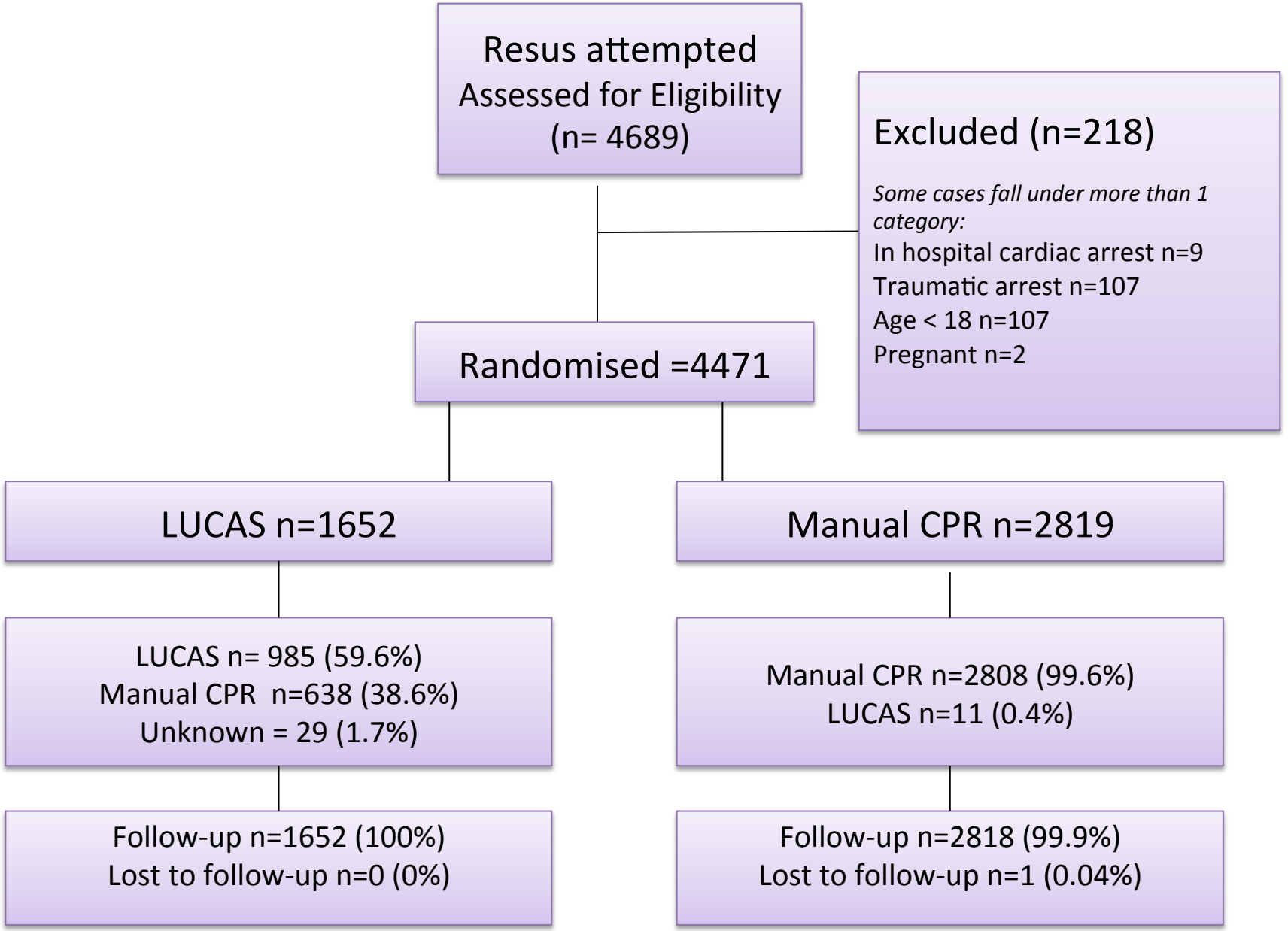
P opulation: Adults, non-traumatic OHCA

I ntervention: LUCAS CPR

C omparator: Standard CPR

O utcome: 30 day survival, clinical and cost effectiveness

Protocol: Perkins GD *et al* Scand J Trauma Resusc Emerg Med. 2010



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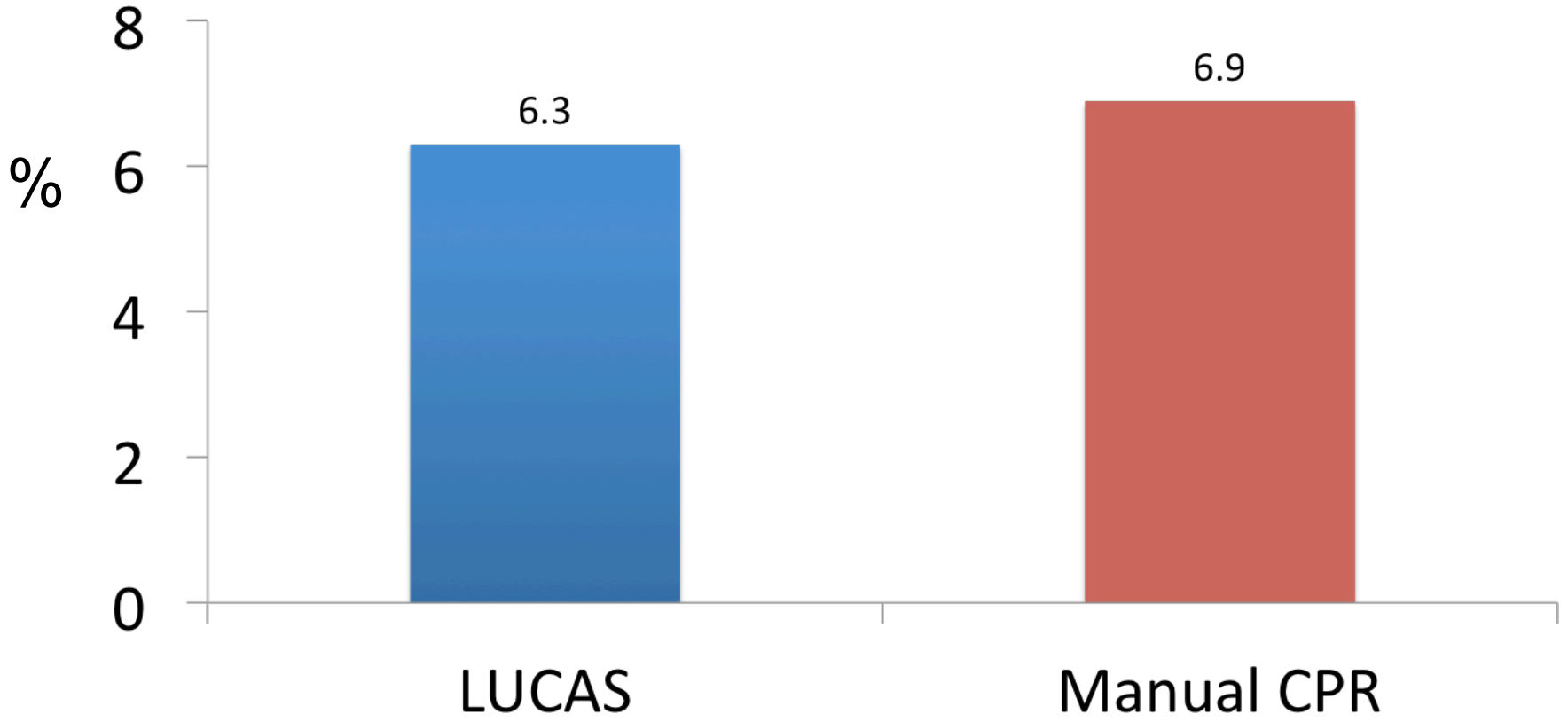
No difference in 30 day survival

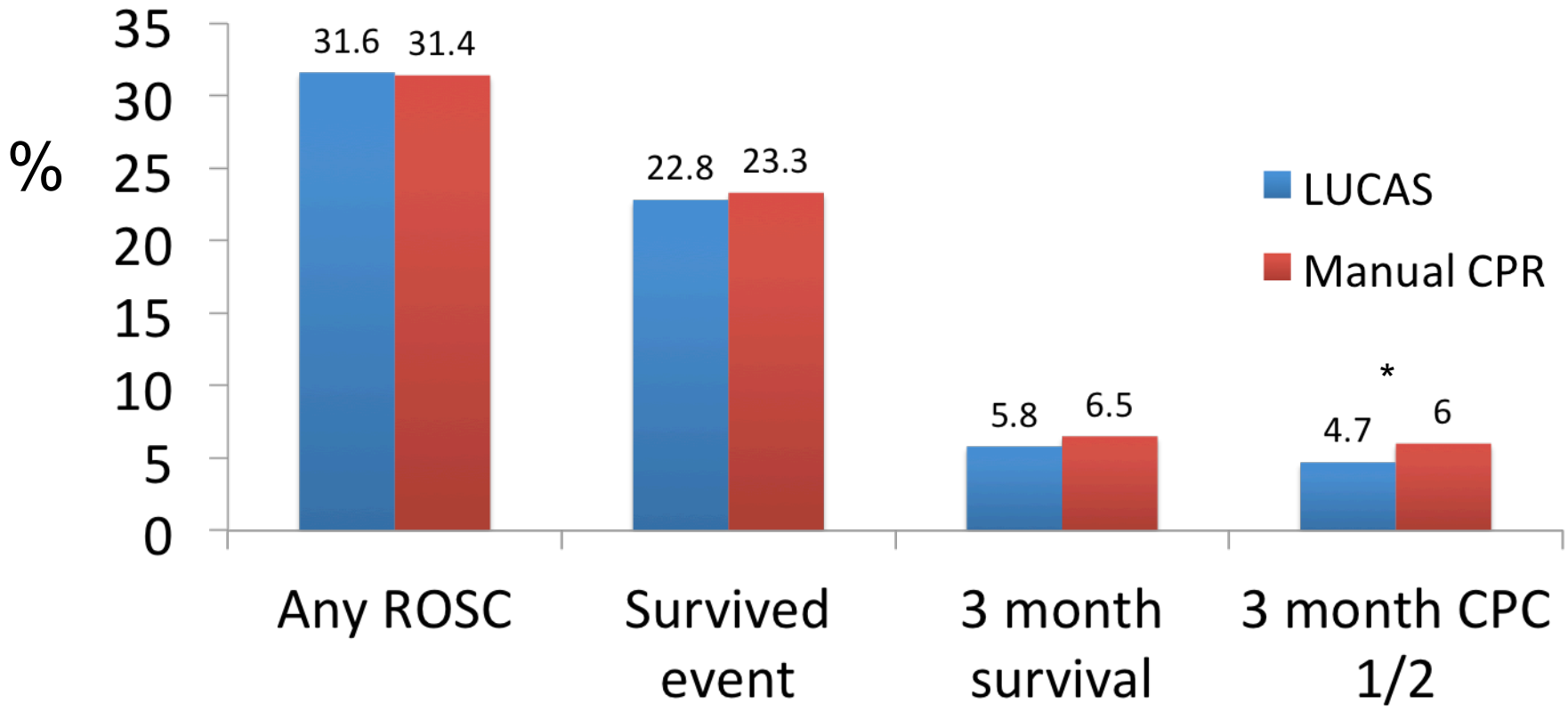
Unadjusted odds ratio = 0.91 (95% CI: 0.71, 1.17) P=0.473
Adjusted odds ratio = 0.86 (95% CI: 0.64, 1.15) P=0.31



