



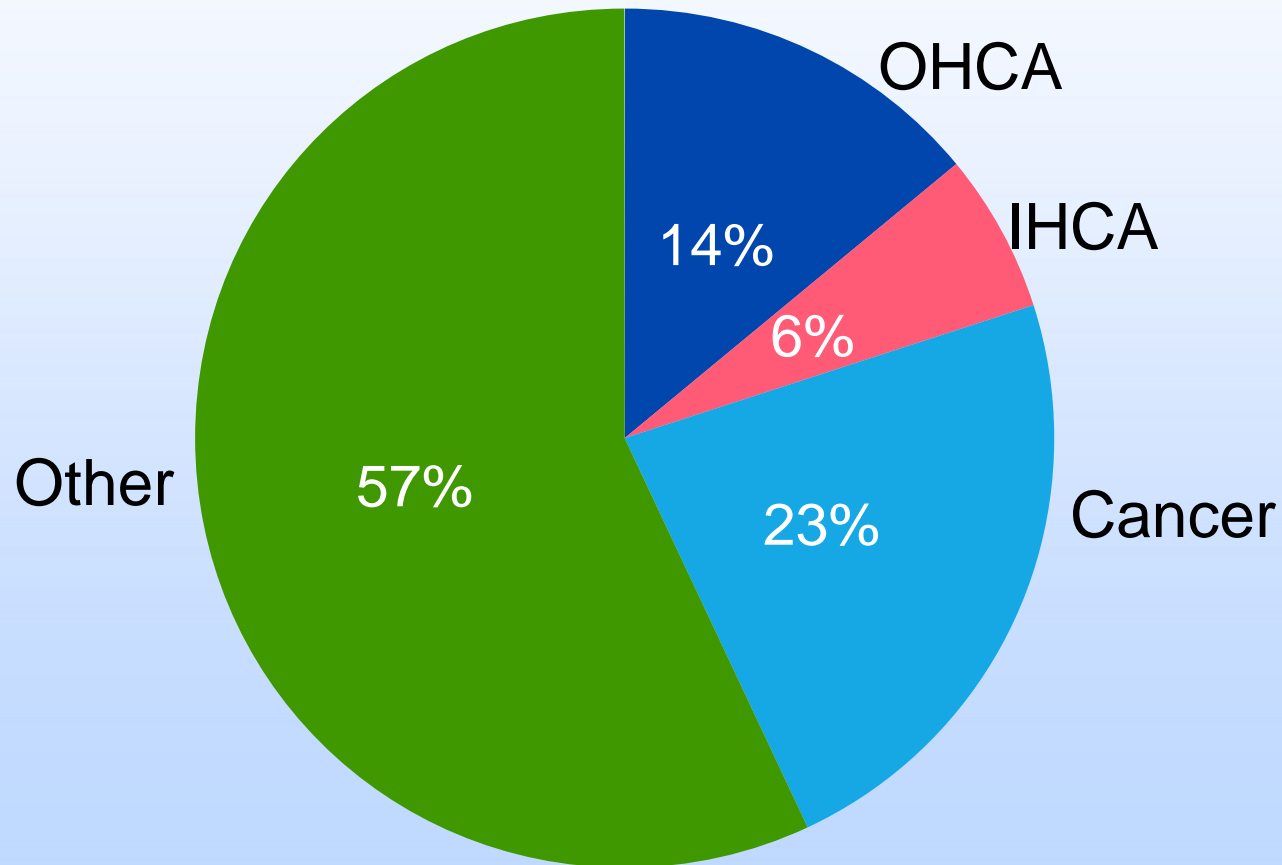
The Role of Coronary Angiography in Cardiac Arrest Survivors: to all?

Malcolm R. Bell, MBBS, FRACP
Torino, IT
October 2014

Conflicts and disclosures - none

Cardiac Arrest **1 in 5** deaths in the US

2,513,171 US Deaths in 2011



Go AS, Circulation 2013;129:e28-e292;

