

The future of resuscitation

The role of the Cardiac Arrest Centres

Dr. Luis Garcia-Castrillo
UESEM President

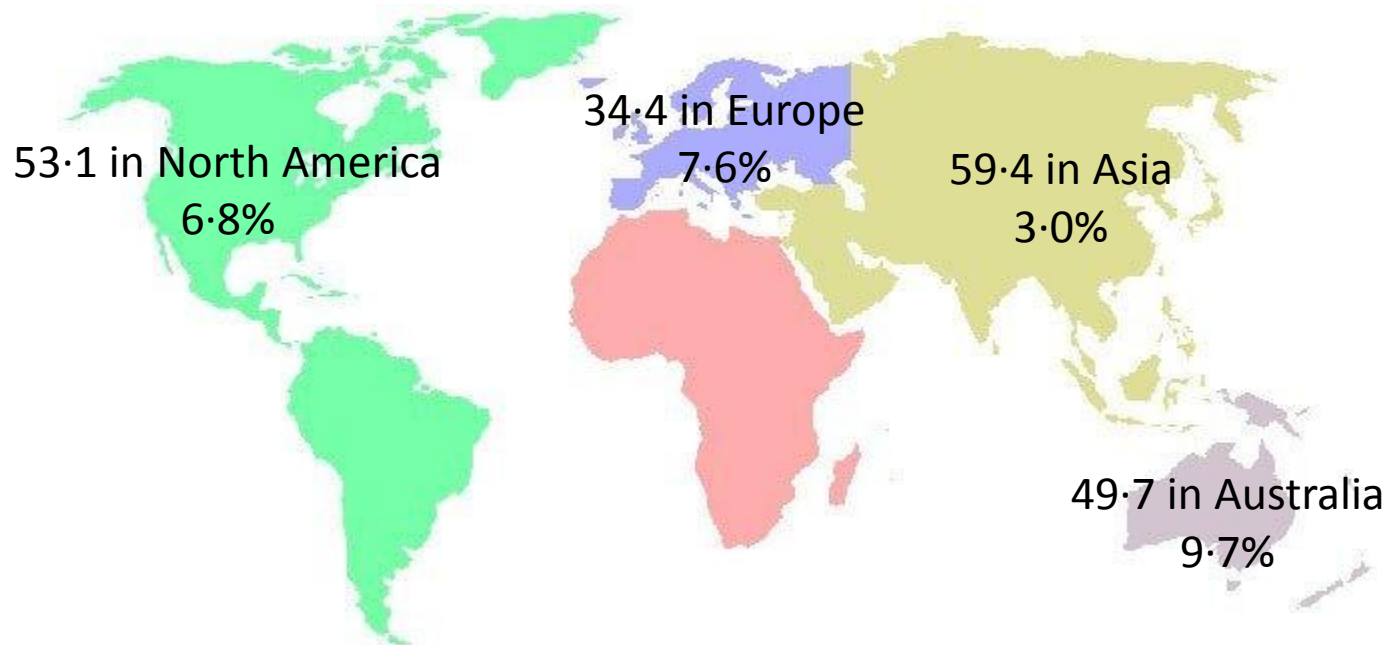


Incidence OHCA and Survival

It is estimated that 275.000 people in Europe have a cardiac arrest treated by EMS per year, with only 29.000 of those surviving to hospital discharge.