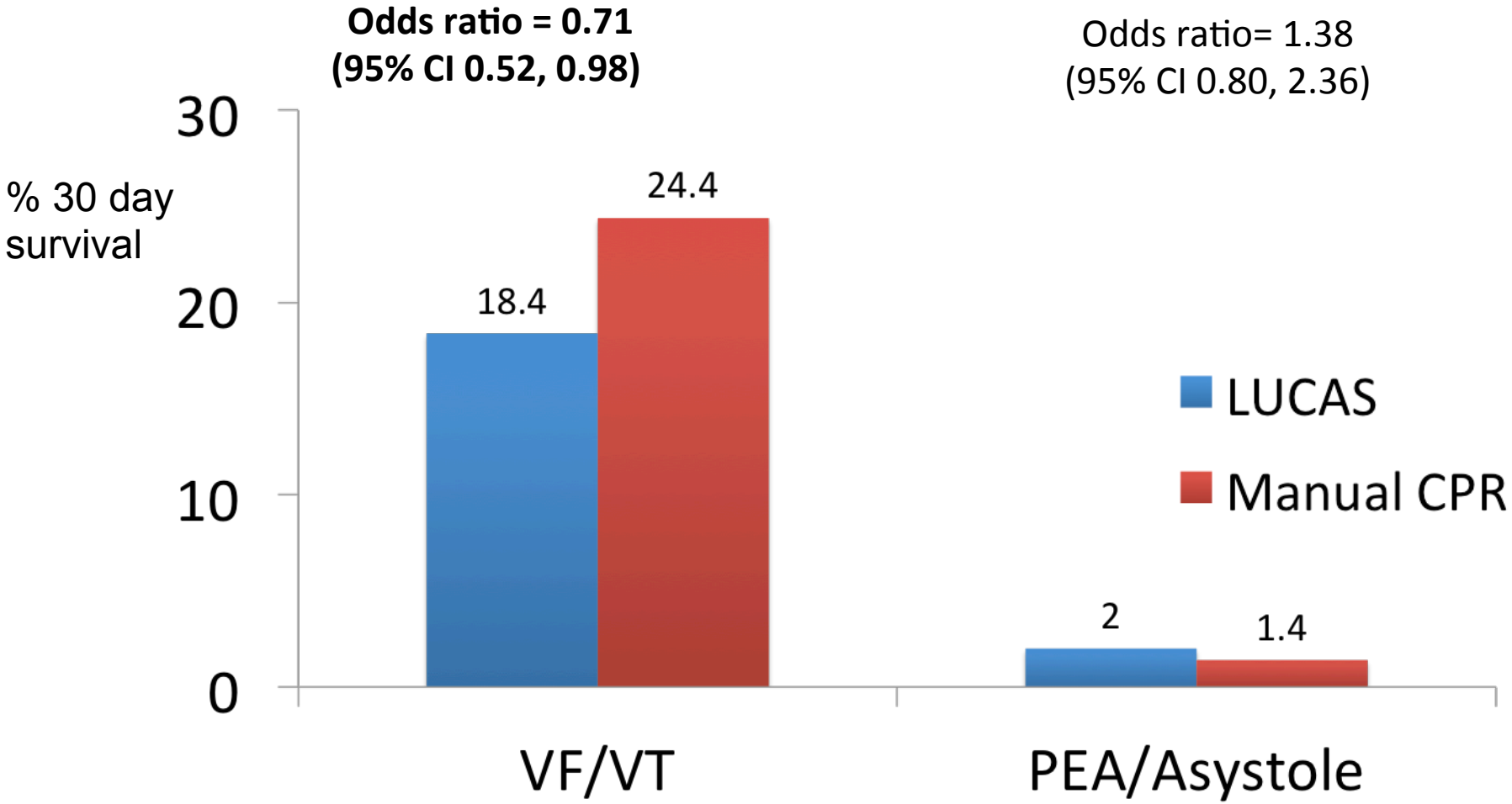
WARWICK
UNIVERSITY OF SURREY

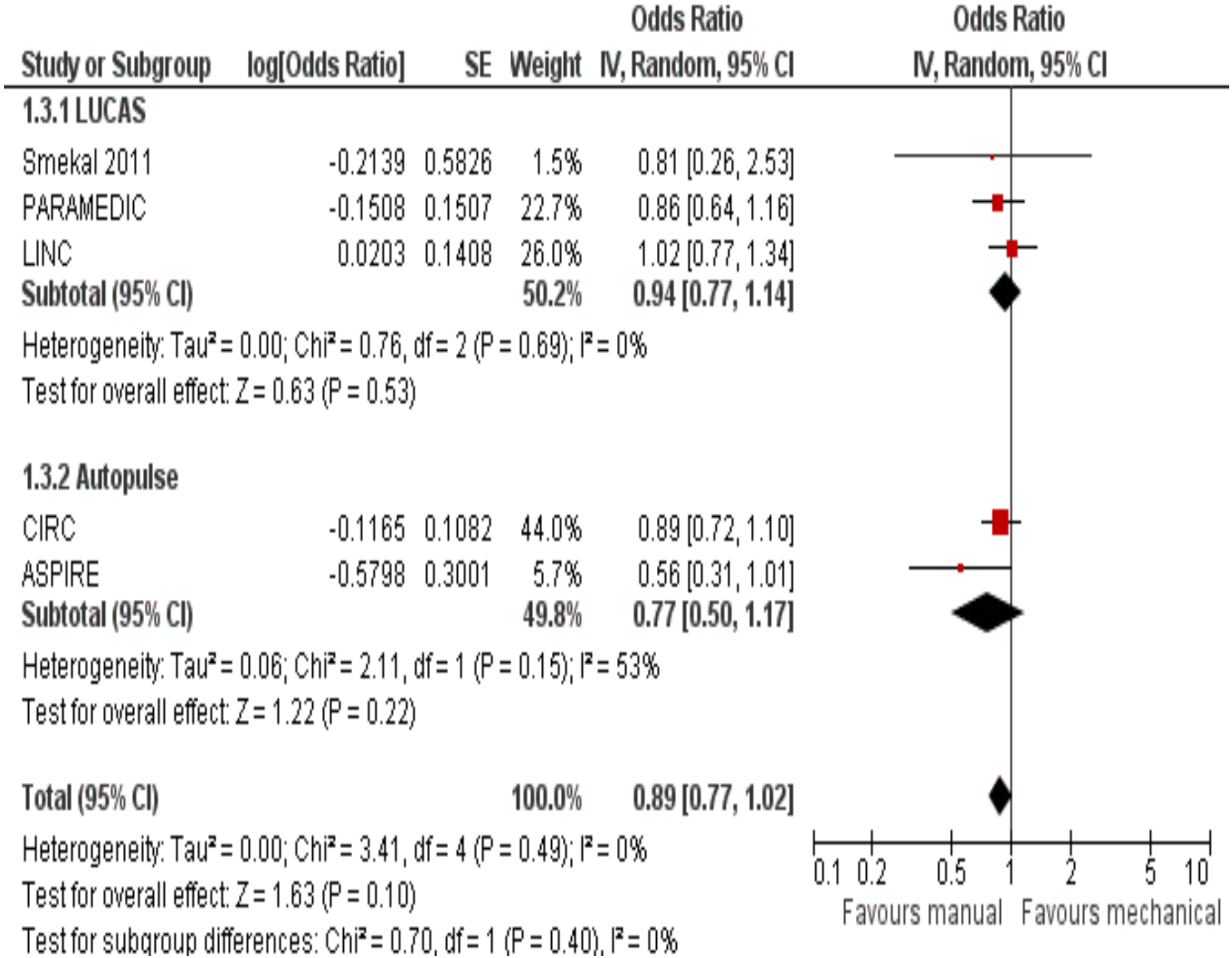
Secondary outcomes

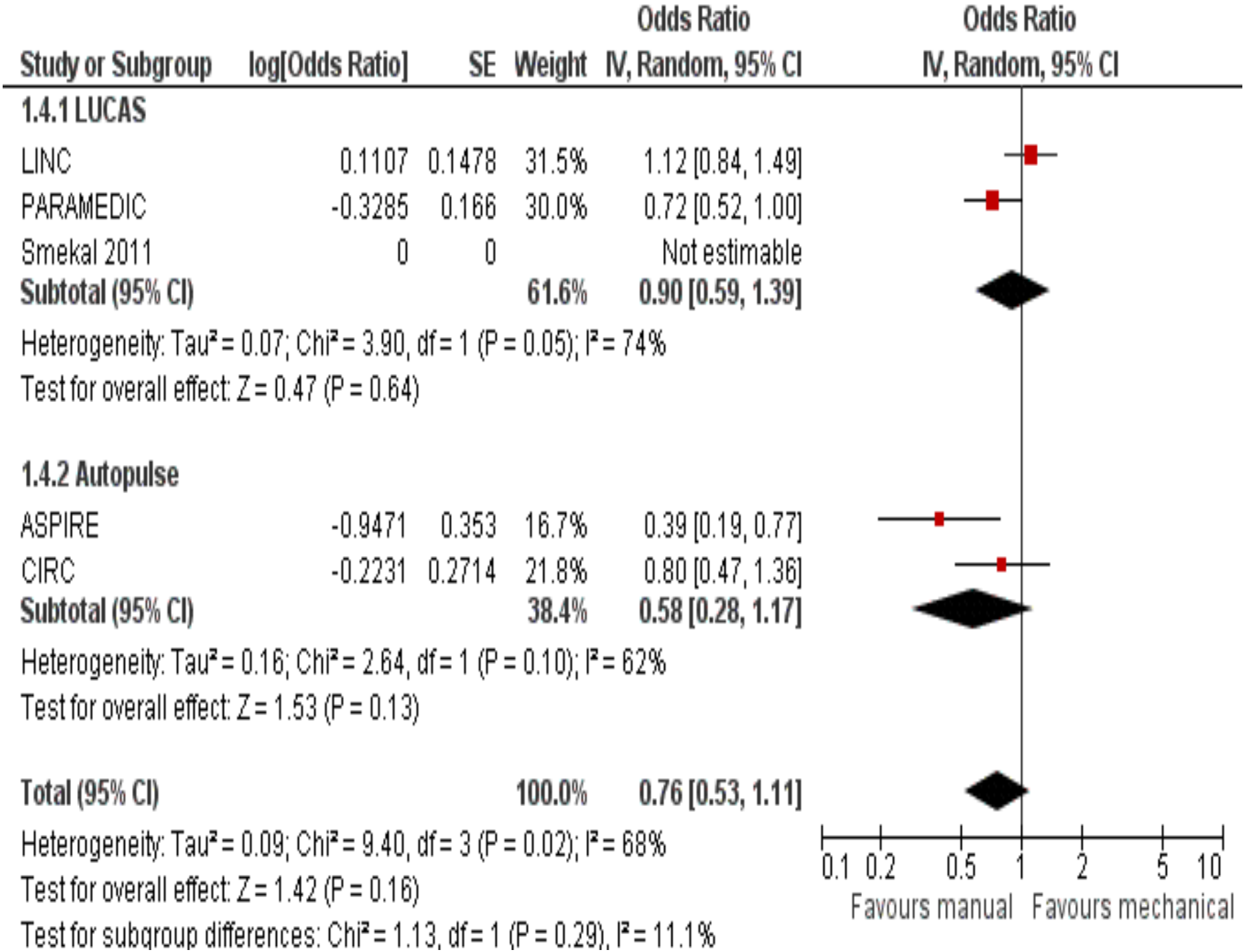
CPC Unadjusted odds ratio = 0.77 (95% CI = 0.59, 1.02) P=0.0667
CPC Adjusted odds ratio= 0.72 (95% CI = 0.52, 0.99) P=0.0459



Sub-group analysis (rhythm)




Study or Subgroup
log[Odds Ratio]
SE
Weight
Odds Ratio
IV, Random, 95% CI
Odds Ratio
IV, Random, 95% CI
1.3.1 LUCAS
Smekal 2011 -0.2139 0.5826 1.5% 0.81 [0.26, 2.53]
PARAMEDIC -0.1508 0.1507 22.7% 0.86 [0.64, 1.16]
LINC 0.0203 0.1408 26.0% 1.02 [0.77, 1.34]
Subtotal (95% CI) 50.2% 0.94 [0.77, 1.14]
Heterogeneity: Tau² = 0.00; Chi² = 0.76, df = 2 (P = 0.69); I² = 0%
Test for overall effect: Z = 0.63 (P = 0.53)
1.3.2 Autopulse
CIRC -0.1165 0.1082 44.0% 0.89 [0.72, 1.10]
ASPIRE -0.5798 0.3001 5.7% 0.56 [0.31, 1.01]
Subtotal (95% CI) 49.8% 0.77 [0.50, 1.17]
Heterogeneity: Tau² = 0.06; Chi² = 2.11, df = 1 (P = 0.15); I² = 53%
Test for overall effect: Z = 1.22 (P = 0.22)
Total (95% CI) 100.0% 0.89 [0.77, 1.02]
Heterogeneity: Tau² = 0.00; Chi² = 3.41, df = 4 (P = 0.49); I² = 0%
Test for overall effect: Z = 1.63 (P = 0.10)
Test for subgroup differences: Chi² = 0.70, df = 1 (P = 0.40), I² = 0%
0.1
0.2
0.5
1
2
5
10
Favours manual
Favours mechanical


Study or Subgroup
log[Odds Ratio]
SE
Weight
Odds Ratio
IV, Random, 95% CI
Odds Ratio
IV, Random, 95% CI
1.4.1 LUCAS
LINC 0.1107 0.1478 31.5% 1.12 [0.84, 1.49]
PARAMEDIC -0.3285 0.166 30.0% 0.72 [0.52, 1.00]
Smekal 2011 0 0 Not estimable
Subtotal (95% CI) 61.6% 0.90 [0.59, 1.39]
Heterogeneity: Tau² = 0.07; Chi² = 3.90, df = 1 (P = 0.05); I² = 74%
Test for overall effect: Z = 0.47 (P = 0.64)
1.4.2 Autopulse
ASPIRE -0.9471 0.353 16.7% 0.39 [0.19, 0.77]
CIRC -0.2231 0.2714 21.8% 0.80 [0.47, 1.36]
Subtotal (95% CI) 38.4% 0.58 [0.28, 1.17]
Heterogeneity: Tau² = 0.16; Chi² = 2.64, df = 1 (P = 0.10); I² = 62%
Test for overall effect: Z = 1.53 (P = 0.13)
Total (95% CI) 100.0% 0.76 [0.53, 1.11]
Heterogeneity: Tau² = 0.09; Chi² = 9.40, df = 3 (P = 0.02); I² = 68%
Test for overall effect: Z = 1.42 (P = 0.16)
Test for subgroup differences: Chi² = 1.13, df = 1 (P = 0.29), I² = 11.1%
0.1 0.2 0.5 1 2 5 10
Favours manual
Favours mechanical

A role for mechanical CPR devices?

- Routine use not recommended
- Consider if manual CPR impractical
  - Prolonged CPR
  - EMS transport
  - PCI
  - Bridge to other interventions (e-CPR, organ donation)

Adrenaline for cardiac arrest

AN EXPERIMENTAL RESEARCH INTO THE RESUSCITATION OF DOGS KILLED BY ANESTHETICS AND ASPHYXIA.

By GEORGE CRILE, M.D., AND DAVID H. DOLLEY, M.D.

(*From the Laboratory of Surgical Physiology, Western Reserve Medical School, Cleveland.*)

Plates XLII–XLIX.