http://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_06.pdf

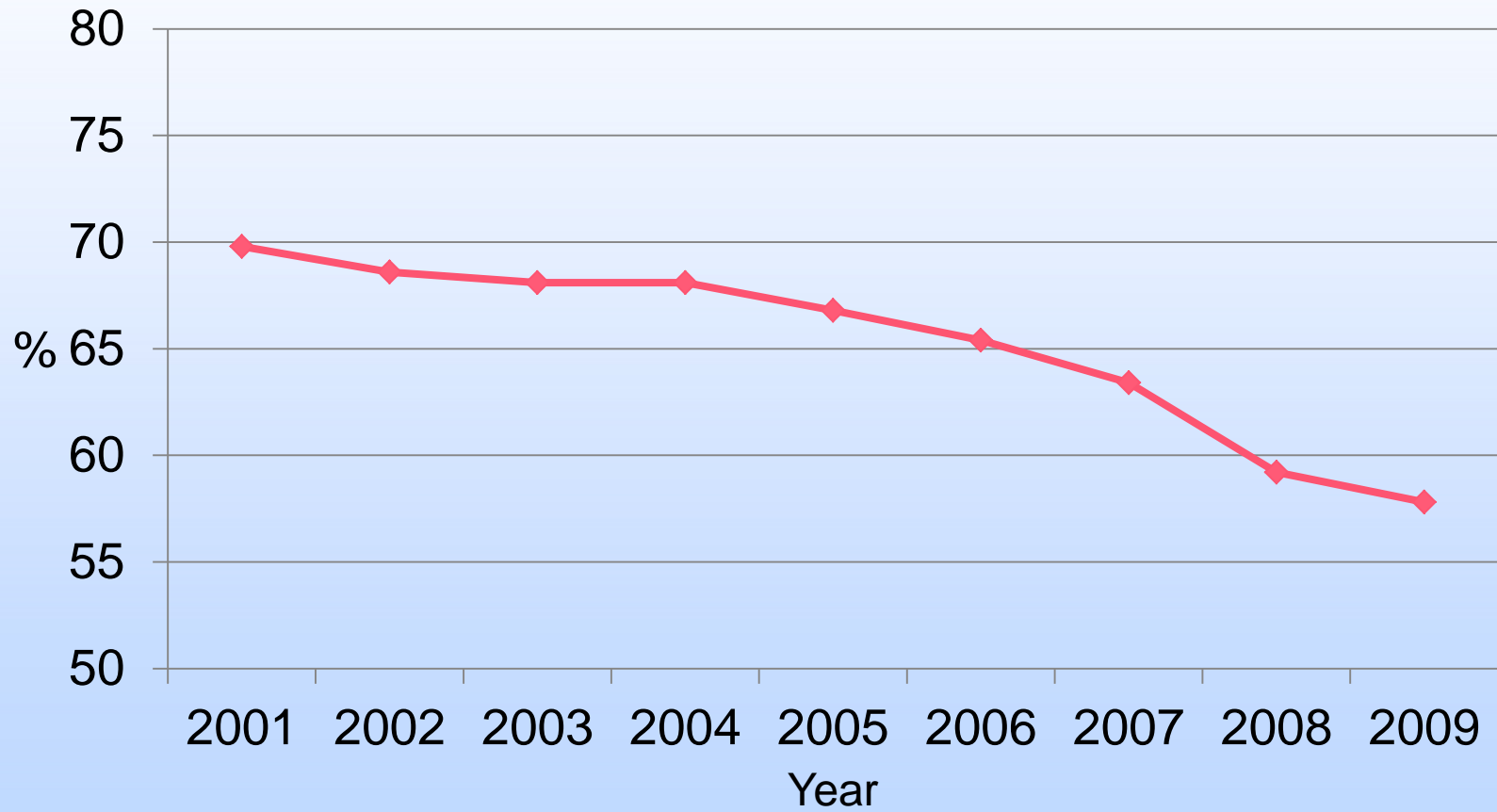
Cardiac Arrest Facts for 2014

- Substantial burden
- Average age in the 60s
- About 60% treated by EMS
- Overall survival with EMS-treated victims 10%
- Most deaths are neurologic
- Improved in-hospital survival – about 35%
 - 49% survival in recent TTM trial*
 - Vast majority are CPC 1 or 2

