Emergency Treatment of Acute MI 2020: What's new, what's next?

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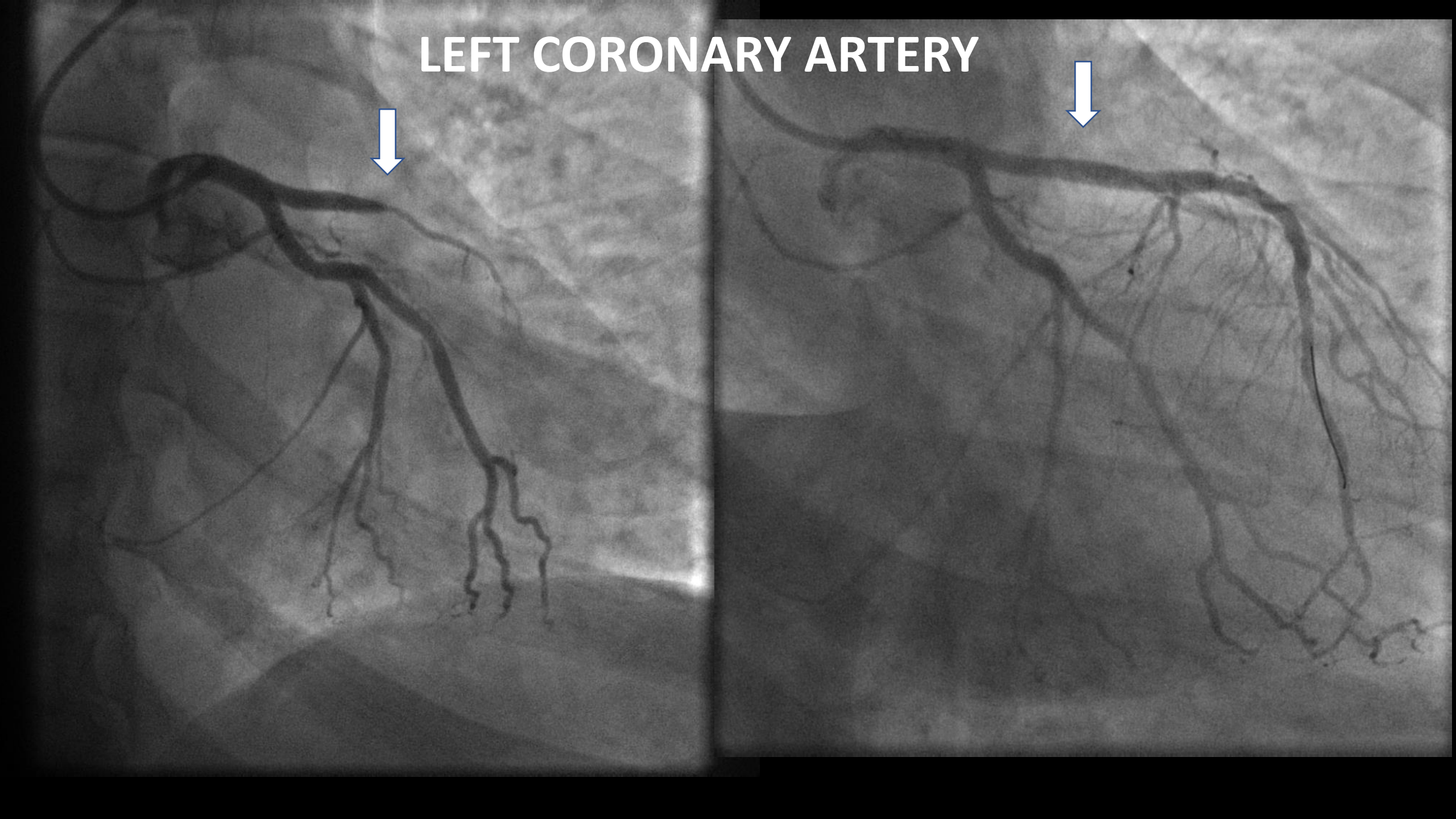
Crozer Keystone Health System