In a previous communication by one of us (Crile) resuscitation was attempted by means of both direct and indirect cardiac massage, with and without artificial respiration, with and without intravenous saline infusion, and with and without the addition of adrenalin. The results of these experiments may be summarized as follows: By cardiac massage alone animals were rarely resuscitated at any time after quiescence of the circulation and respiration; by combining either direct or indirect cardiac massage with artificial respiration and the head-down posture a certain percentage of the animals were recovered after the lapse of from one to three minutes. The results, however, were quite uncertain, and in the case of death from chloroform recovery was the exception. By adding to cardiac massage artificial respiration and intravenous saline infusion, resuscitations were in a slightly greater proportion successful. The same procedures, with the addition of adrenalin to the intravenous saline infusion, were markedly more successful in the deaths from asphyxia through rarely so in the cases of death from chloroform. It required in almost every instance a vigorous compression of the thorax over the heart for a considerable time, varying from five to ten minutes, before resuscitation could be accomplished. Even then there were a considerable number of failures. In the majority of these failures autopsy showed

1906

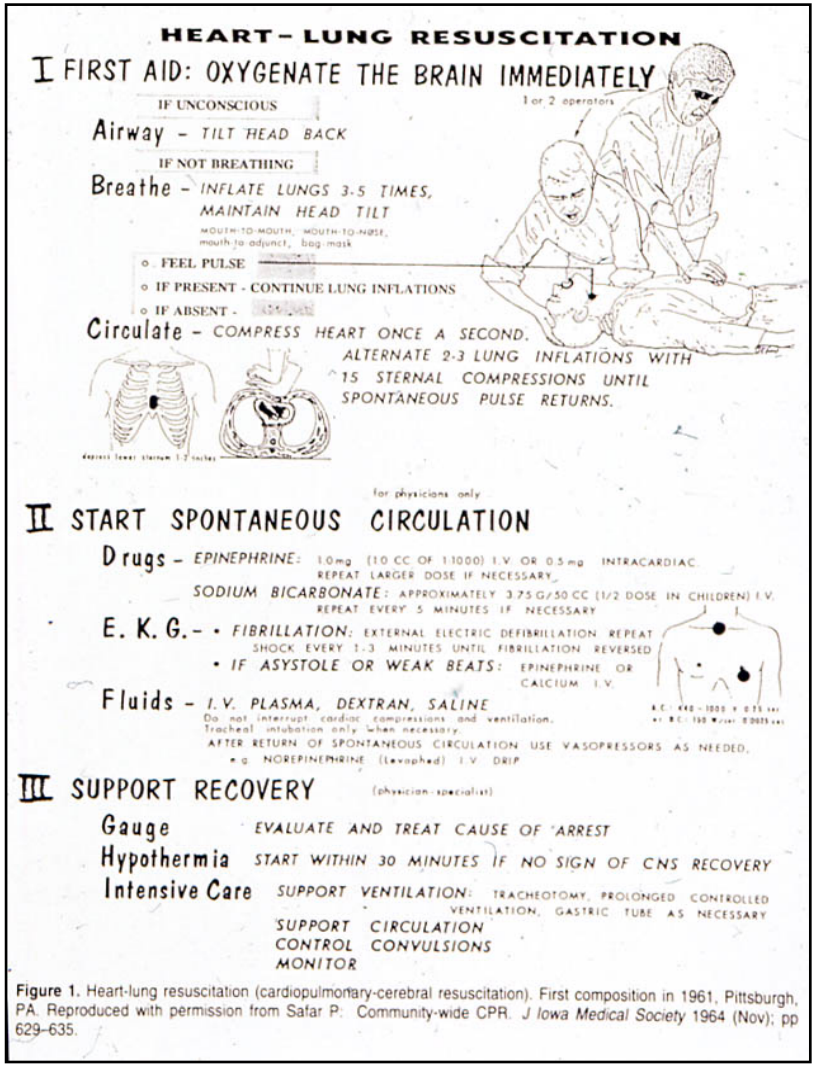
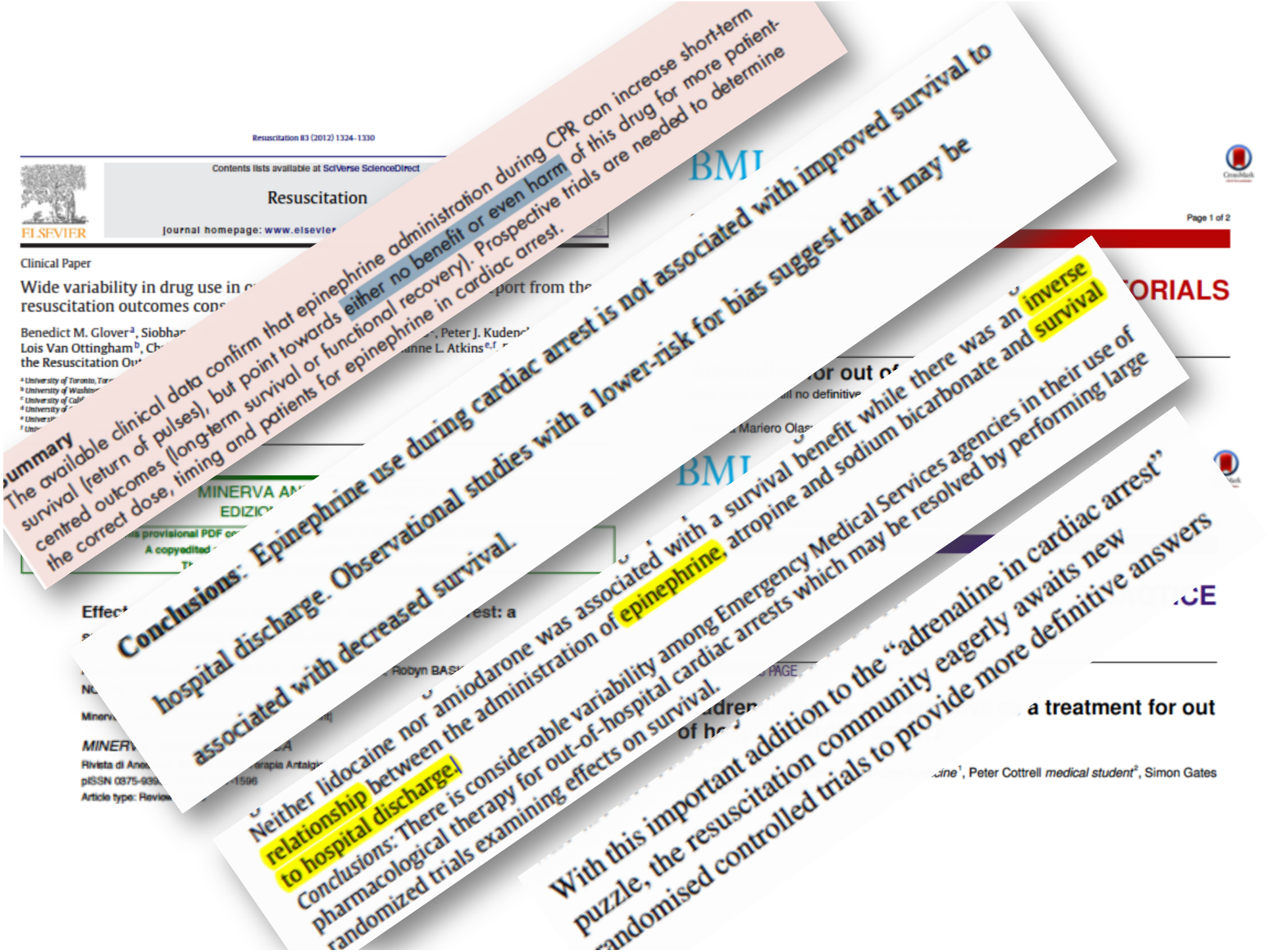


Figure 1. Heart-lung resuscitation (cardiopulmonary-cerebral resuscitation). First composition in 1961, Pittsburgh, PA. Reproduced with permission from Safar P. Community-wide CPR. *J Iowa Medical Society* 1964 (Nov); pp 629–635.

1961

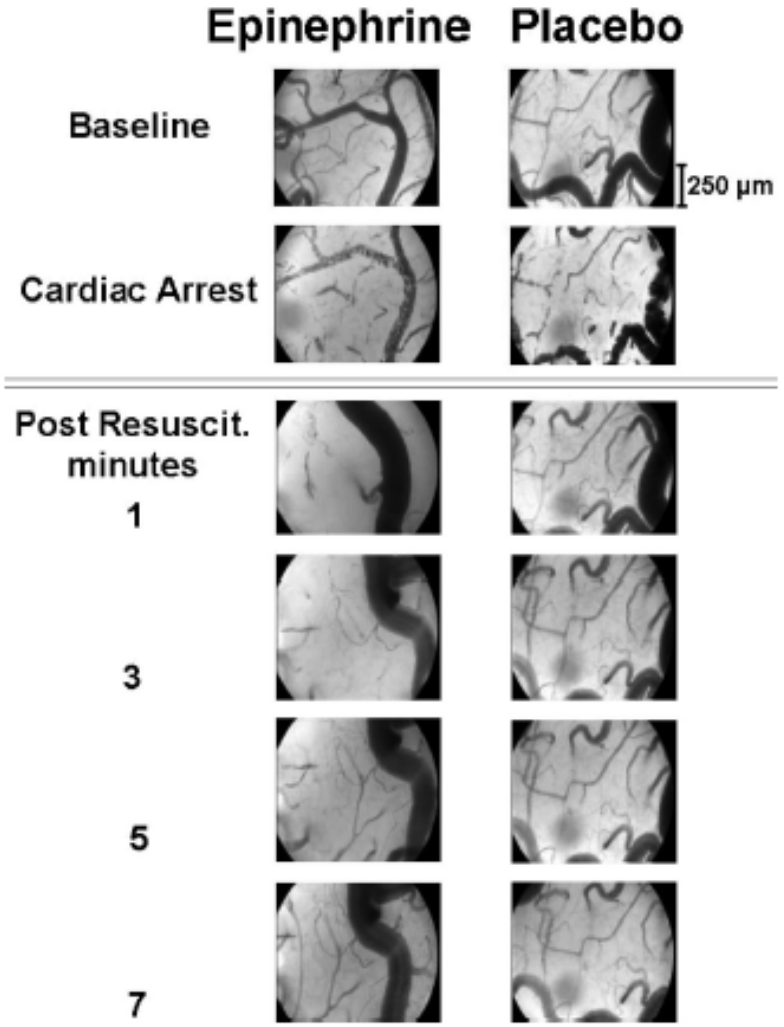

Resuscitation 83 (2012) 1324–1330
Contents lists available at SciVerse ScienceDirect
Resuscitation
Journal homepage: www.elsevier
ELSEVIER
Clinical Paper
Wide variability in drug use in
resuscitation outcomes
Benedict M. Glover
Lois Van Ottingham
the Resuscitation
Peter J. Kuden
Anne L. Atkins
Summary
The available clinical data confirm that epinephrine administration during CPR can increase short-term survival (return of pulses), but point towards either no benefit or even harm of this drug for more patient-centred outcomes (long-term survival or functional recovery). Prospective trials are needed to determine the correct dose, timing and patients for epinephrine in cardiac arrest.
BMJ
Conclusions: Epinephrine use during cardiac arrest is not associated with improved survival to hospital discharge. Observational studies with a lower-risk for bias suggest that it may be associated with decreased survival.
Page 1 of 2
Neither lidocaine nor amiodarone was associated with a survival benefit while there was an inverse relationship between the administration of epinephrine, atropine and sodium bicarbonate and survival to hospital discharge.
Conclusions: There is considerable variability among Emergency Medical Services agencies in their use of pharmacological therapy for out-of-hospital cardiac arrests which may be resolved by performing large randomized trials examining effects on survival.
With this important addition to the "adrenaline in cardiac arrest" puzzle, the resuscitation community eagerly awaits new randomised controlled trials to provide more definitive answers
a treatment for out
Peter Cottrell medical student
Simon Gates

Epinephrine reduces cerebral perfusion during cardiopulmonary resuscitation*

Crit Care Med 2009;37:1408-15

Giuseppe Ristagno, MD; Wanchun Tang, MD, FCCM; Lei Huang, MD; Alain Fymat, MD; Yun-Te Chang, MD; Shijie Sun, MD, FCCM; Carlos Castillo, MSEE; Max Harry Weil, MD, PhD, FCCM

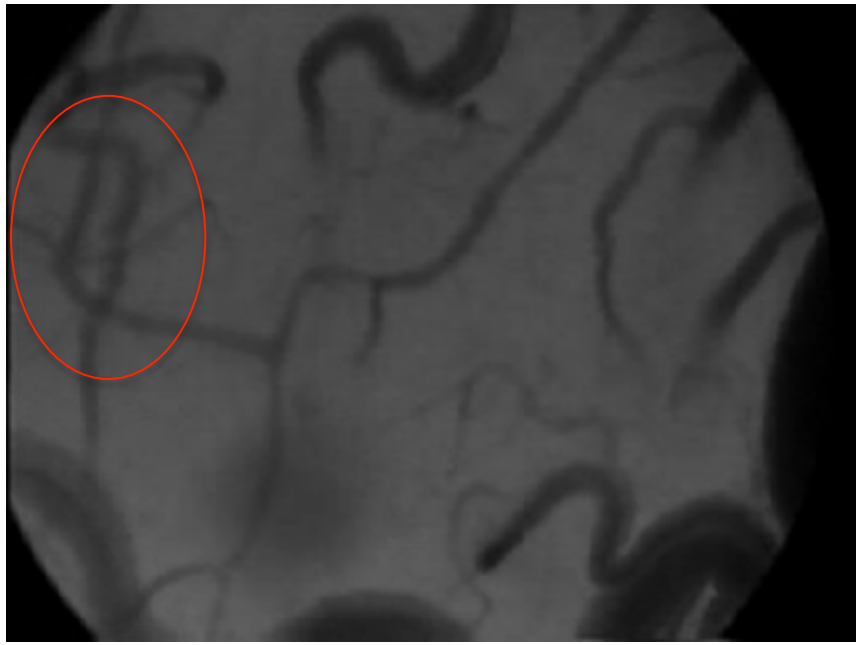
- Pig study
- Cerebral oxygen tension (PbO_2) and microcirculatory imaging
- Adrenaline increased arterial pressure but reduced PbO_2 and microcirculatory flow.