*Nielsen N: NEJM 2013

In Hospital Mortality after OHCA

US National Inpatient Sample

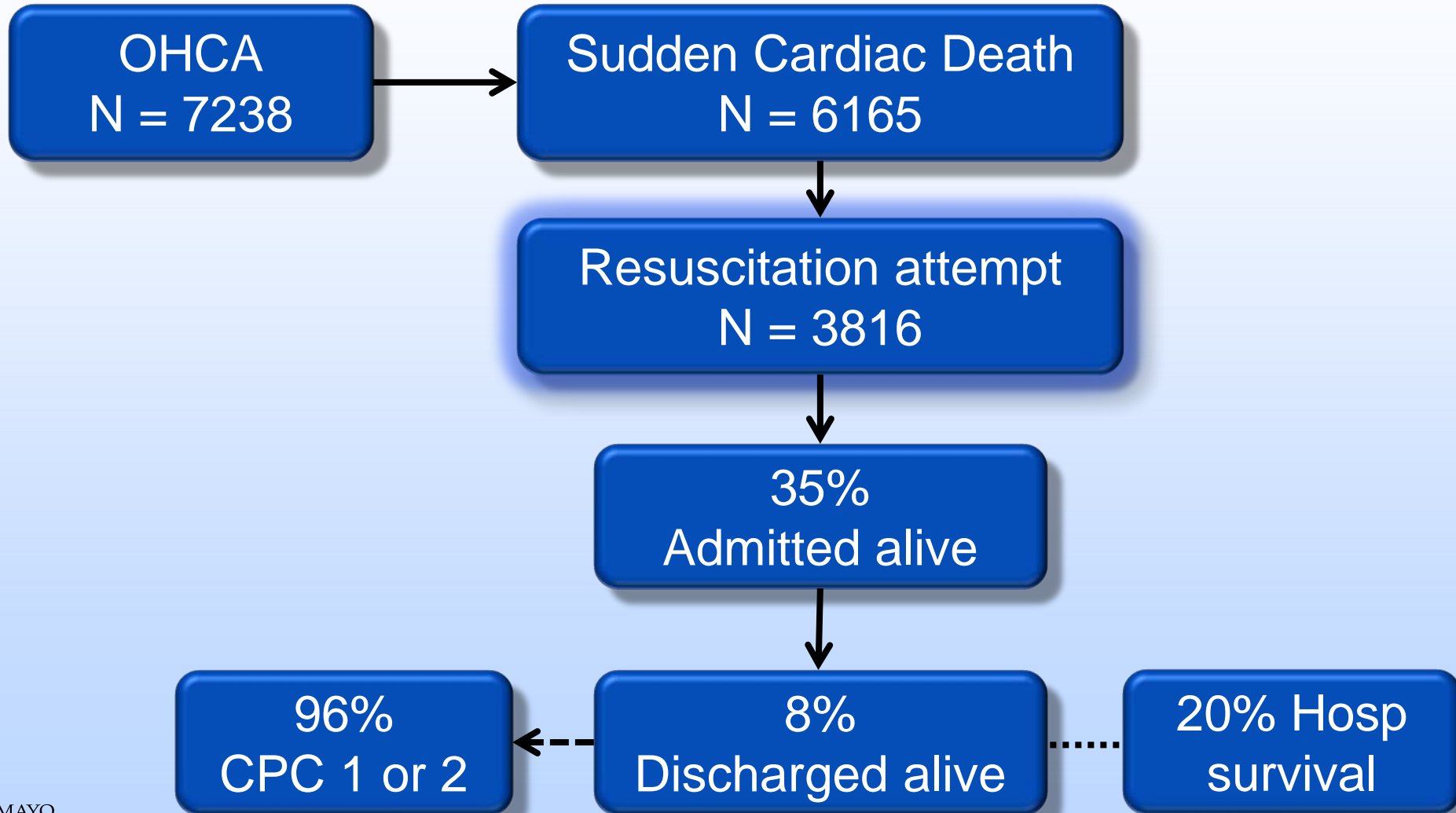


Fugate J: Circ 2012





SCD in Greater Paris (2011-2013)