34 yo man with anterior STEMI

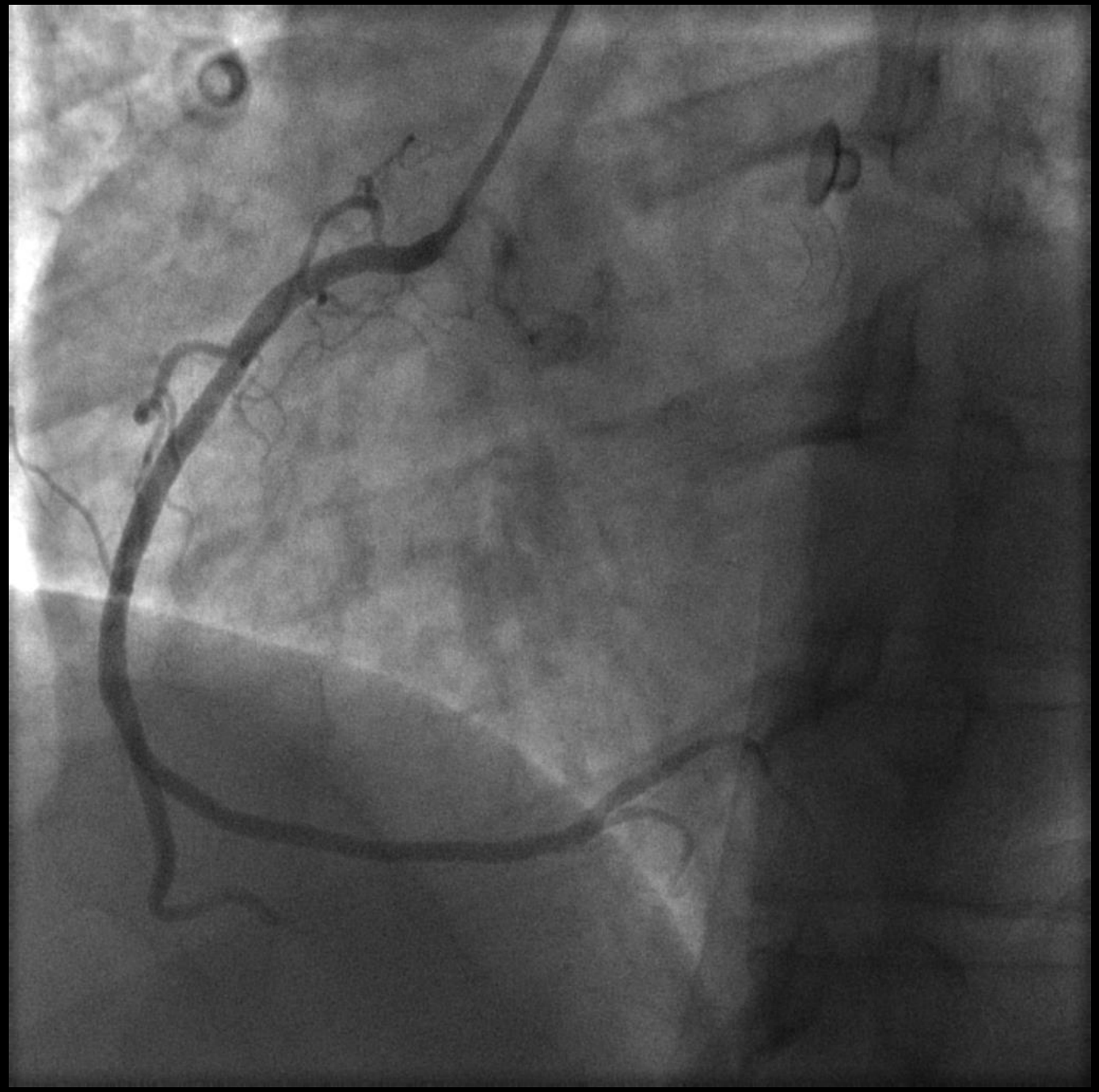
Known risk factors negative except FH ? mother w/CAD.

To cath lab BP 110/70, HR 80/min, SpO2 98% 2LNC, no heart failure in lab.