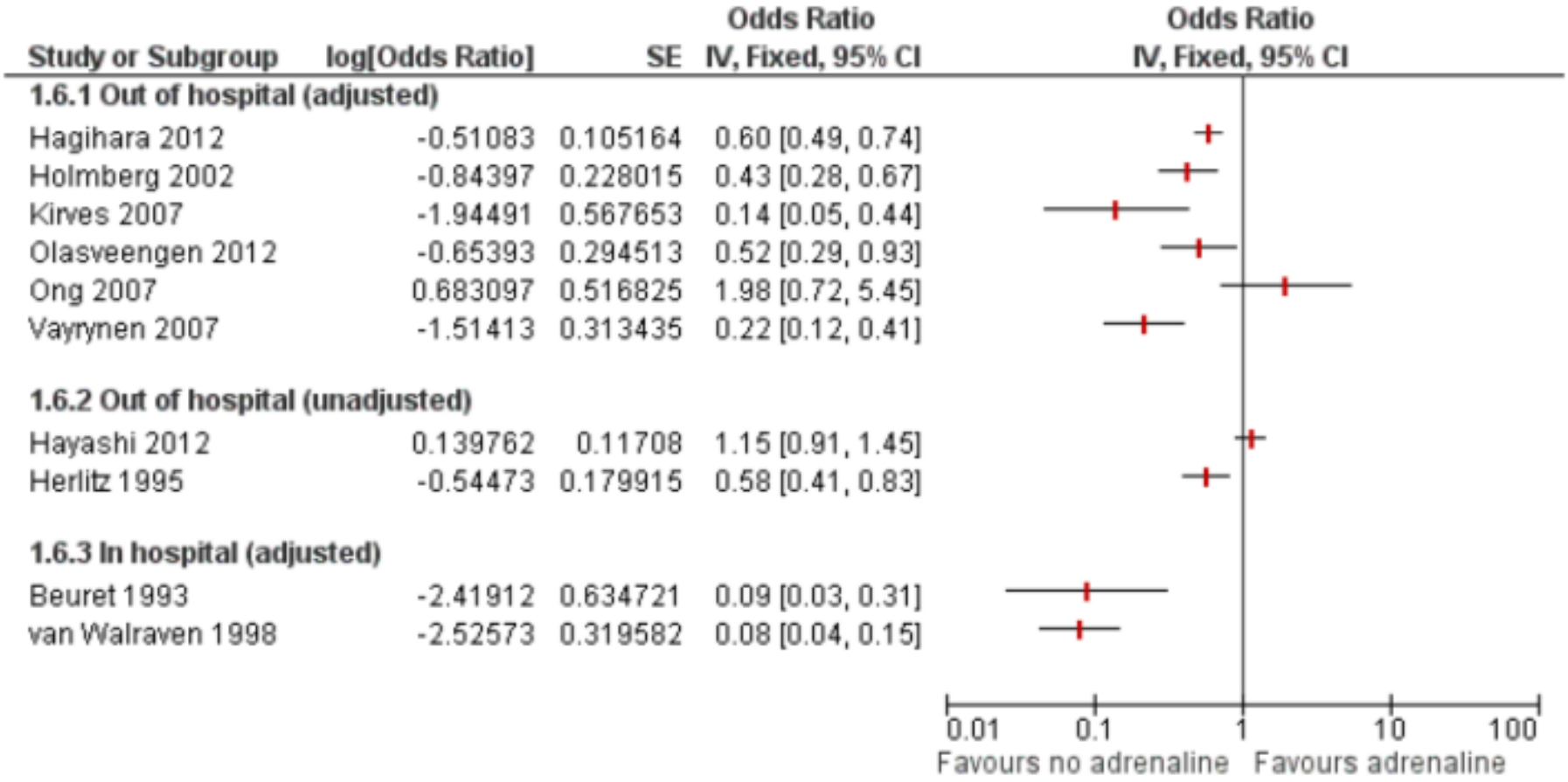
Blood flow 3 min after ROSC

Adrenaline arm

Saline (placebo) arm



Films courtesy of Giuseppe Ristagno,


Study or Subgroup
log[Odds Ratio]
SE
Odds Ratio
IV, Fixed, 95% CI
Odds Ratio
IV, Fixed, 95% CI
1.6.1 Out of hospital (adjusted)
Hagihara 2012 -0.51083 0.105164 0.60 [0.49, 0.74]
Holmberg 2002 -0.84397 0.228015 0.43 [0.28, 0.67]
Kirves 2007 -1.94491 0.567653 0.14 [0.05, 0.44]
Olasveengen 2012 -0.65393 0.294513 0.52 [0.29, 0.93]
Ong 2007 0.683097 0.516825 1.98 [0.72, 5.45]
Vayrynen 2007 -1.51413 0.313435 0.22 [0.12, 0.41]
1.6.2 Out of hospital (unadjusted)
Hayashi 2012 0.139762 0.11708 1.15 [0.91, 1.45]
Herlitz 1995 -0.54473 0.179915 0.58 [0.41, 0.83]
1.6.3 In hospital (adjusted)
Beuret 1993 -2.41912 0.634721 0.09 [0.03, 0.31]
van Walraven 1998 -2.52573 0.319582 0.08 [0.04, 0.15]
0.01
0.1
1
10
100
Favours no adrenaline
Favours adrenaline

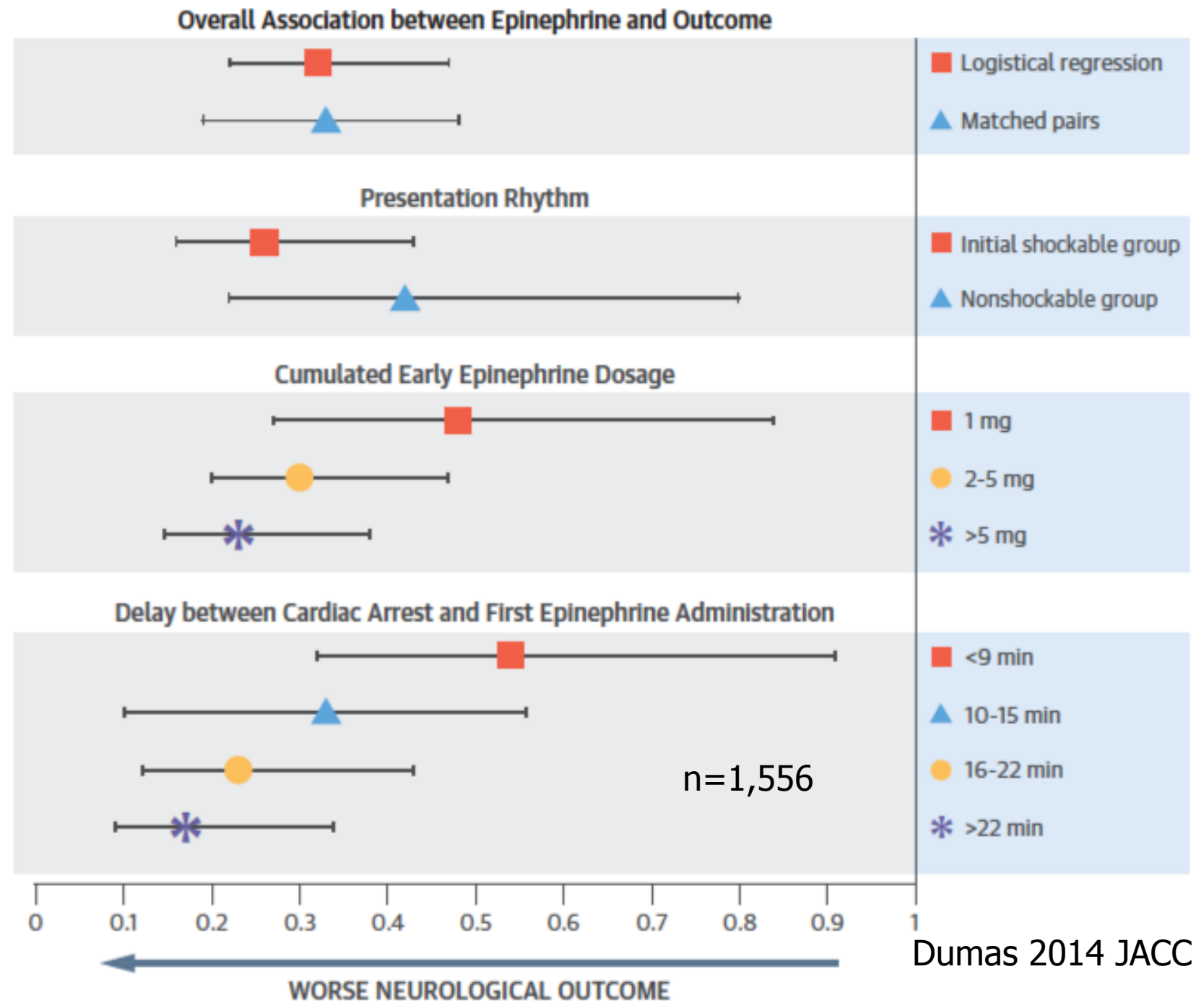
Prehospital Epinephrine Use and Survival Among Patients With Out-of-Hospital Cardiac Arrest

Hagihara A. JAMA 2012;307:1161-8

Whole of Japan - 2005 -2008
417 188 cases analysed; 15 030 received epinephrine;
13 401 propensity-matched pairs

Table 4. Conditional Logistic Regression Analyses of Outcome in Epinephrine Group (vs No-Epinephrine Group) Among Propensity-Matched Patients With Out-of-Hospital Cardiac Arrest (n = 26 802)

	Odds Ratio (95% CI)[a]			
Analysis	ROSC	1-Month Survival	CPC 1 or 2	OPC 1 or 2
Unadjusted	1.91 (1.78-2.05)	0.71 (0.64-0.79)	0.41 (0.34-0.49)	0.43 (0.36-0.51)
Adjusted for propensity	2.01 (1.83-2.21)	0.71 (0.62-0.81)	0.41 (0.33-0.52)	0.43 (0.34-0.54)
Adjusted for propensity and selected variables[b]	2.24 (2.03-2.48)	0.60 (0.49-0.74)	0.40 (0.26-0.63)	0.43 (0.28-0.66)
Adjusted for propensity and all covariates[c]	2.51 (2.24-2.80)	0.54 (0.43-0.68)	0.21 (0.10-0.44)	0.23 (0.11-0.45)



Dumas 2014 JACC

Prehospital Assessment of the Role of Adrenaline: Measuring the Effectiveness of Drug administration In Cardiac arrest

- Placebo versus adrenaline in out-of-hospital cardiac arrest
- Primary end point 30-day survival
- Target sample size = 8000
- Pilot started Dec 2014

Warwick Medical School
CLINICAL TRIALS UNIT

PARAMEDIC2
The Adrenaline Trial

NHS
National Institute for Health Research

ROC

Population

Persistent or recurrent VF/VT* after ≥1 shock

Vascular Access

Intervention

RANDOMIZE

Amiodarone

Lidocaine

Neither (saline placebo)