CPC = Cerebral Performance Category

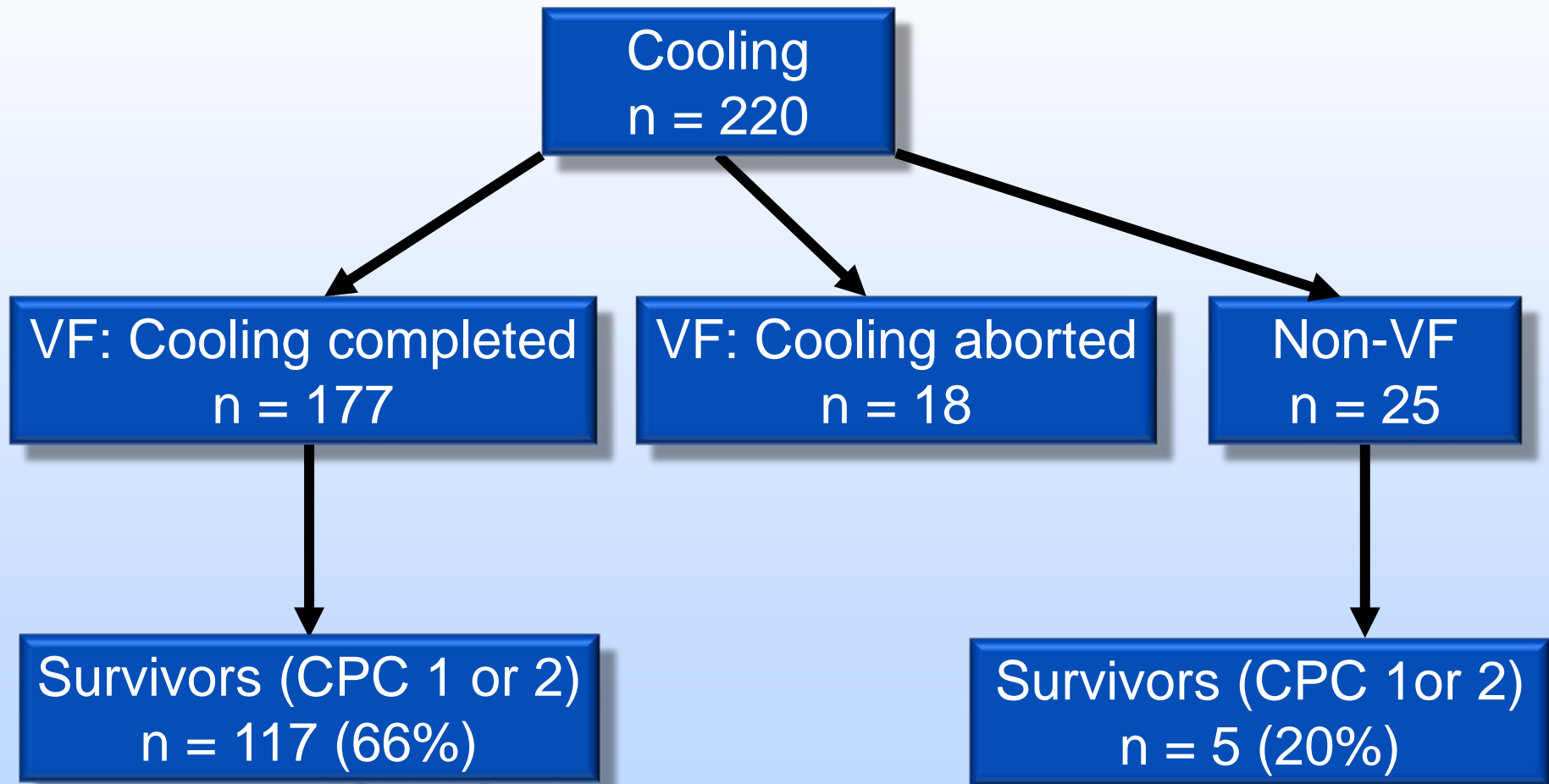
Bougouin W: Intensive Care Med 2014

SCD in Greater Paris (2011-2013)

- 65 years average age
- 72% at home
- 80% bystander CPR
- 26% shockable rhythm
- 35% admitted alive
- 58% had coronary angiography
- 58% had therapeutic hypothermia



Mayo Therapeutic Hypothermia Program 2005 to 2014



In comatose patients
after OHCA and ROSC,
does acute coronary angiography with
PCI improve survival compared to
conventional therapy?

Historical Perspective – OHCA

Pre 2002

No therapeutic hypothermia

Survival poor

Coronary angiography and PCI rarely performed

Historical Perspective – OHCA

2002-2012

Therapeutic hypothermia
Chain of resuscitation
(pre hospital to ICU care)

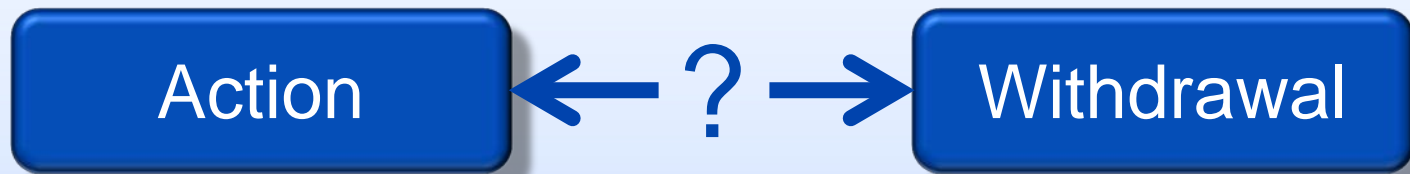
Survival improved
Coronary angiography and PCI
routine for STEMI

2010 AHA Guidelines for CPR and Emergency CV Care

Appropriate treatment of ACS or STEMI, including PCI , to be initiated regardless of coma	Class I LOE = B
PCI after ROSC in patients with OHCA of presumed cardiac etiology is reasonable even if no obvious STEMI	Class IIb LOE = B

STEMI complicated by OHCA

- Cardiac arrest patients excluded from RCTs
- Challenging decisions for everyone



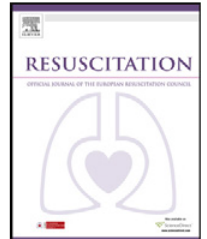
- Bleeding issues: medications and hypothermia
- Delay or compromise in cooling or ICU care
- Impact on publicly reported mortality rates