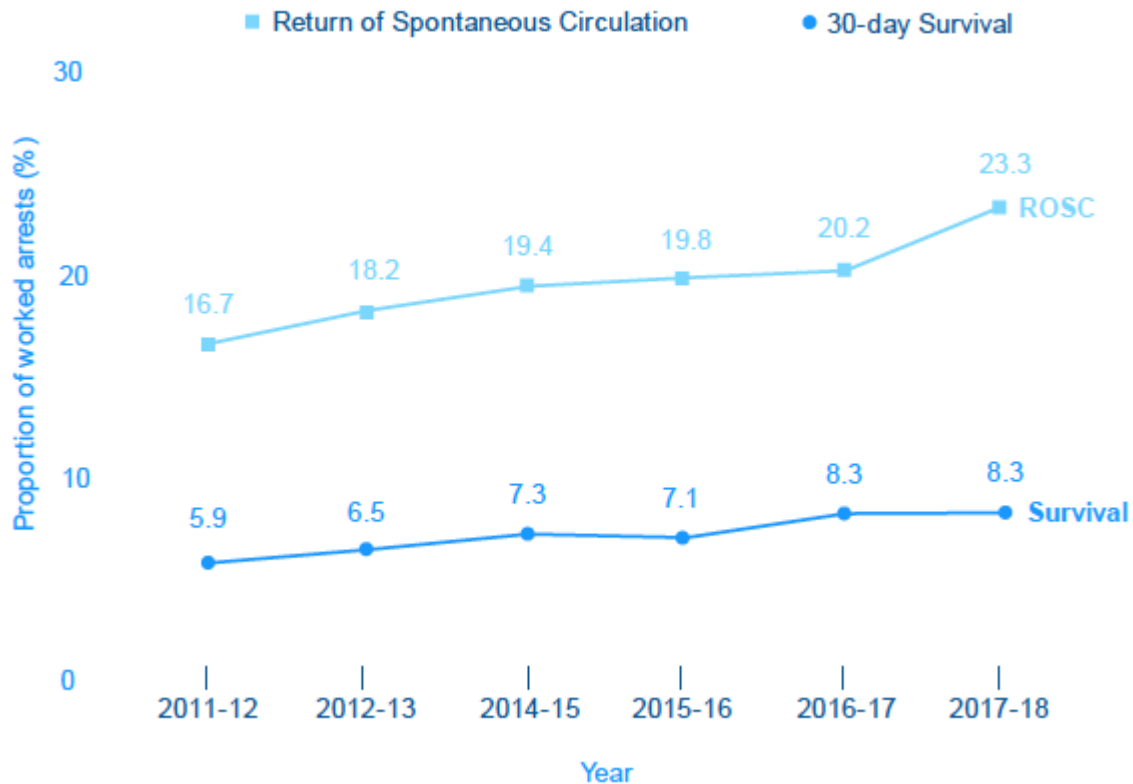
Incidence OHCA and Survival



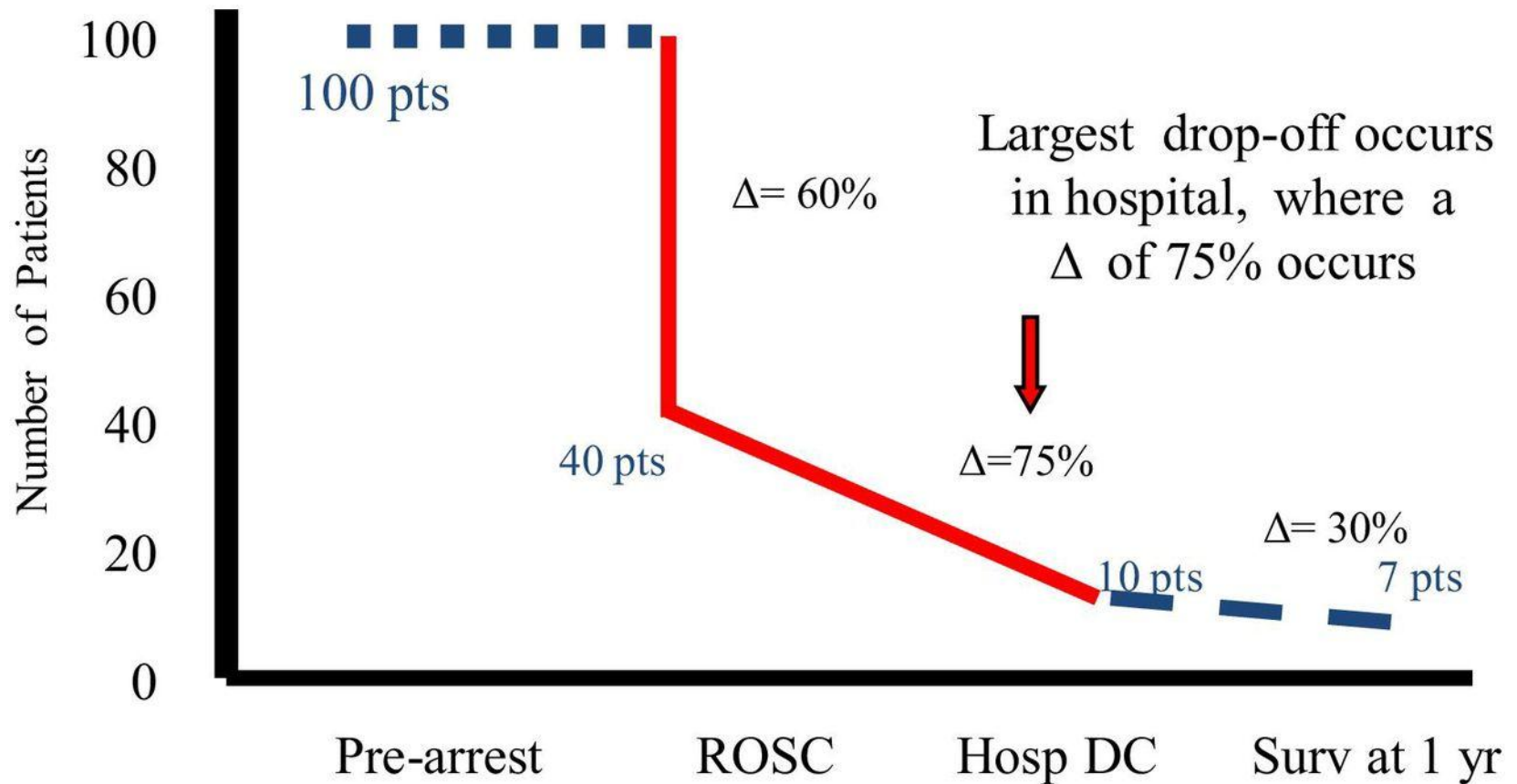
Cases 100.000 hb./year
% survival(hosp. discharge)