LEFT CORONARY ARTERY



RIGHT CORONARY ARTERY



34 yo man with anterior STEMI
Time line from diagnosis to treatment:

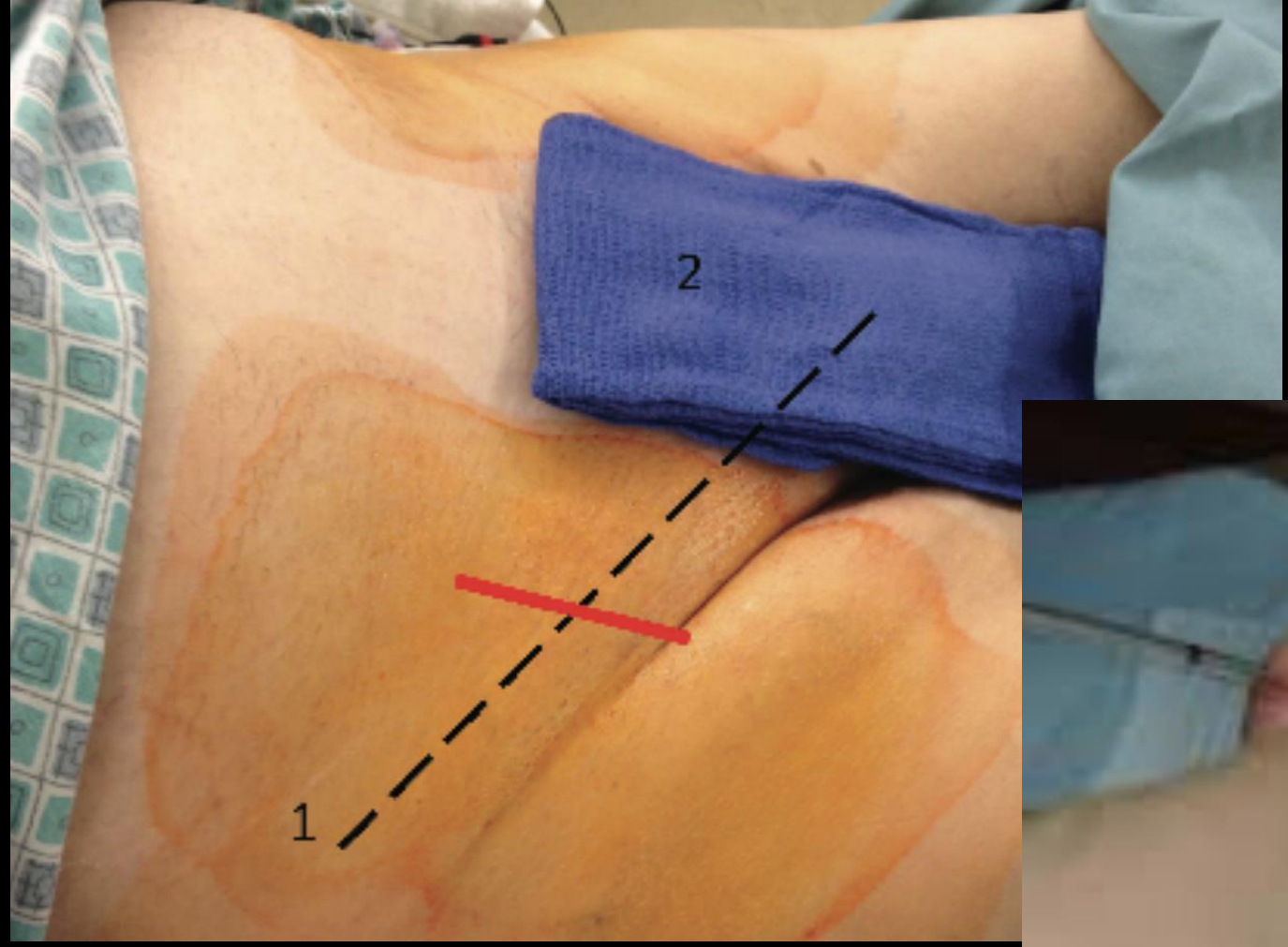
First medical contact (FMC)	23:00 hrs
Cath lab activation	23:23 hrs
ED arrival	23:31 hrs
Enters cath lab	00:09 hrs
Balloon inflation in LAD	00:26 hrs

FMC to reperfusion	86 min
ED door to balloon inflation	55 min

ACC/AHA STEMI Guideline 2013
FMC to reperfusion:
<90 min "ideal"