Outcome

SURVIVAL TO HOSPITAL DISCHARGE

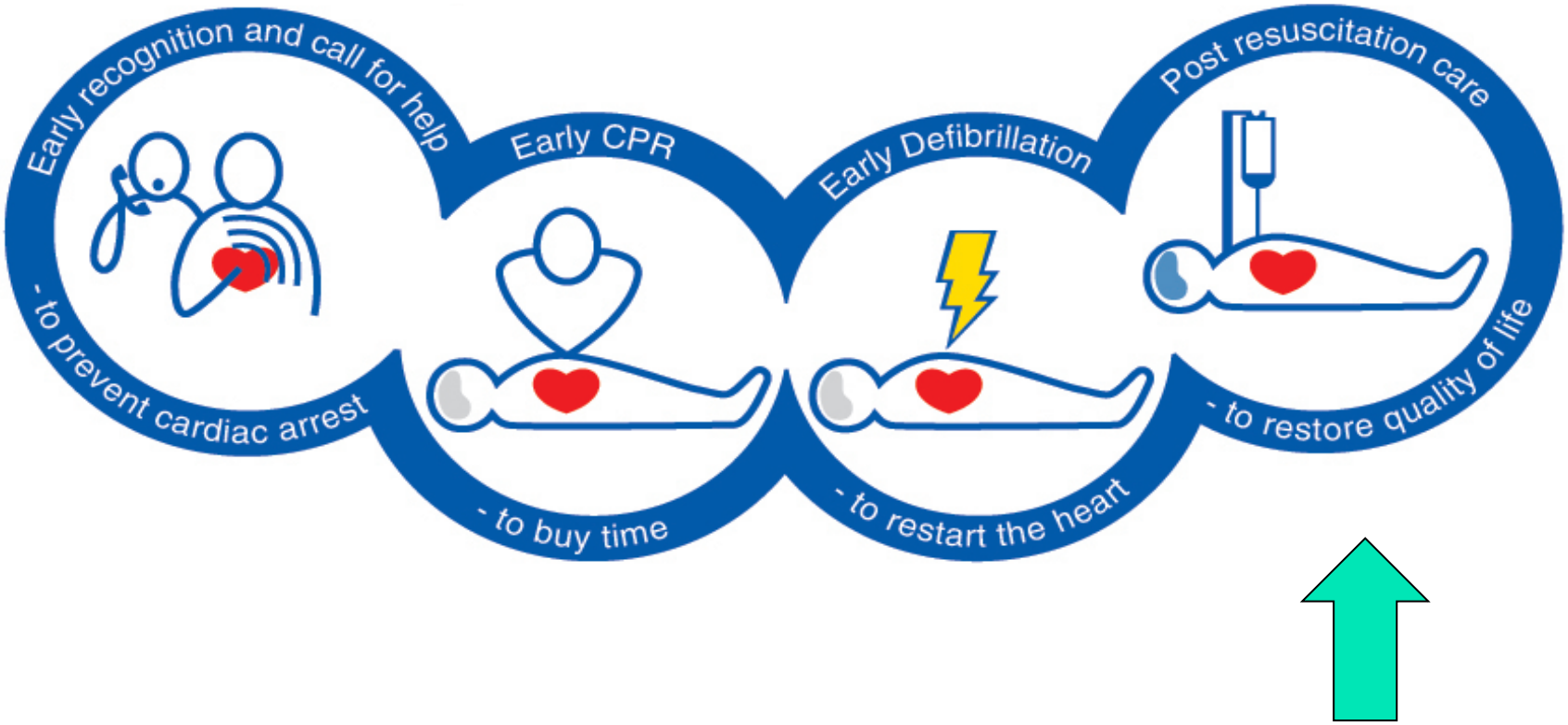
ROC ALPS

Amiodarone, Lidocaine, or Placebo Study

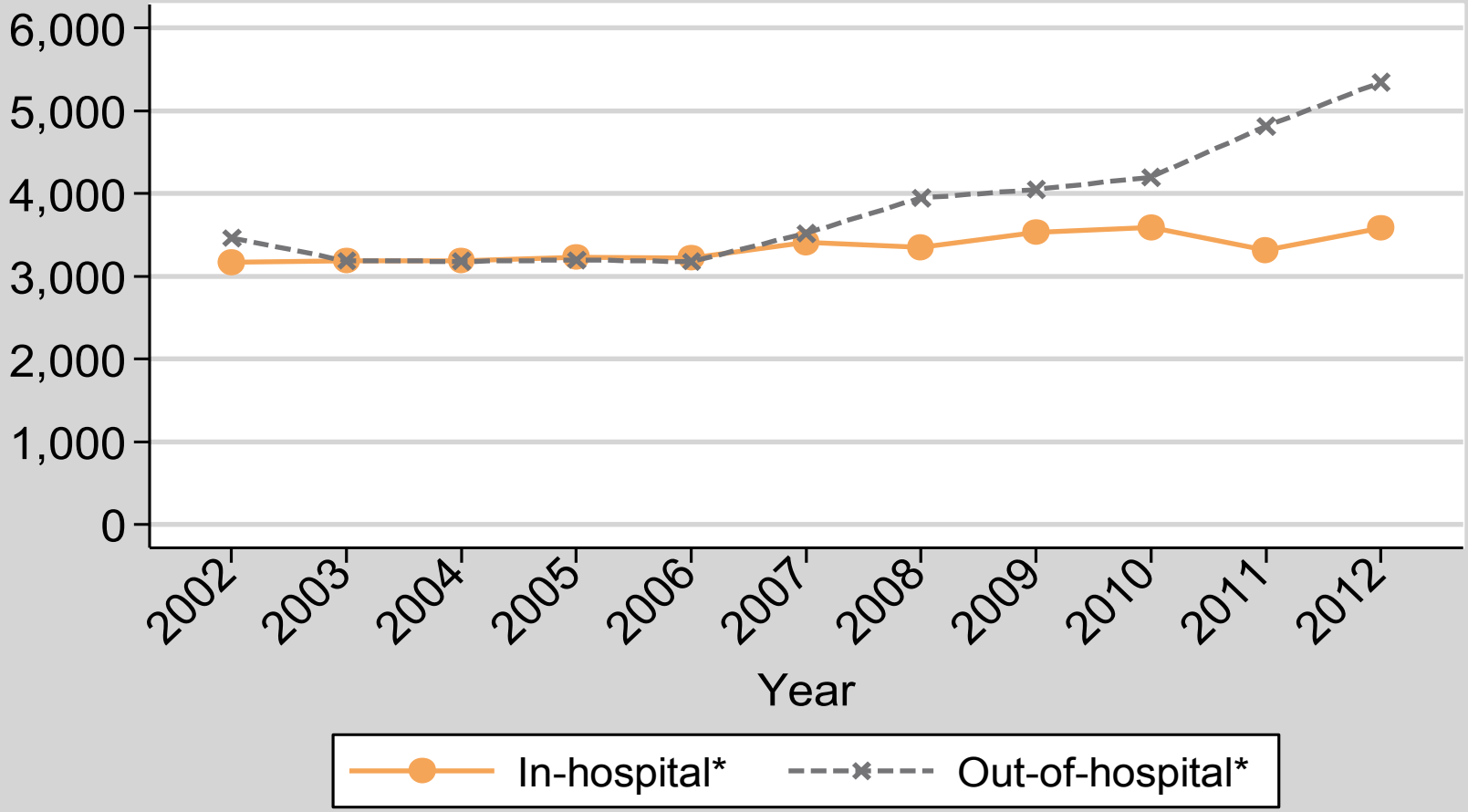
Version 24: Rev. 2012-4-24

RESUSCITATION OUTCOMES CONSORTIUM

Chain of survival

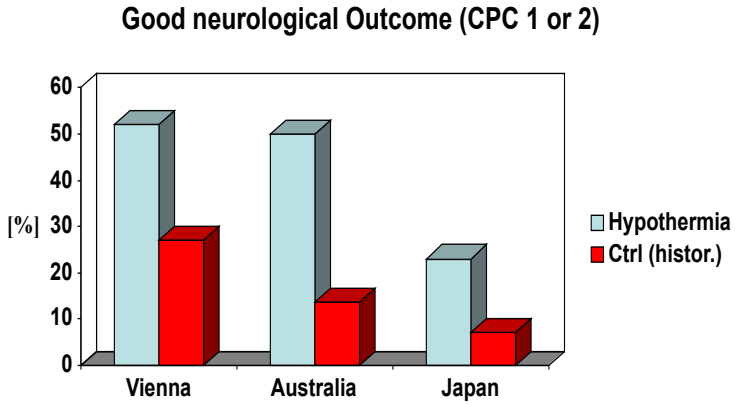


Admissions following cardiac arrest

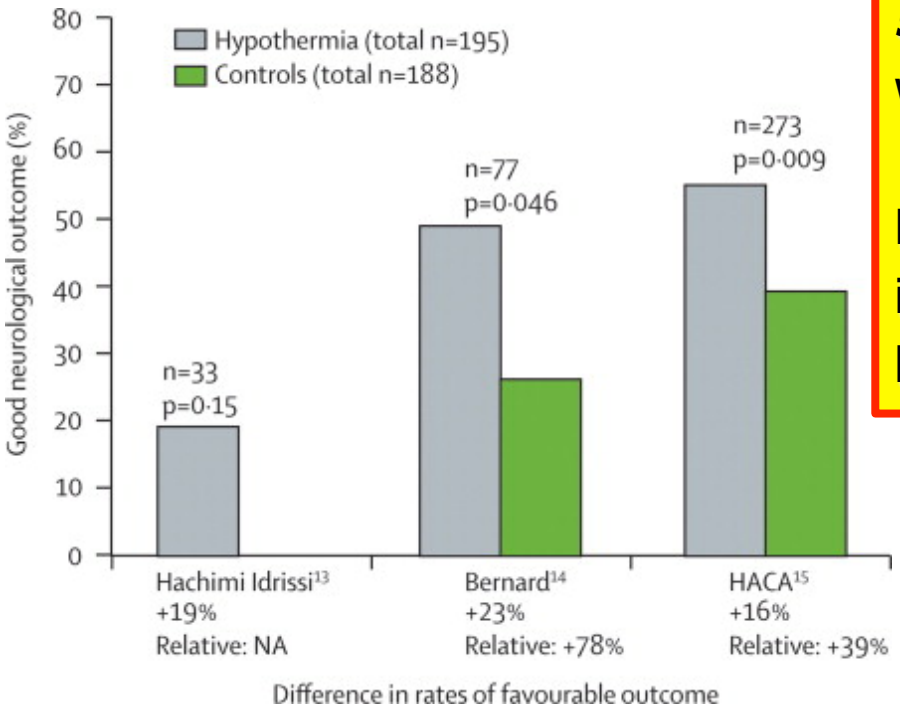


* location of cardiac arrest is approximated using location immediately prior to critical care admission

TH - clinical studies



Zeiner et al. Stroke 2000;31:86-94
Bernard et al. Ann Emerg Med 1997;30:146-153
Yanagawa et al. Resuscitation 1998;39:61-66



ILCOR Advisory Statement (2003)

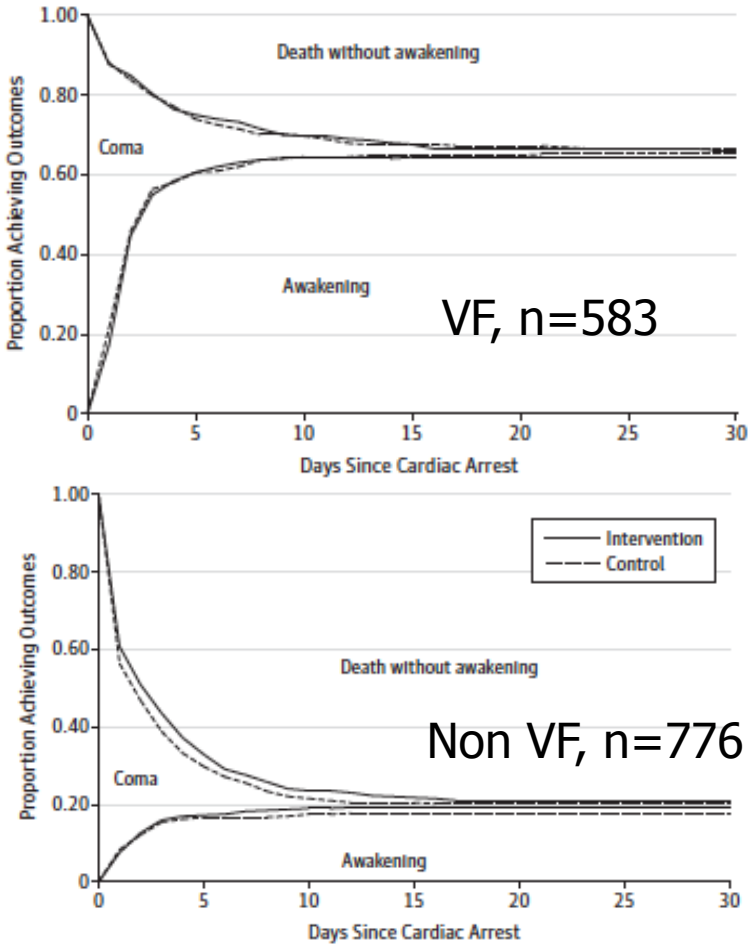
Unconscious adult patients with spontaneous circulation after out-of-hospital cardiac arrest ***should be cooled*** to 32-34°C for 12-24 hrs when the initial rhythm was VF.

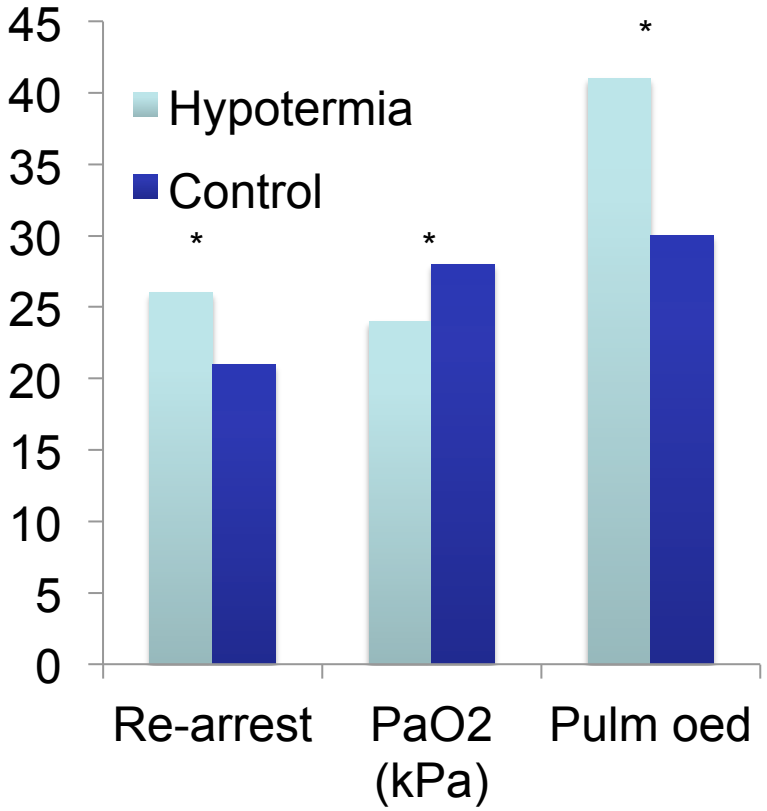
For any other rhythm, or cardiac arrest inhospital, such cooling may also be beneficial.

Original Investigation

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

A Randomized Clinical Trial





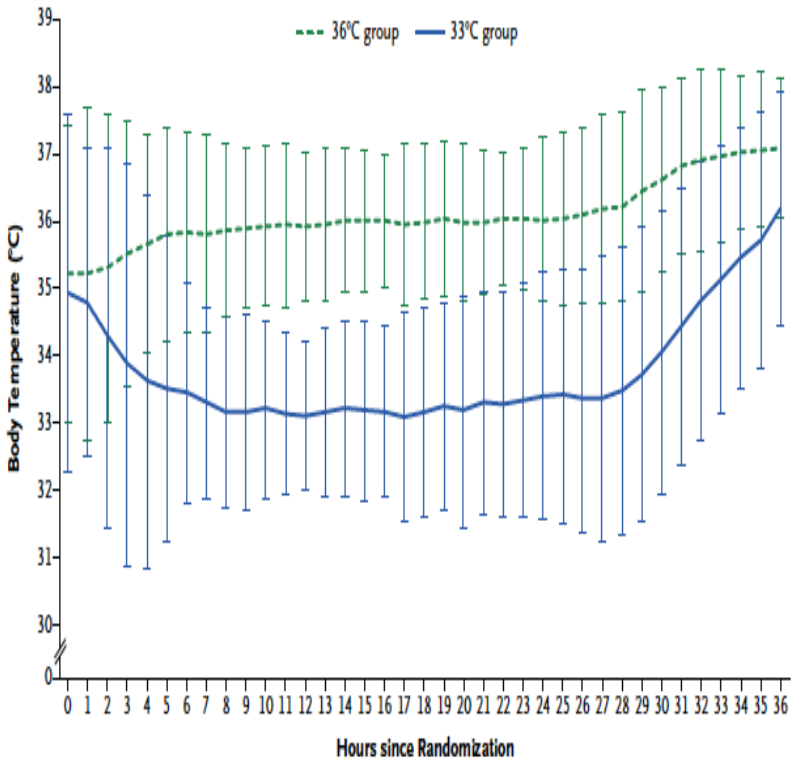
2L Ice cold saline

* P < 0.05

ORIGINAL ARTICLE

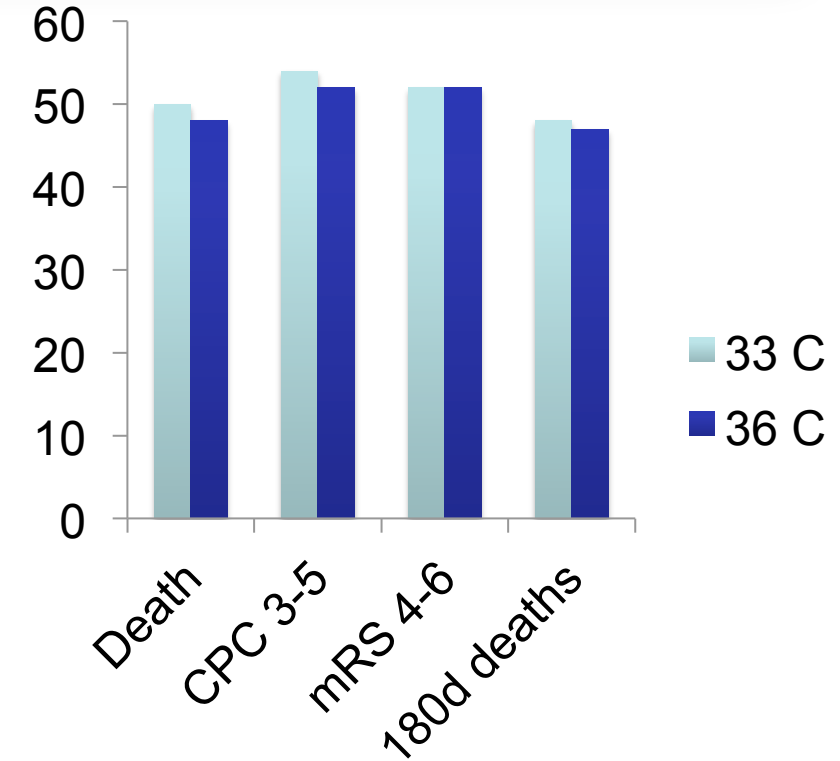
Targeted Temperature Management at 33°C versus 36°C after Cardiac Arrest