OHCA outcome. Trends 2011-18



Cardiac Arrest Mortality Distribution



Karl B. Kern JCIN 2012;5:597-605

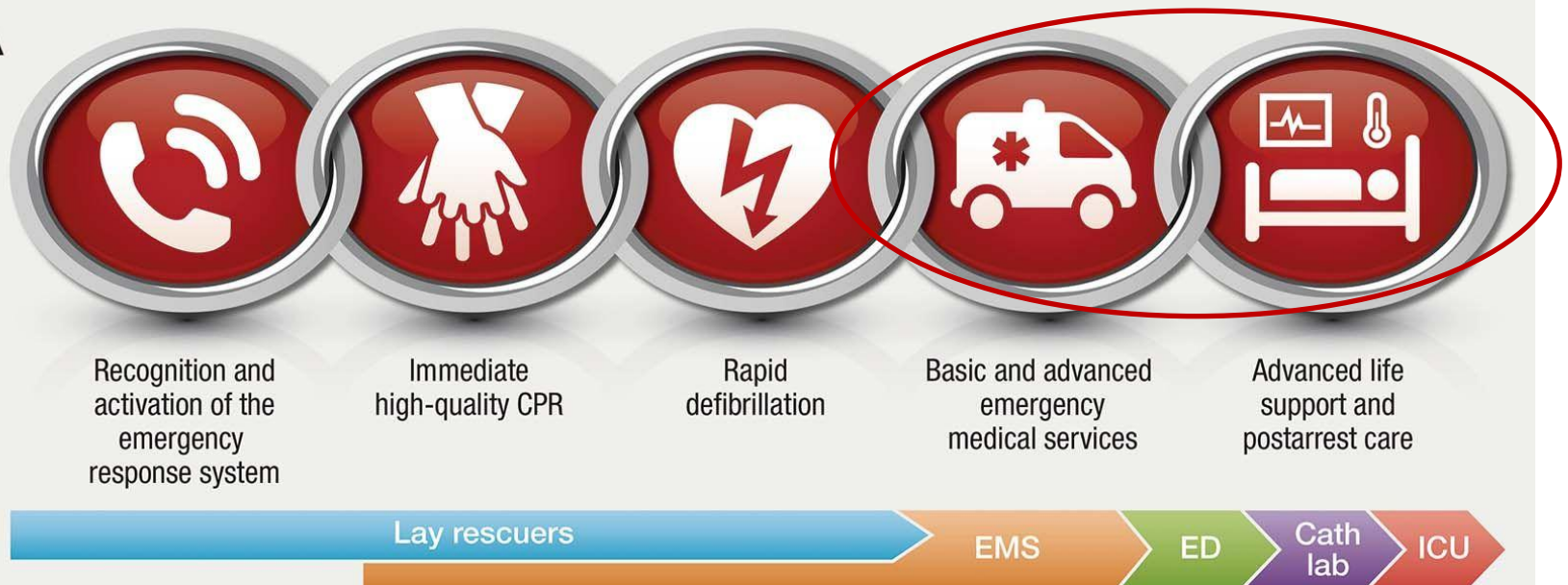


Fourth link

Chain of survival



OHCA



Fourth Link

Content

- Cardiac Arrest Centres(CAC)
- Regionalization of the CAC

Geographical distribution of cardiac arrests



Legend
postalcode
1 Dot = 1
Arrests

NOCOI

PAOS I Study



CAC in Guidelines

AHA 2015 guidelines in regards to regionalized cardiac arrest centres:

- “A regionalized approach to OHCA resuscitation that includes the use of cardiac resuscitation centre’s may be considered”.
(Class IIb, Level of Evidence C-LD)



CAC Guidelines

Resuscitation 95 (2015) 202–222



Contents lists available at [ScienceDirect](#)

Resuscitation

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



European Resuscitation Council and European Society of Intensive Care Medicine Guidelines for Post-resuscitation Care 2015
Section 5 of the European Resuscitation Council Guidelines for Resuscitation 2015[☆]



Cardiac arrest centres

There is wide variability in survival among hospitals caring for patients after resuscitation from cardiac arrest.