Contents lists available at SciVerse ScienceDirect

Resuscitation

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



Clinical paper

Acute coronary angiography in patients resuscitated from out-of-hospital cardiac arrest—A systematic review and meta-analysis[☆]

Jacob Moesgaard Larsen*, Jan Ravkilde

Department of Cardiology and Centre for Cardiovascular Research, Aalborg University Hospital, Hobrovej 18-22, 9000 Aalborg, Denmark

Larsen JM and Ravkilde J: Resuscitation 2012;83:1427-1433

STEMI and OHCA

- Most studies prior to introduction of TH
- High prevalence of VT/VF
- 90% will have “acute” coronary occlusion
- High PCI success rates
- Survival about 65%

PCI feasible and associated with
good outcomes

If no ST elevation, should we send
immediately to the cath lab?

OHCA without obvious Noncardiac Cause

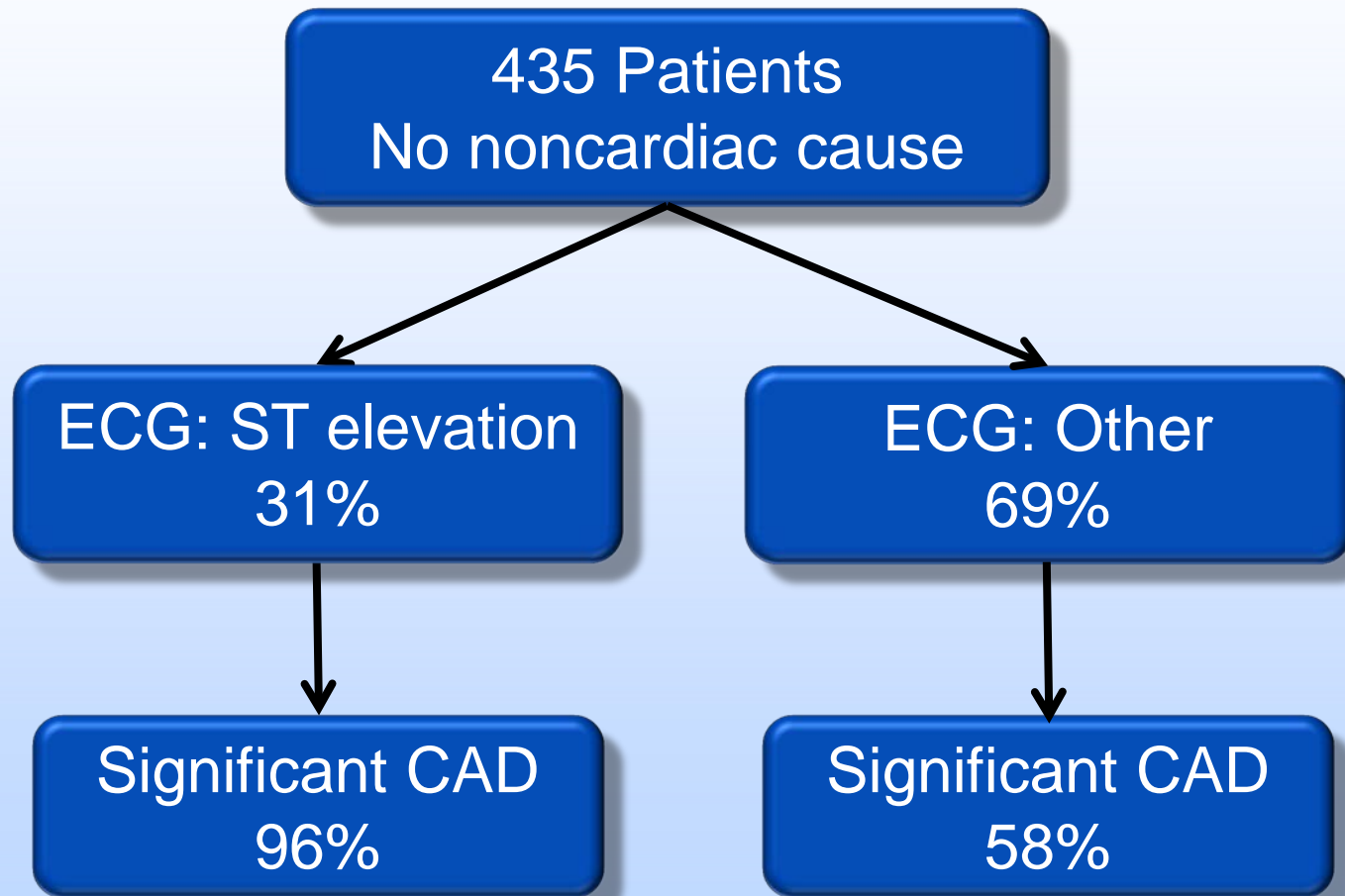
Acute coronary angiography?