Niklas Nielsen, M.D., Ph.D., Jørn Wetterslev, M.D., Ph.D., Tobias Cronberg, M.D., Ph.D.,



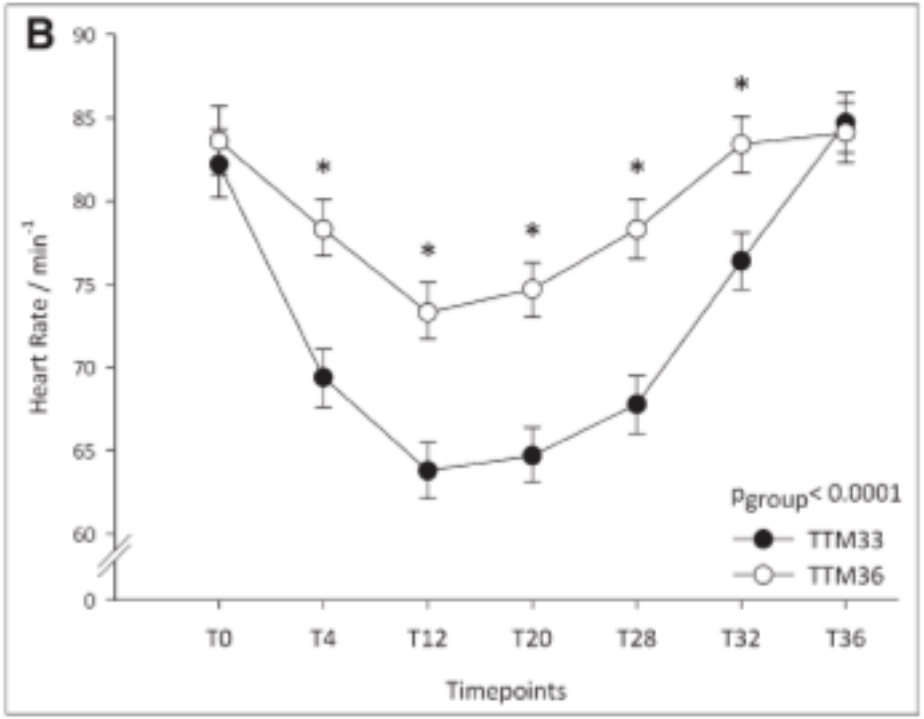
n=466

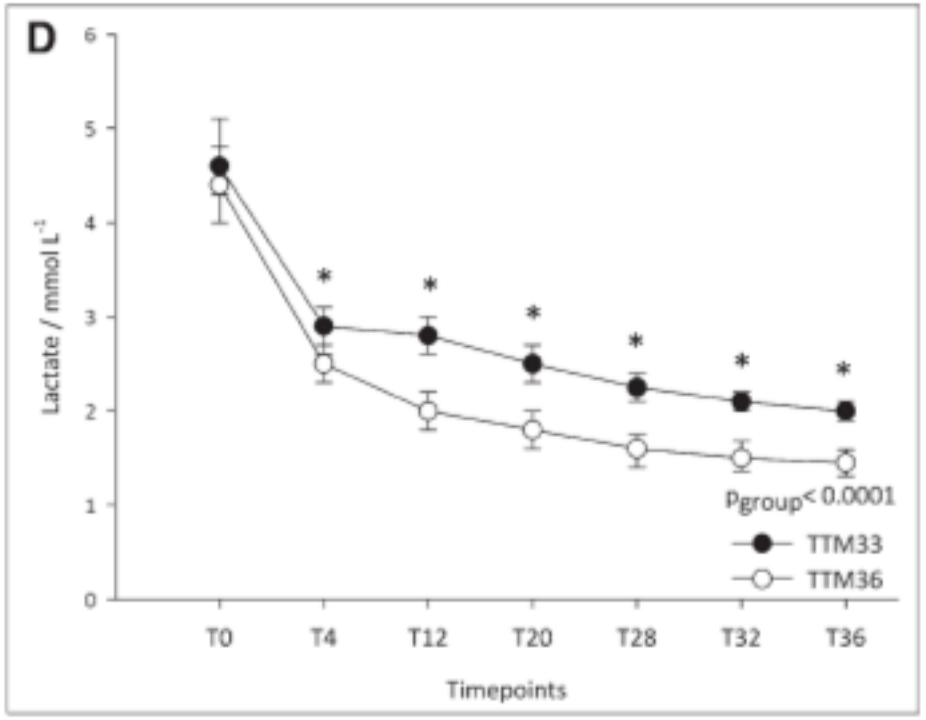
n=473



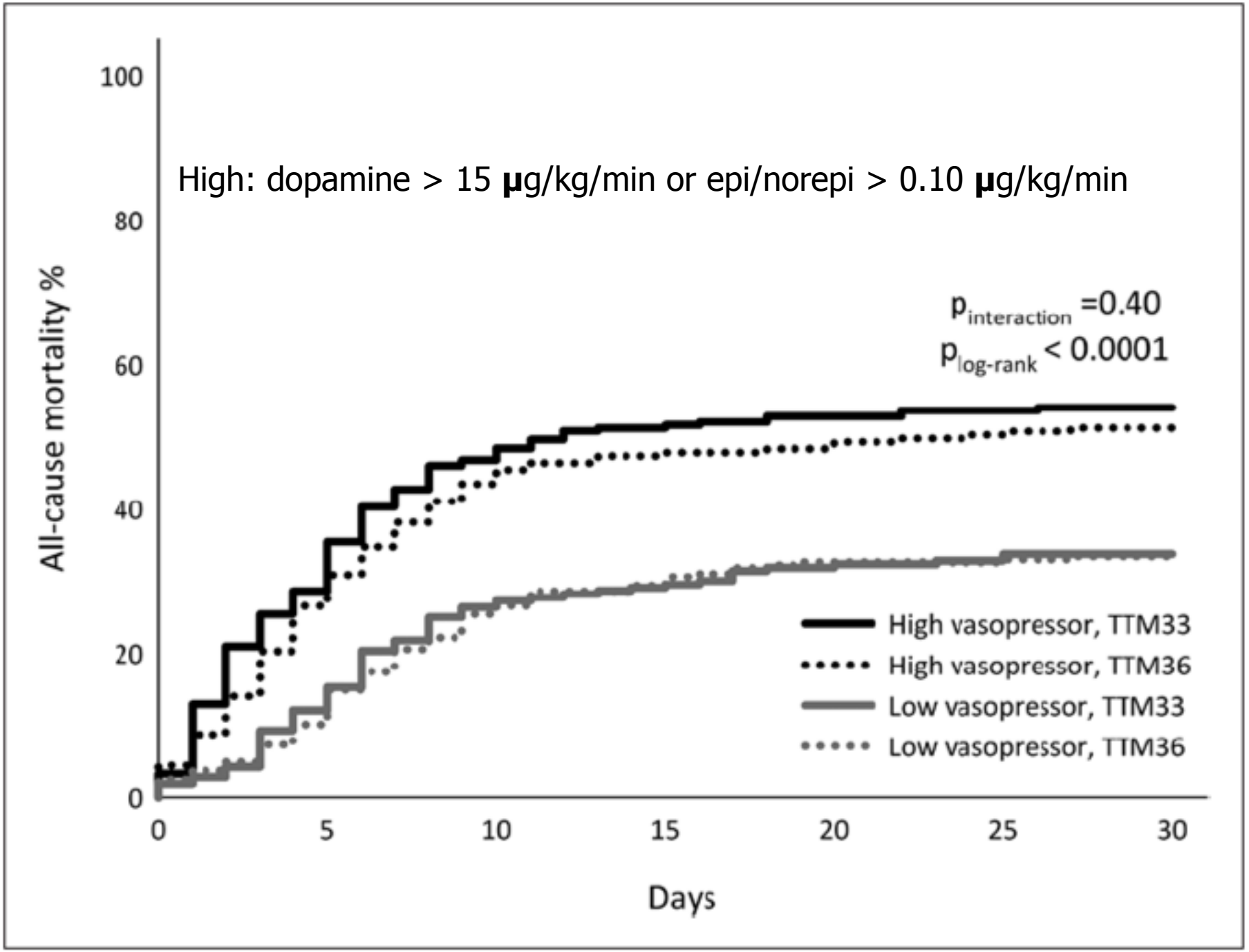
Death at discharge OR 1.06 (0.89-1.28)

Hemodynamics and Vasopressor Support During Targeted Temperature Management at 33°C Versus 36°C After Out-of-Hospital Cardiac Arrest: A Post Hoc Study of the Target Temperature Management Trial*





Critical Care Medicine In press


High: dopamine > 15 µg/kg/min or epi/norepi > 0.10 µg/kg/min
$p_{interaction}$ =0.40
$p_{log\text{-}rank}$ < 0.0001
All-cause mortality %
100
80
60
40
20
0
0
5
10
15
20
25
30
Days
High vasopressor, TTM33
High vasopressor, TTM36
Low vasopressor, TTM33
Low vasopressor, TTM36

Interpretation

- Consider targeted temperature management in comatose survivors of out of hospital cardiac arrest
- Temperature target 33 or 35 acceptable
- Avoid pyrexia
- Delay prognostication until 72 hours

Intensive Care Med (2014) 40:1816–1831
DOI 10.1007/s00134-014-3470-x

CONFERENCE REPORTS AND EXPERT PANEL

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Alain Cariou
Fabio Cavallaro
Tobias Cronberg
Hans Friberg
Cornelia Hoedemaekers
Janneke Horn
Jerry P. Nolan
Andrea O. Rossetti
Jasmeet Soar

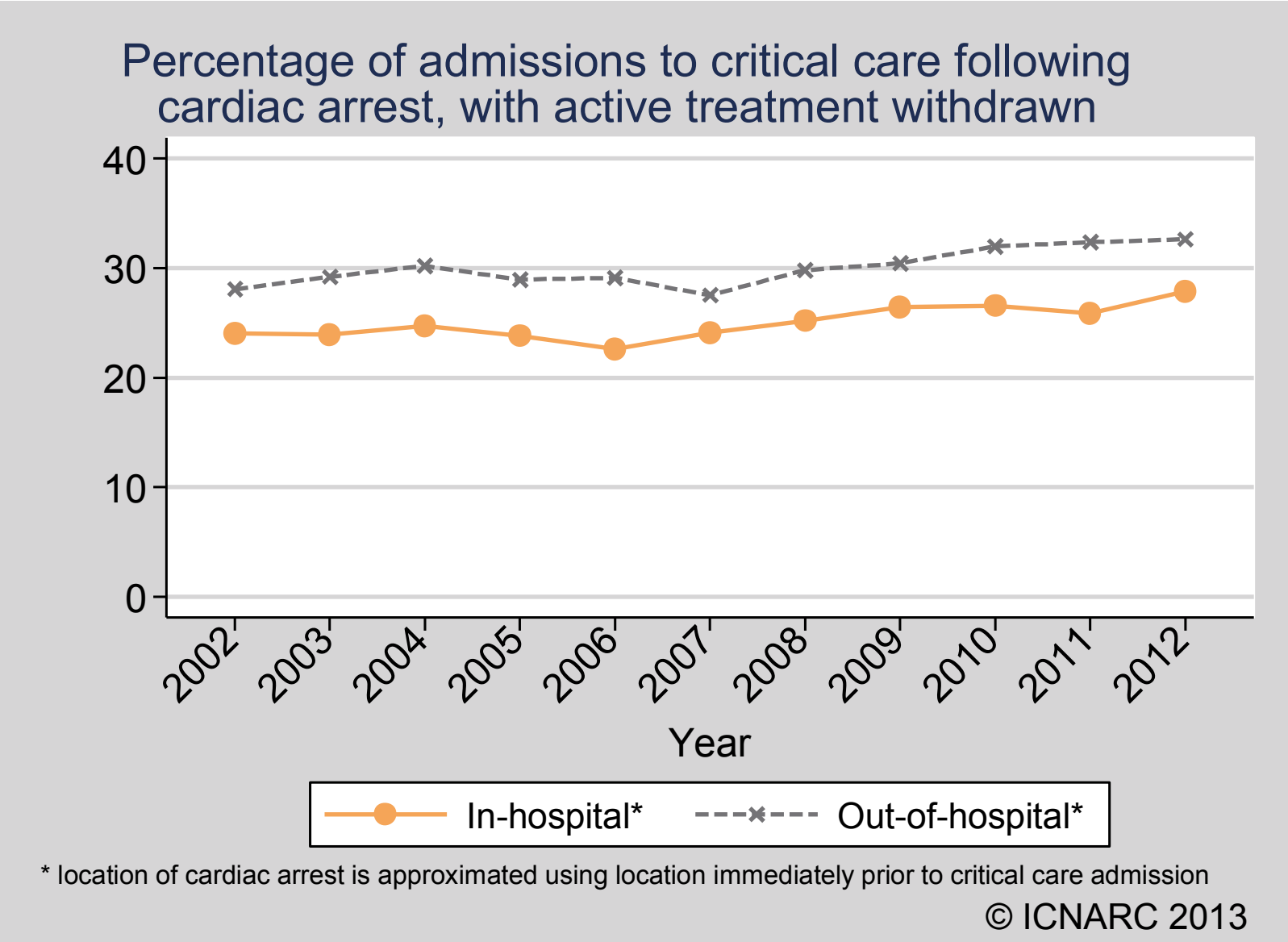
Prognostication in comatose survivors of cardiac arrest: An advisory statement from the European Resuscitation Council and the European Society of Intensive Care Medicine