Many studies have reported an association between survival to hospital discharge and transport to a cardiac arrest centre but there is inconsistency in the hospital factors that are most related to patient outcome.



CAC Requirements

- General intensive care, including mechanical ventilation, (TTM).
- Acute cardiac care including coronary angiography and percutaneous coronary intervention (PCI).
- 24-h radiology service.
- Delayed, multi-modality and standardised. neuroprognostication.
- Minimum number of cases.
- Regionalization of the CAC.



Rational for CAC

National sample of US hospitals:

A total of 109,739 OHCA patients were identified.

General In-hospital mortality was 70.6%.

Size of Hospitals

- | | |
|----------------------|--------------------|
| – Urban hospitals | OR 0.63, P = 0.004 |
| – Teaching hospitals | OR 0.58, P = 0.001 |
| – Large hospitals | OR 0.55, P < 0.001 |



Rational for CAC

3981 OHCA; 23.6% ROSC arrived at 151 hospitals.

33.1% survived. (North America)

PCI (19.2%), reperfusion (17.7%), induced hypothermia (39.3%) .

Survival were higher in hospitals treating more subjects per year.

Odds Survival (Per 5 pat. /year) OR 1.06; (95%CI: 1.04–1.08)

Factors:

- | | |
|------------------------------|--------------------------|
| — Early coronary angiography | OR 1.69; 95%CI 1.06–2.70 |
| — Coronary reperfusion | OR 1.94; 95%CI 1.34–2.82 |
| — Induced hypothermia | OR 1.36; 95%CI 1.01–1.83 |



CAC volume effect

- Schober et al. Admission of OHCA to a High Volume Cardiac Arrest Centre is Linked to Improved Outcome.
 - Retrospective study from 2013-2015 in Vienna involving 861 patients, 7 hospitals.
 - Survival examined in relation to hospital admission rate of CA patients/year, multivariable analysis

Survival to discharge

- Admission >100 CA OR of 5.2 (1.2 –7) $p = 0.025$



CAC volume effect

National Cardiac Arrest Audit UK

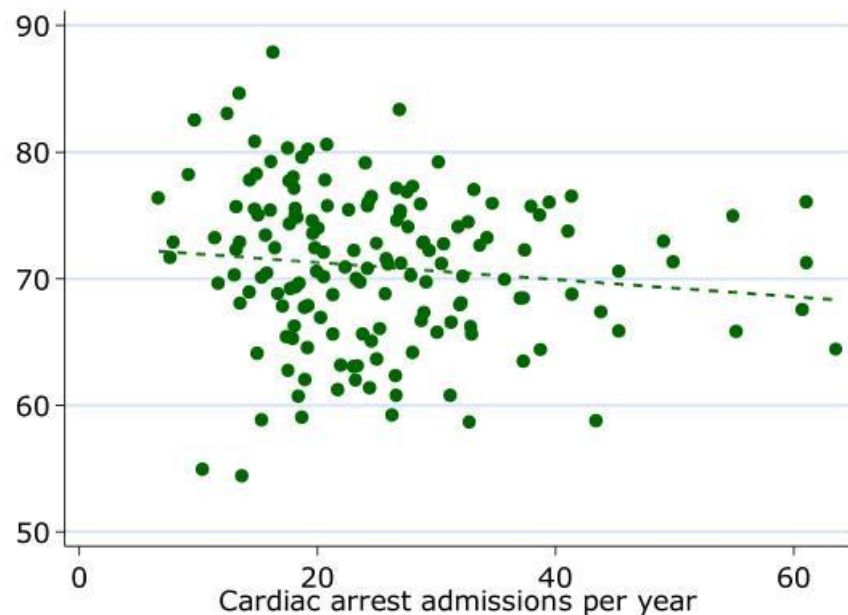
ICU Volume and outcome

ICU cases/year	OR mortality
<20	1.00
20-34	0.78
35-50	0.71
> 50	0.62

Carr BG.

US 4674 patients from 39 hospitals Adjusted Mortality Ranks from 46-68%.

Volume – outcome relationship? ICNARC data



Rational for CAC Interventions

- Stub et al. Association between hospital post-resuscitative performance and clinical outcomes after out-of-hospital cardiac arrest.
 - Retrospective study of ROC PRIMED cohort from 2007-2009 involving over 3000 patients in US and Canada
 - Survival examined in relation to how adherent hospitals were with respect to 3 factors:
 - 1) Coronary angiography within 24h
 - 2) TTM
 - 3) Prognostication after 72hrs

Survival to discharge

- | | | | |
|-------------------|-------|------------|------|
| – High performers | 35.1% | 0-2 Rankin | 26% |
| – Low performers | 16.2% | 0-2 Rankin | 8,4% |



CAC Rational PCI

- Hollenbeck et al. Early cardiac catheterization is associated with improved survival in comatose survivors of cardiac arrest without STEMI.
 - 269 patients; all VF/VT arrests, USA
 - Early cath (on arrival or initiation of TTM) vs late cath (during admission)

Mortality:

Early cath	34.3% vs
No early cath	51.4 % (P<0.01)

Cerebral Performance Category (CPC) 1-2:

Early cath	60.7%
No early cath	44.5% (P<0.01)



CAC Transport Risks

2015



28.0 %
of the
EU's population
live in a rural
area



CAC Transport Risks

People living in rural areas have longer travel times to the nearest hospital

Average minutes of car travel time to nearest hospital by community type for ...