34 yo man with anterior STEMI

- Trop > 80 ng/ml, CPK 7,847 U/L. LVEF 30%. Heart failure, resolved.
- LDL-C 172, HDL-C 60, T Chol 251, TG 97. A1C 5.6%.
- 3 day LOS. Atorva 80mg/d, ticagrelor 90 mg bid, ASA 81mg/d, lisinopril 10mg/d, carvedilol 12.5mg bid, spironolactone 25 mg/d. LifeVest.
- 8 weeks later LVEF 40% - LifeVest removed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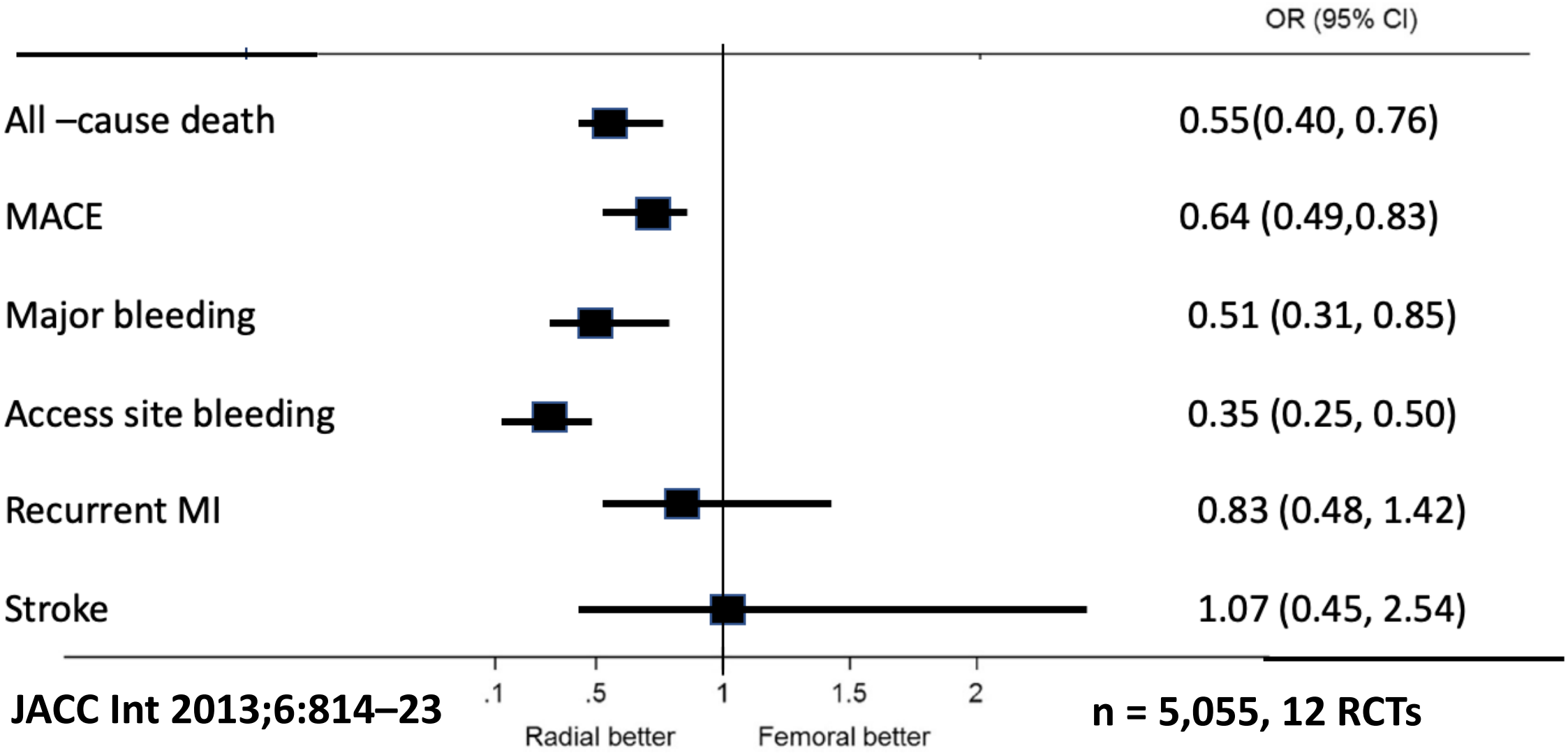
Metanalysis: Radial vs Femoral Access for PCI in STEMI