Prognostication in comatose survivors of cardiac arrest: An advisory statement from the European Resuscitation Council and the European Society of Intensive Care Medicine☆

Claudio Sandroni[a,*], Alain Cariou[b], Fabio Cavallaro[a], Tobias Cronberg[c], Hans Friberg[d], Cornelia Hoedemaekers[e], Janneke Horn[f], Jerry P. Nolan[g], Andrea O. Rossetti[h], Jasmeet Soar[i]

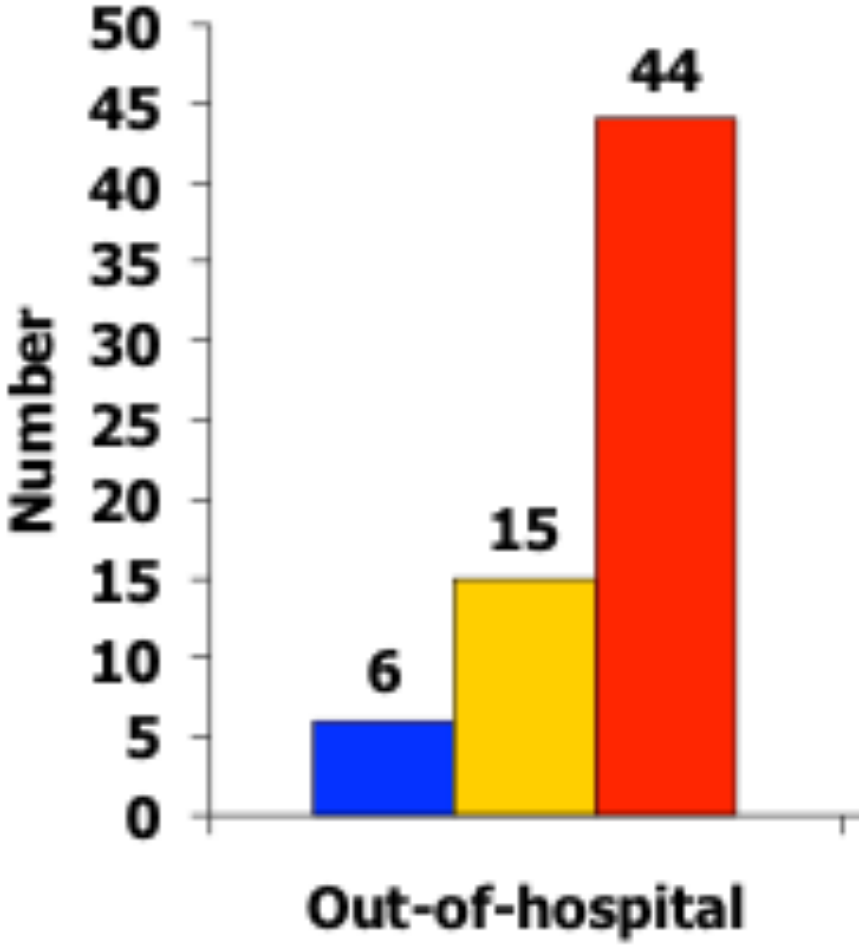
Resuscitation 2014;85:1779-89

Active treatment withdrawn

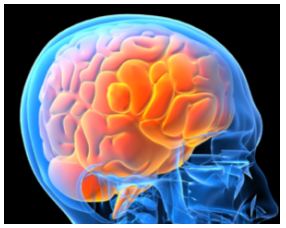


* location of cardiac arrest is approximated using location immediately prior to critical care admission

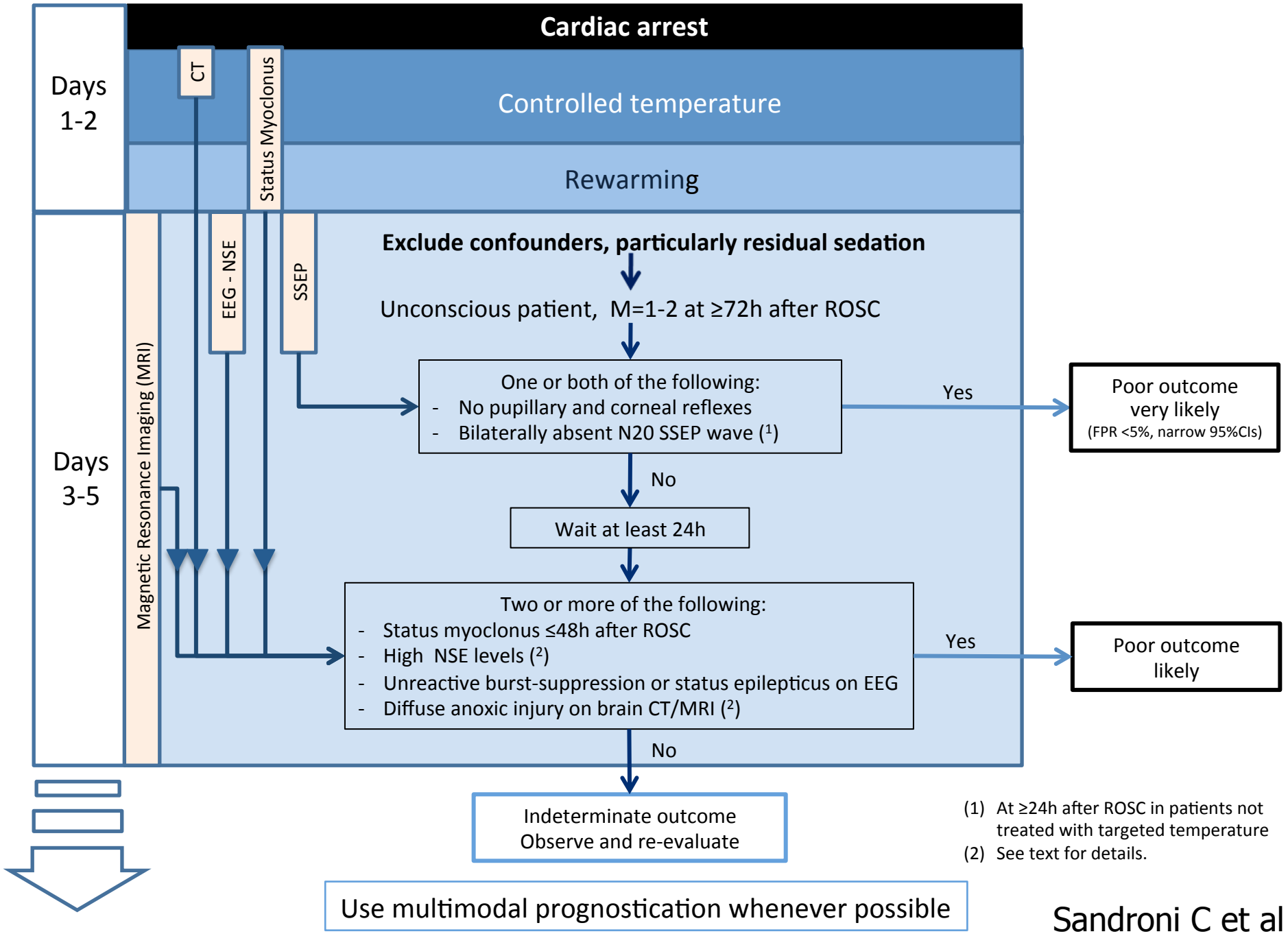
Treatment withdrawn in ITU – 30%



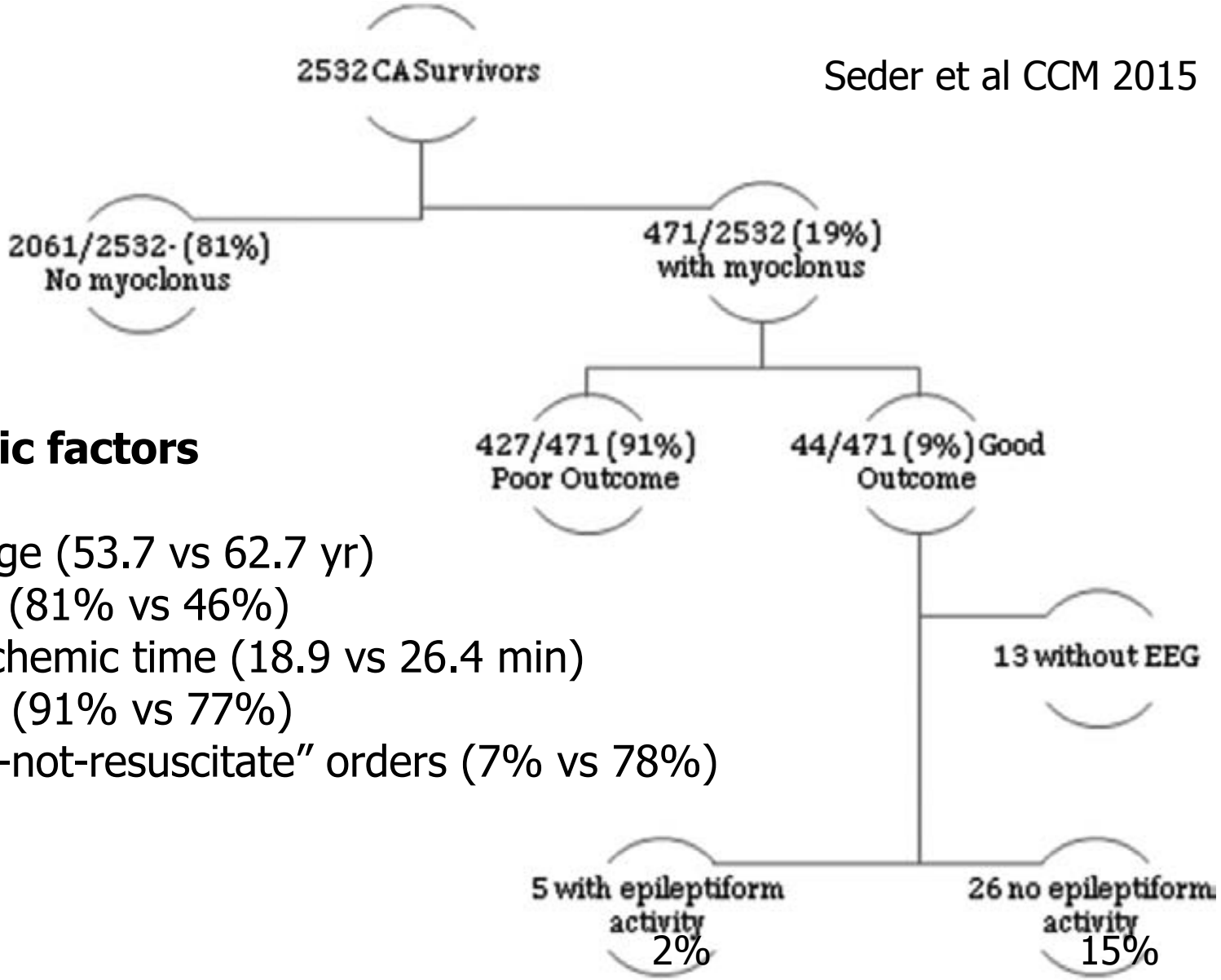
Multi organ failure
Heart
Brain



Laver S. Intensive Care Med 2004; 30:2126-8


Cardiac arrest
Days 1-2
CT
Status Myoclonus
Controlled temperature
Rewarming
Days 3-5
Magnetic Resonance Imaging (MRI)
EEG - NSE
SSEP
Exclude confounders, particularly residual sedation
Unconscious patient, M=1-2 at ≥72h after ROSC
One or both of the following:
- No pupillary and corneal reflexes
- Bilaterally absent N20 SSEP wave (1)
Yes
Poor outcome very likely
(FPR <5%, narrow 95%CIs)
No
Wait at least 24h
Two or more of the following:
- Status myoclonus ≤48h after ROSC
- High NSE levels (2)
- Unreactive burst-suppression or status epilepticus on EEG
- Diffuse anoxic injury on brain CT/MRI (2)
Yes
Poor outcome likely
No
Indeterminate outcome
Observe and re-evaluate
(1) At ≥24h after ROSC in patients not treated with targeted temperature
(2) See text for details.
Use multimodal prognostication whenever possible
Sandroni C et al

Neurologic Outcomes and Postresuscitation Care of Patients With Myoclonus Following Cardiac Arrest



Seder et al CCM 2015

Prognostic factors

Younger age (53.7 vs 62.7 yr)
Shockable (81% vs 46%)
Shorter ischemic time (18.9 vs 26.4 min)
Witnessed (91% vs 77%)
Fewer "do-not-resuscitate" orders (7% vs 78%)