Source: Survey of U.S. adults conducted Sept. 24-Oct. 7, 2018, and Homeland Infrastructure Foundation-Level data.

PEW RESEARCH CENTER



CAC Transport Risks

- Re-arrest rate estimated at 18% for VF/VT during transport to hospital
- Cudnik et al. A geospatial assessment of transport distance and survival to discharge in out of hospital cardiac arrest patients: Implications for resuscitation centres.
 - Secondary analysis of ROC study, 7540 patients (2005 -2007)

Those taken to further hospital had better survival for VF/VT
32.8% vs 25.6% $p < 0.001$.

Distance (per km) OR 1.00 (0.99 – 1.01)

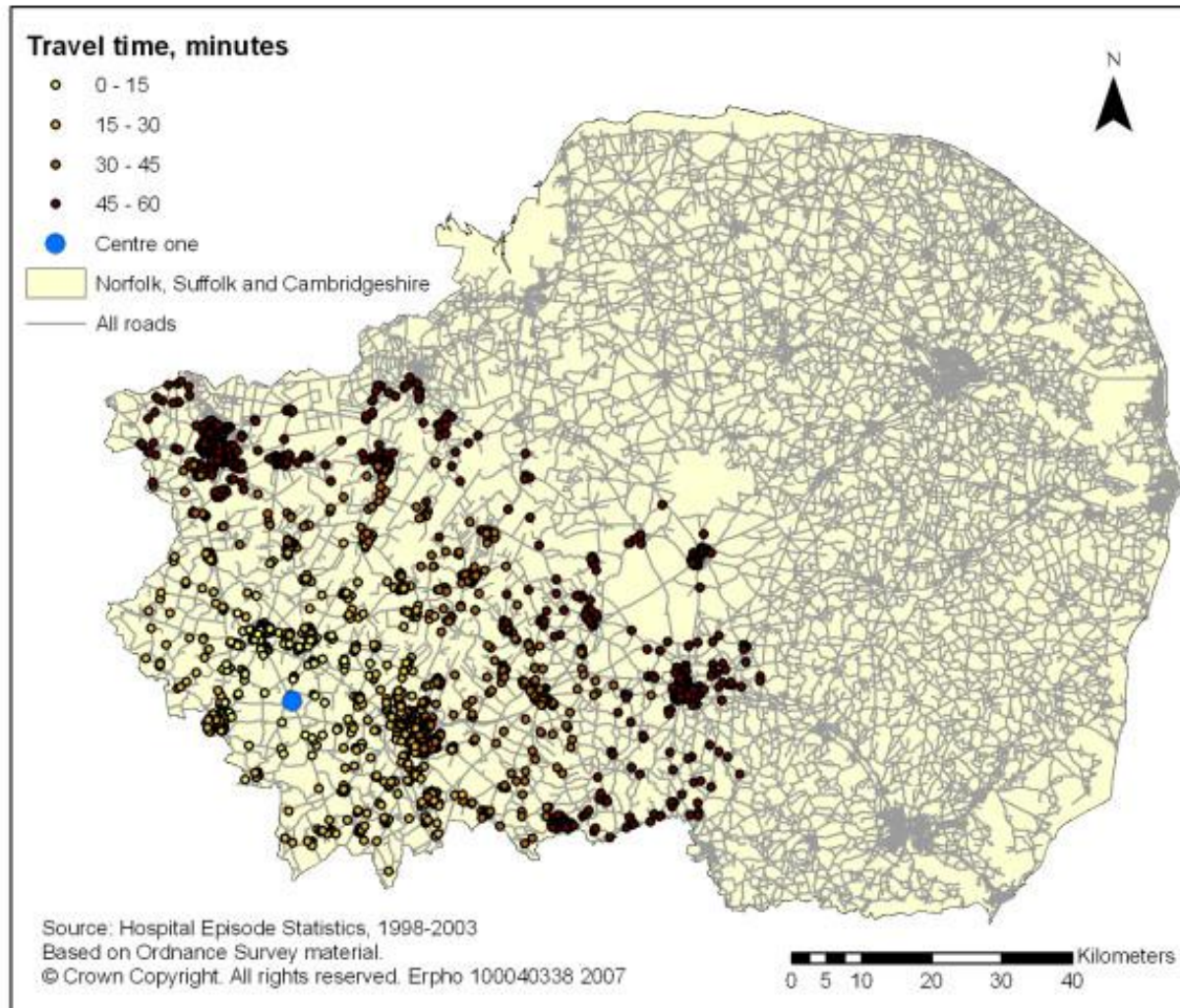
Transport to closest hospital OR 0.82 (0.69 – 0.97)