- No RCT performed
- Multiple studies but no adequate control groups
- Tremendous potential for selection bias

Always a Challenge!

- Resource use and uncertain outcomes in patients with risk of irreversible brain injury
- Likelihood of finding “acute” thrombotic occlusion?
- Unable to verify chest pain, risk factors etc.
- ECG reliability?
- Tn – low level elevation

Coronary Angiographic Findings Post-ROSC



PROCAT study (Dumas F: Circ Cardiovasc Interv 2010)

OHCA without Obvious Noncardiac Cause and no ST Elevation

- Evidence supporting routine acute CA is weak
- High prevalence of CAD
 - True culprit lesion present?
 - Outcomes with PCI favorable
- No consensus for acute angiography
- Prudent to consider if suspect:
 - LCx acute occlusion
 - Severe left main

Bangalore S and Hochman J: Circ Cardiovasc Interv 2010

Larsen JM and Ravkilde J: Resuscitation 2012

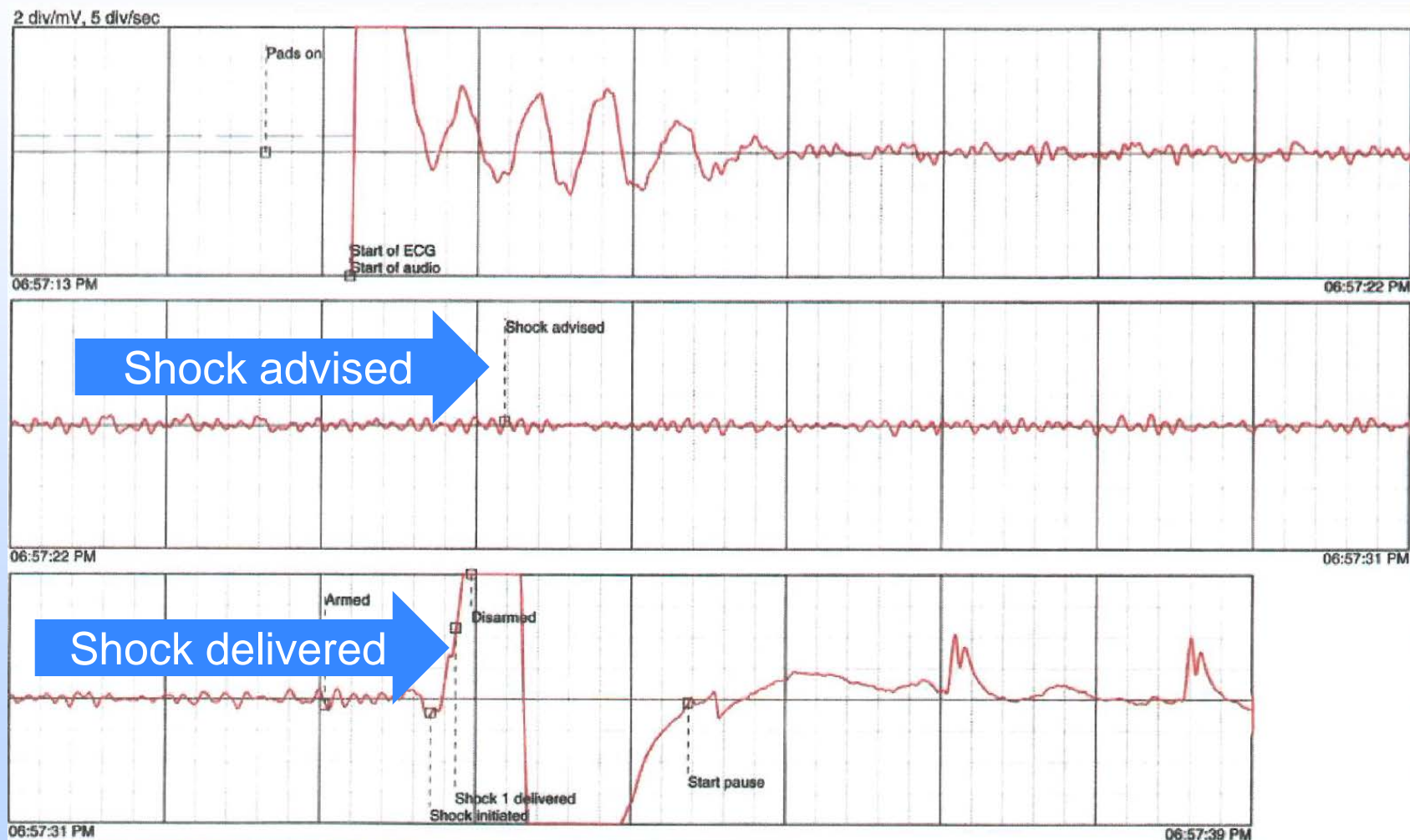
Nielsen N and Kjaergaard J: Resuscitation 2013