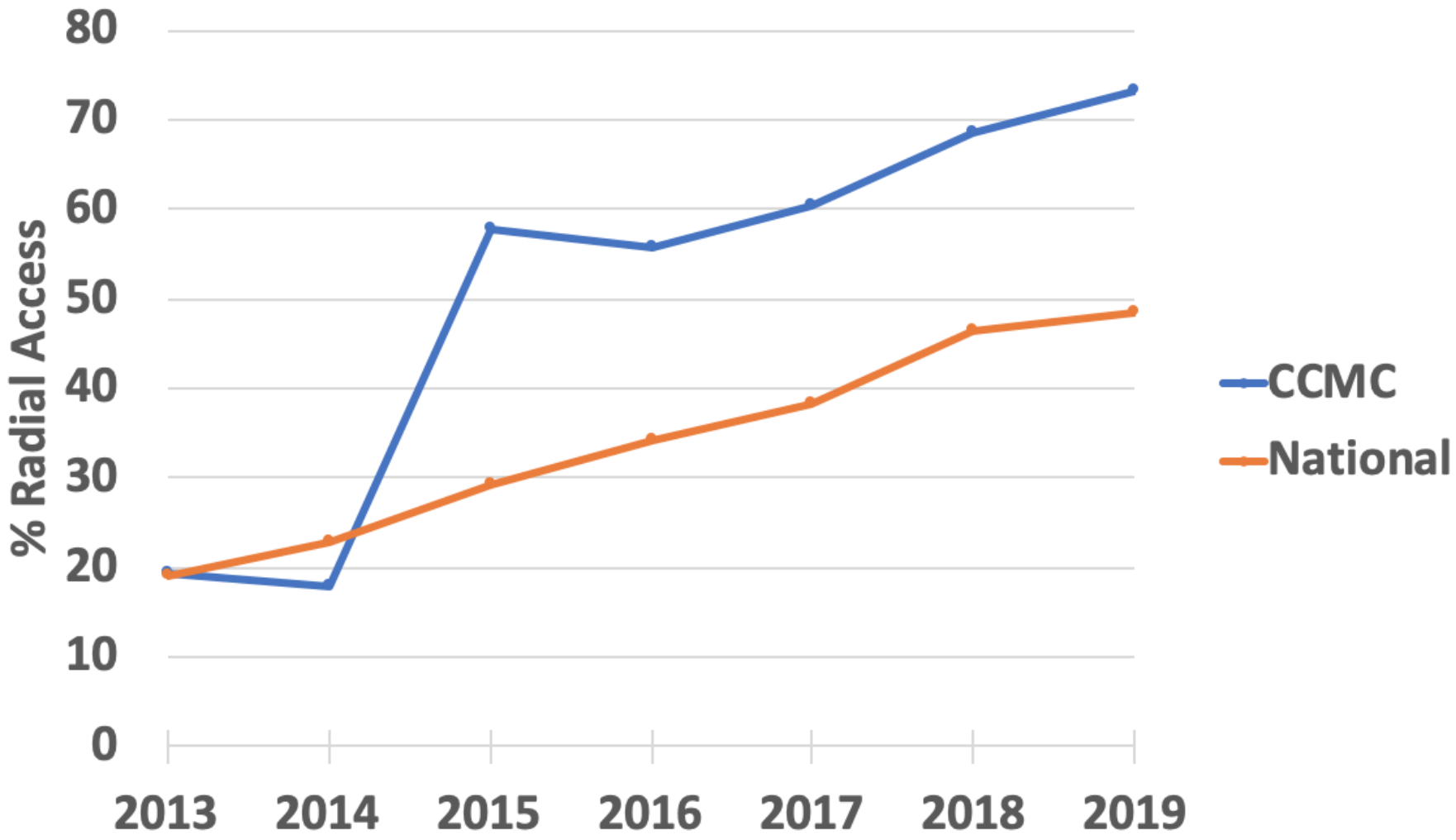
JACC Int 2013;6:814–23

n = 5,055, 12 RCTs

JACC Int 2013;6:814–23

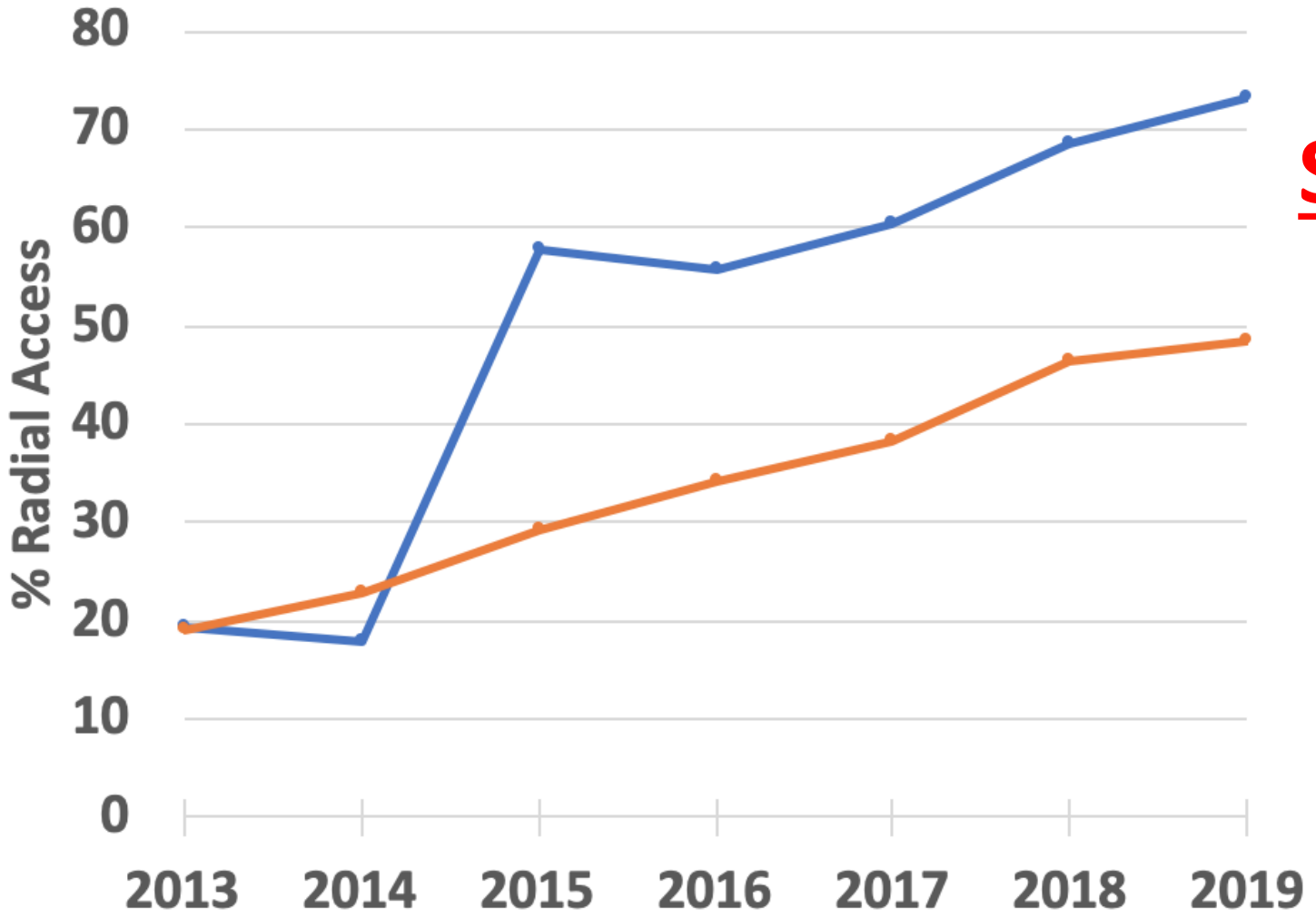
% Radial Access - All PCI