Limitations: Overall transport distances were modest



Rational for CAC Similar approaches

- Specialist stroke care reduction



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Patients

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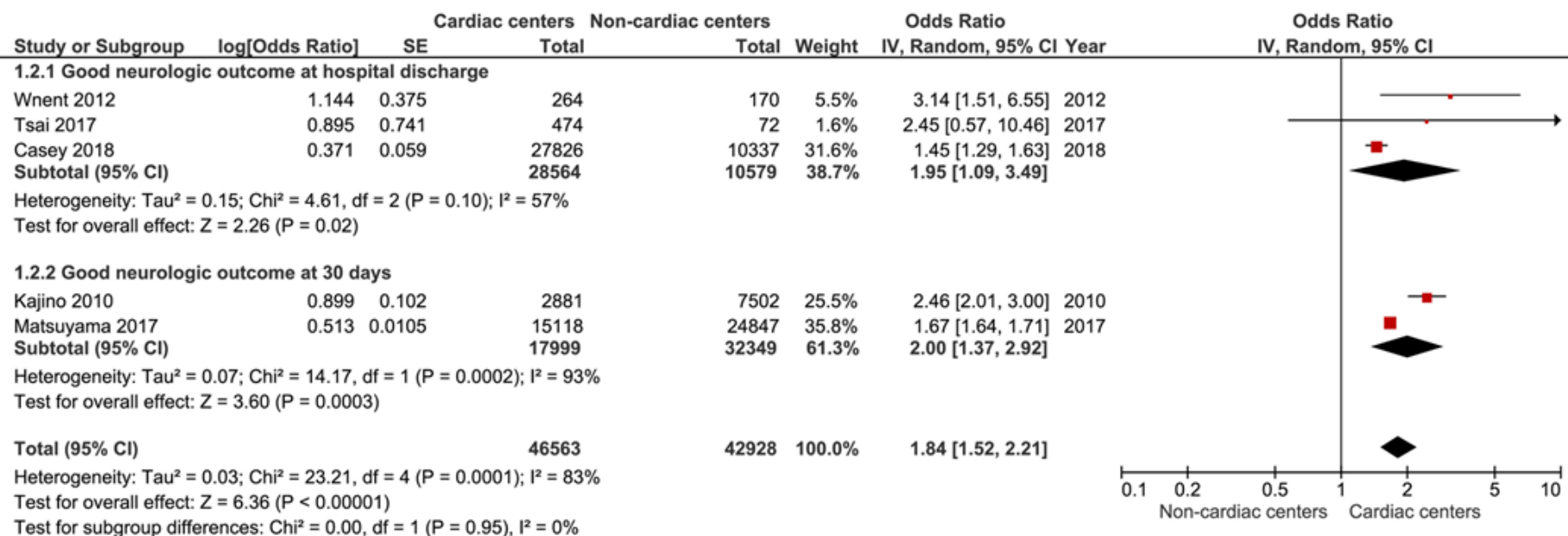
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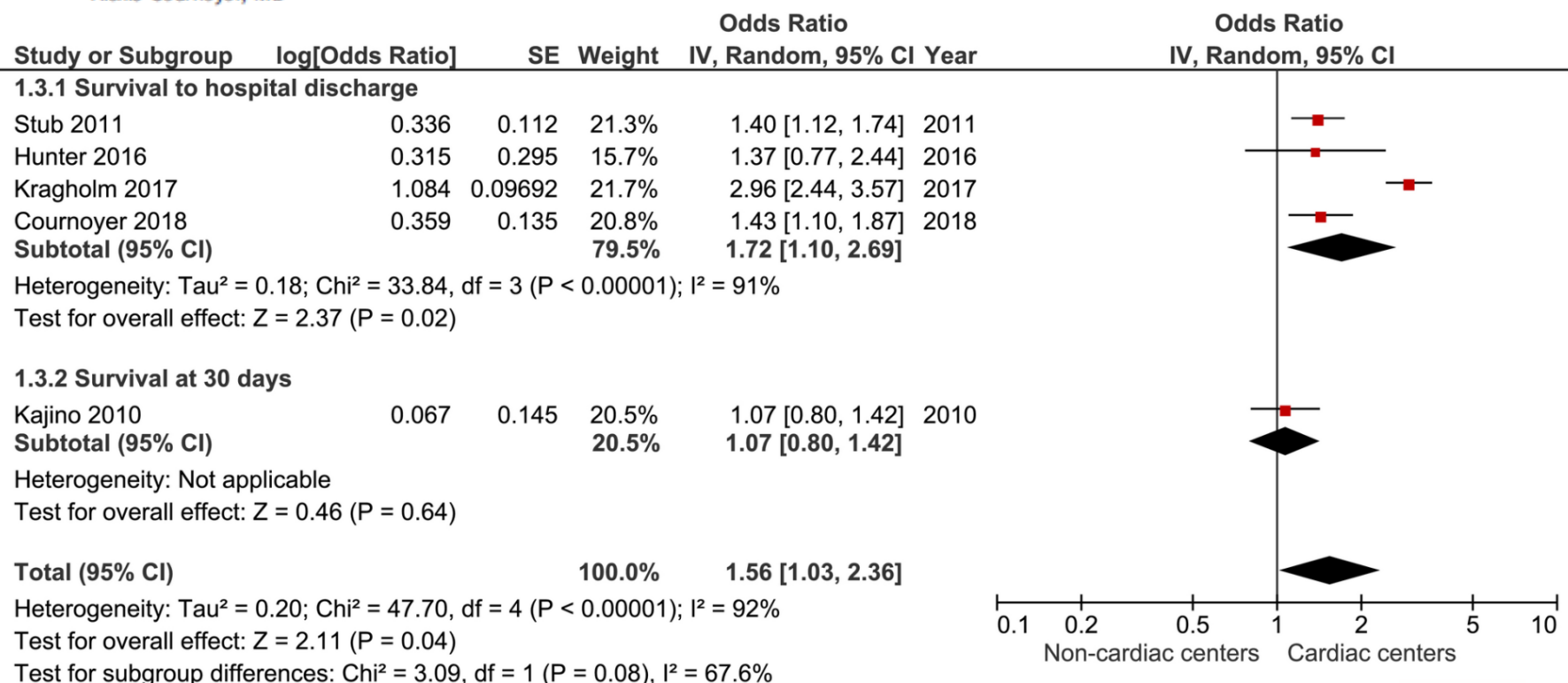
Do Out-of-Hospital Cardiac Arrest Patients Have Increased Chances of Survival When Transported to a Cardiac Resuscitation Center? A Systematic Review and Meta-Analysis