Clinical examination

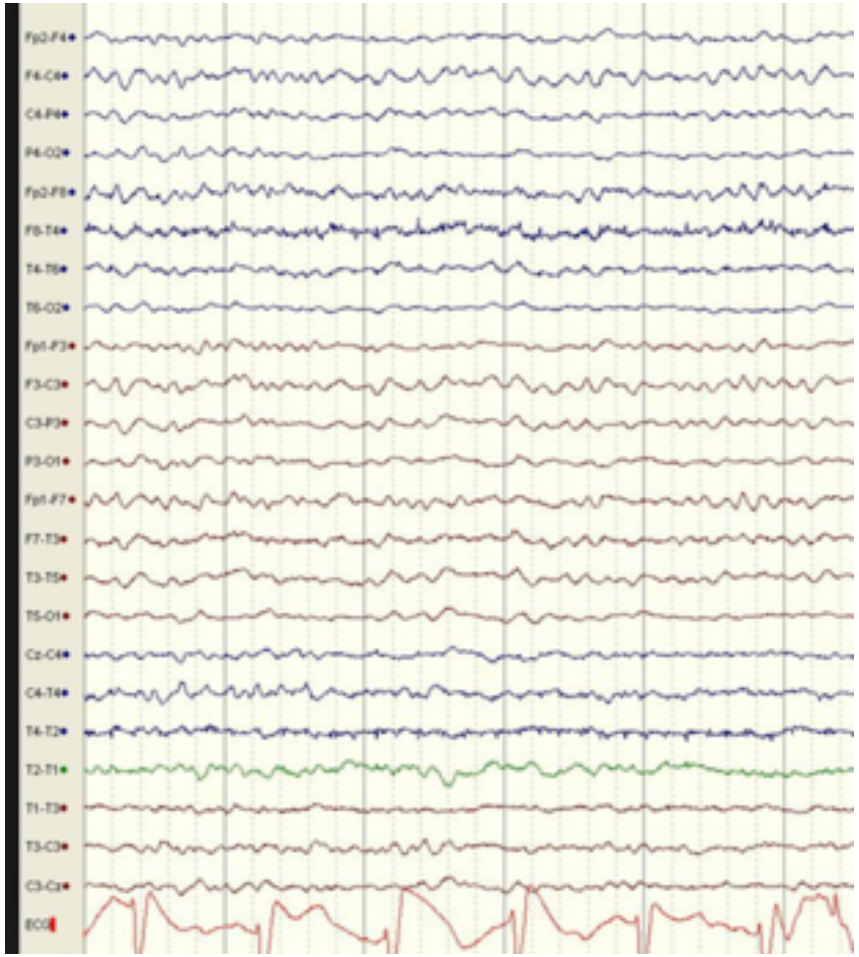
	Sensitivity	False positive rate
Motor response to pain	74%	27% (12-48%)
Bilateral absence of pupillary reflex at 24 hours		8%(1-25%)
Bilateral absence pupillary reflex at 72 hours (TH)	24%	0%(0-2%)
Bilateral absence pupillary reflex at 72 hours (NTH)	18%	0%(0-8%)
Bilateral absence corneal reflexes (NTH)	29%	4%(1-7%)

Brain imaging

- Reduced GM/WM ratio
- Sulcal effacement on brain CT within 24 h
- Sens 81%, FPR 8% (0-38%)

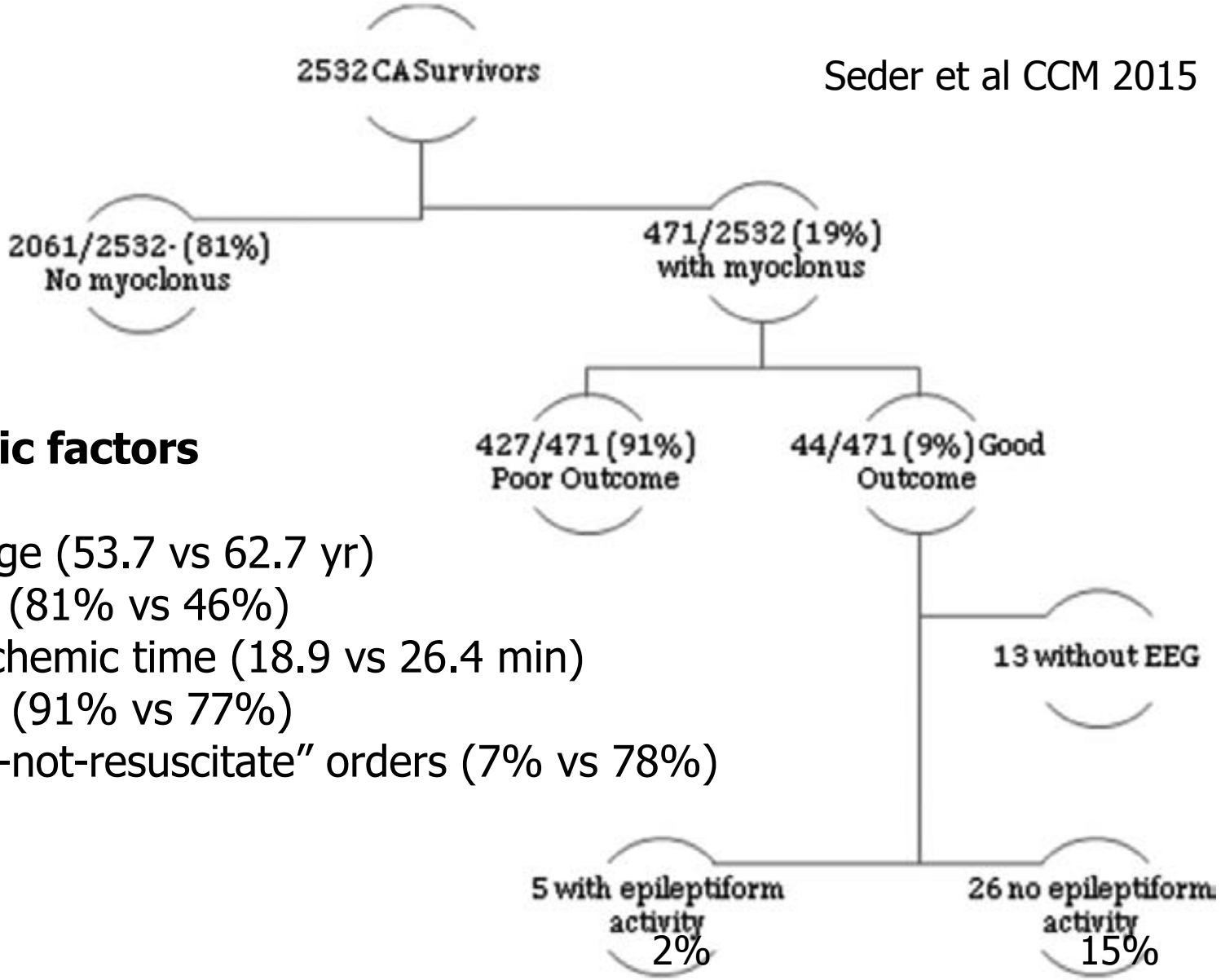
- MRI extensive reduction in diffusion (at 2-5 days)

Neurophysiology



- Bilateral absence of SSEP at > 72 h
  - Sensitivity 45%,
  - FPR 0(0-2%)
- EEG
  - Absence of reactivity
  - Burst-suppression
  - Status epilepticus

Neurologic Outcomes and Postresuscitation Care of Patients With Myoclonus Following Cardiac Arrest



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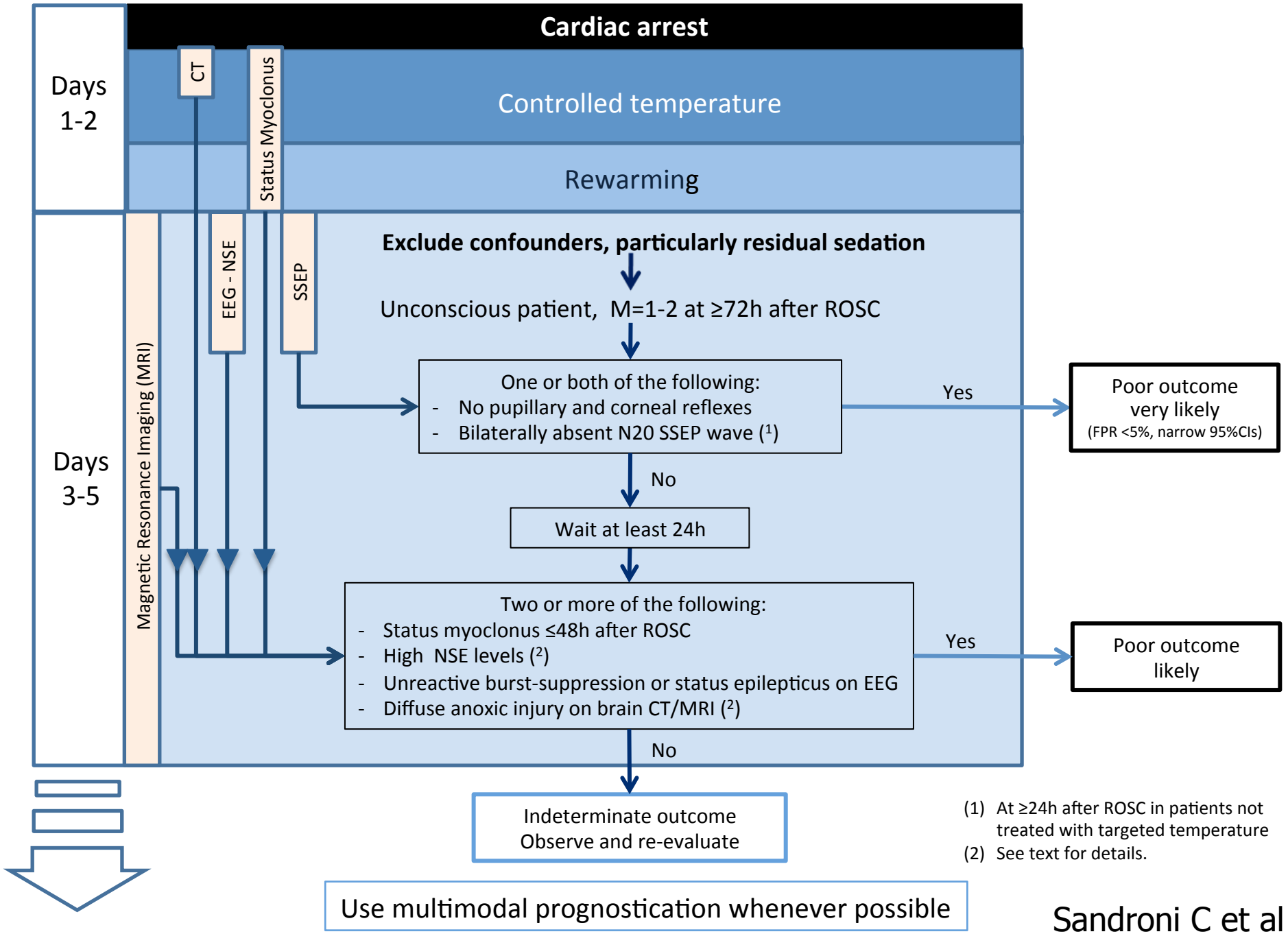
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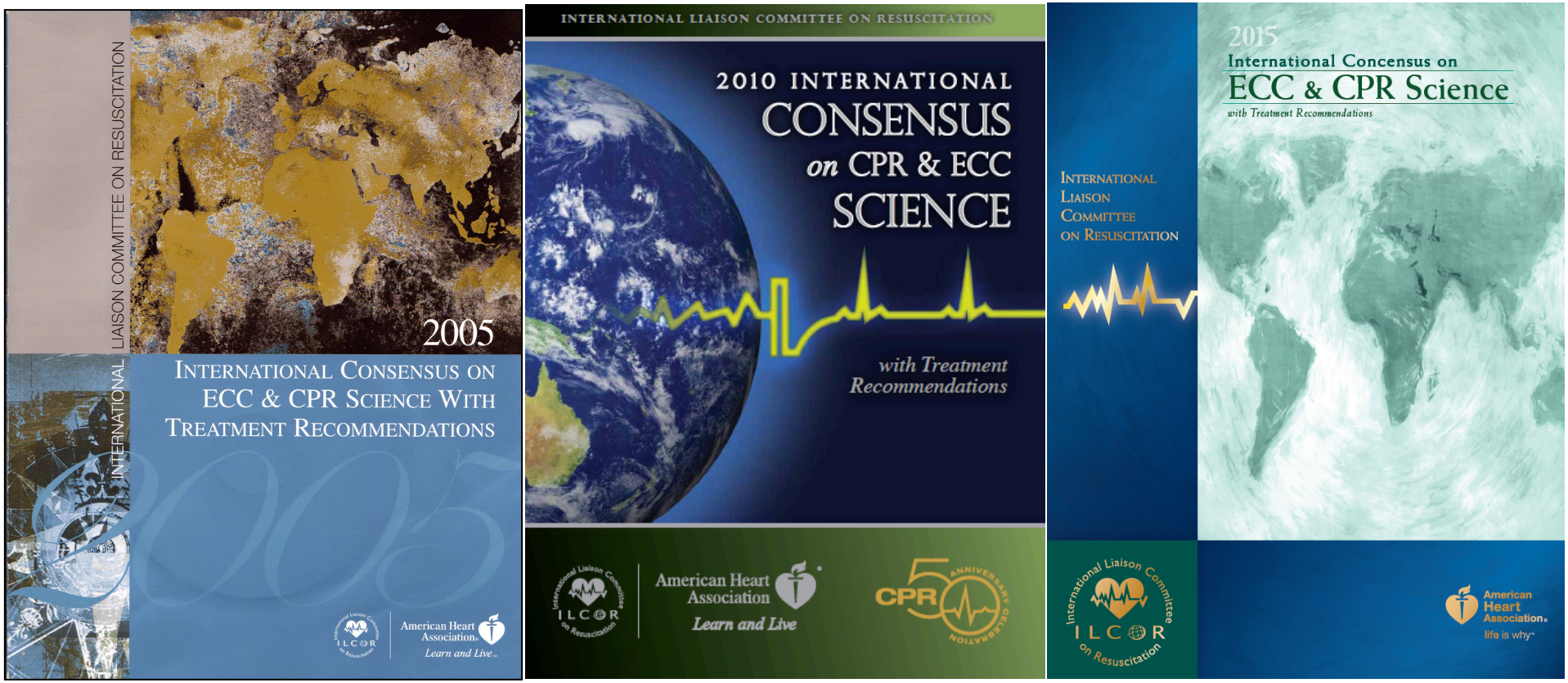
Sandroni C et al

International Consensus Conference on ECC and CPR Science with Treatment Recommendations 2005, 2010… and 15th Oct 2015



Summary

- Update on new science and controversies in cardiac arrest
- Focus on chain of survival
  - High quality CPR
  - Uncertainty about pharmacological treatments
  - Targeted temperature management
  - Neuroprognostication

RESUSCITATION 2015
THE GUIDELINES CONGRESS

29-30-31 **OCTOBER** - PRAGUE - **CZECH REPUBLIC**

Scientific Symposium 2015

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26 November 2015 The National Motorcycle Museum

Highlights

- ☑ Guidelines 2015
- ☑ The science behind the changes
- ☑ Hot topics

Save the date!