Friberg H and Nielsen N: Intensive Care Med 2014

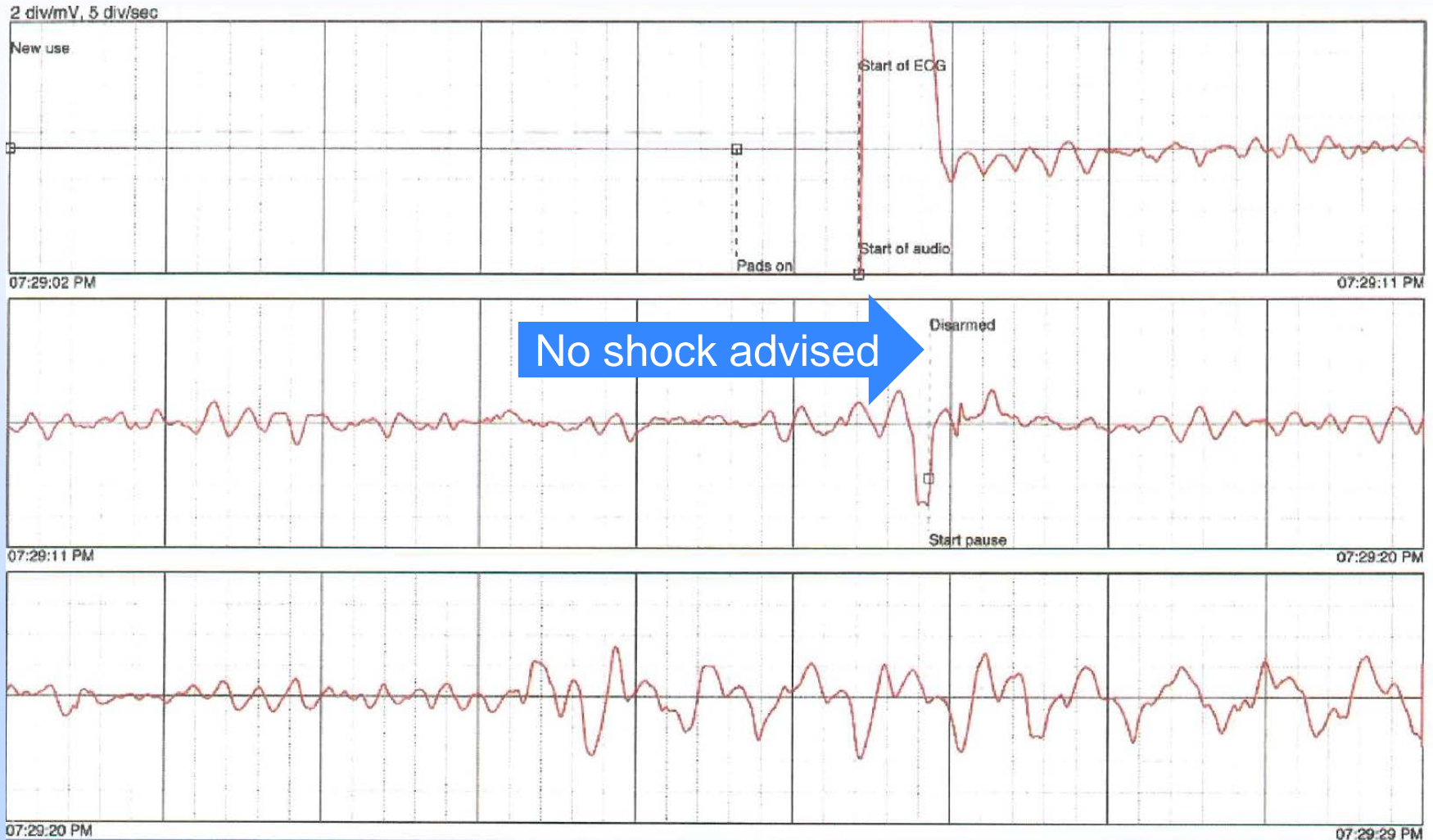
Factors Favoring Survival

- Witnessed arrest
 - Public place – Help, AEDs
- Bystander CPR
- “Shockable” VF
- ETCO₂ tension – predictive of ROSC
- Younger age