Demis Lipe, MD, MSc; Al Giwa, MD, MBA; Nicholas D. Caputo, MD, MSc; Nachiketa Gupta, MD, PhD; Joseph Addison, BS, NRAEMT; Alexis Cournoyer, MD



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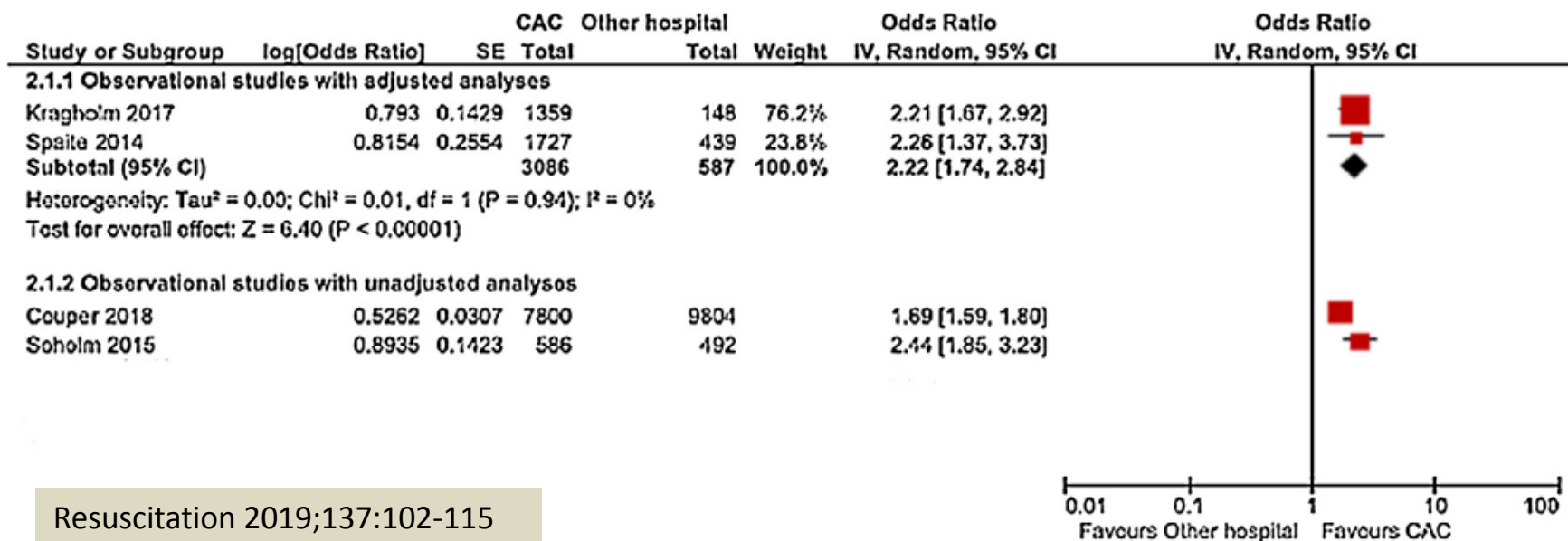


Review

Does care at a cardiac arrest centre improve outcome after out-of-hospital cardiac arrest? — A systematic review[☆]



J. Yeung^{a,*}, T. Matsuyama^b, J. Bray^c, J. Reynolds^d,
M.B. Skrifvars^e



Resuscitation 2019;137:102-115

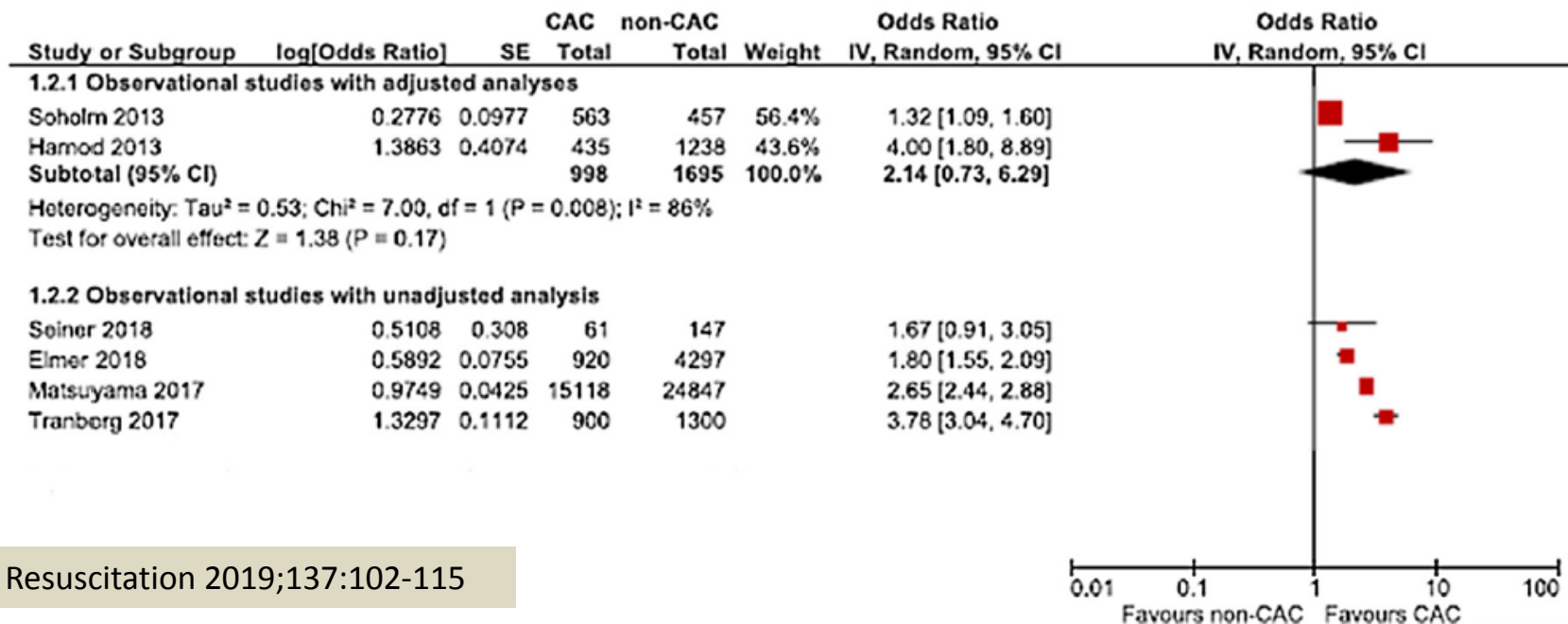
Fig. 3 – Survival to hospital discharge with favourable outcome. Higher odds ratio favours CAC.

Review

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Resuscitation 2019;137:102-115

Fig. 4 – Survival to 30 days. Higher odds ratio favours CAC.



To take Home

- It is reasonable to implement CAC with a define caching area to improve CA survival.
- More orientated design research is need to clarify the level of recommendation.
- Transport time is not a limitation for the regionalization.





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