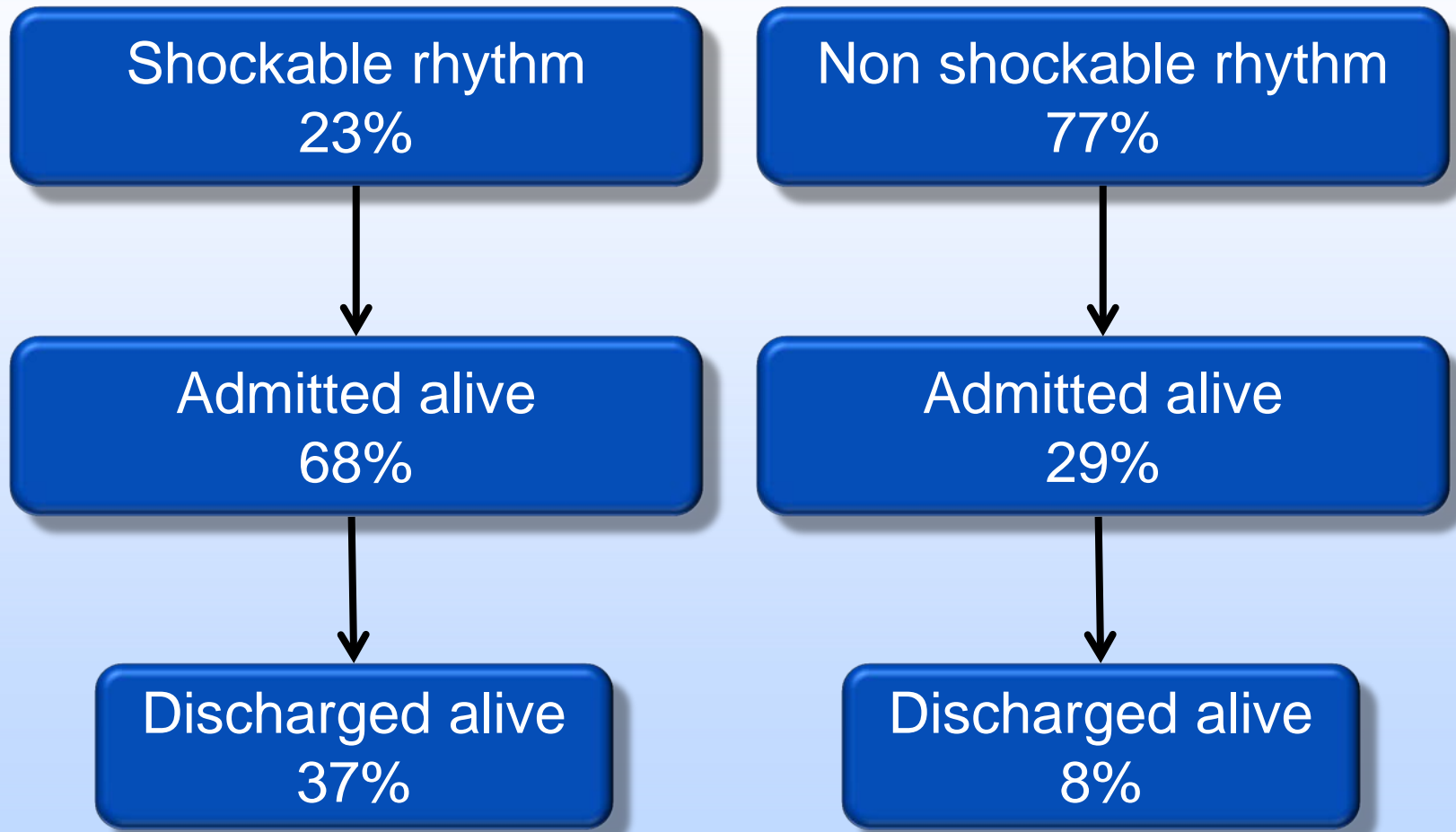
High Frequency VF (low amplitude)



Low Frequency VF (high amplitude)



SCD in Greater Paris: Influence of Initial Rhythm on Outcome



Bougouin W: Intensive Care Med 2014

OHCA without obvious Noncardiac Cause: Conclusions and Recommendations

ST elevation

- Immediate CA and PCI

Shock or recurrent VT/VF

- Strongly consider CA and PCI

OHCA without obvious Noncardiac Cause: Conclusions and Recommendations

No ST elevation

- More uncertainty for use of CA and PCI
- Some evidence for benefit --- neutral?
- Careful patient selection
- Awaiting ILCOR recommendations in 2015
- RCT needed and feasible
- Cooling remains #1 priority



bell.malcolm@mayo.edu