CCMC vs NCDR (US registry) Median



% Radial Access - All PCI

CCMC vs NCDR (US registry) Median



CCMC % radial

STEMI PCI 2019

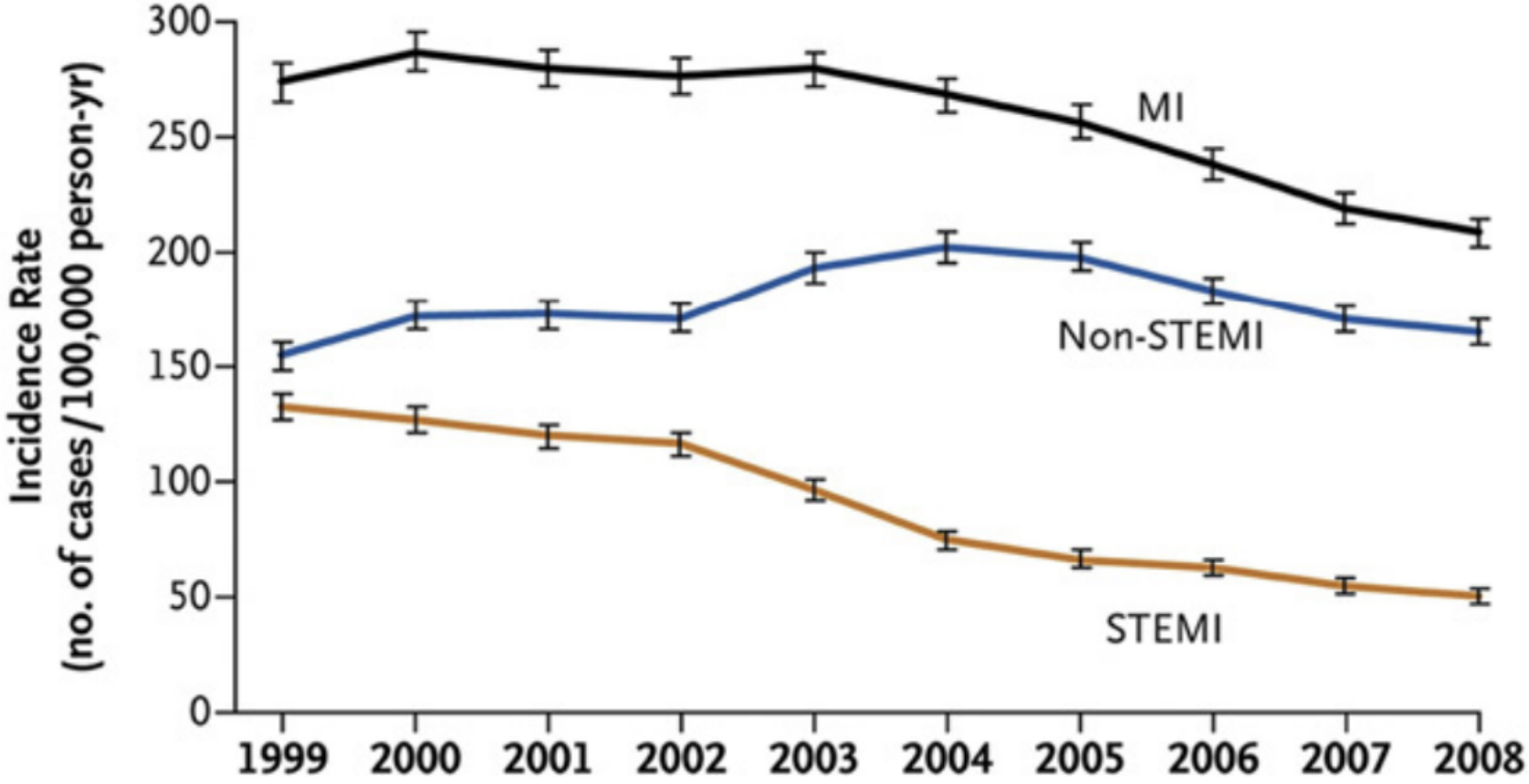
75%

% Radial Access - All PCI

CCMC vs NCDR (US registry) Median

ESC (2017) STEMI Guideline
ESC (2016) NSTEMI Guideline
Radial Access for PCI
Class I

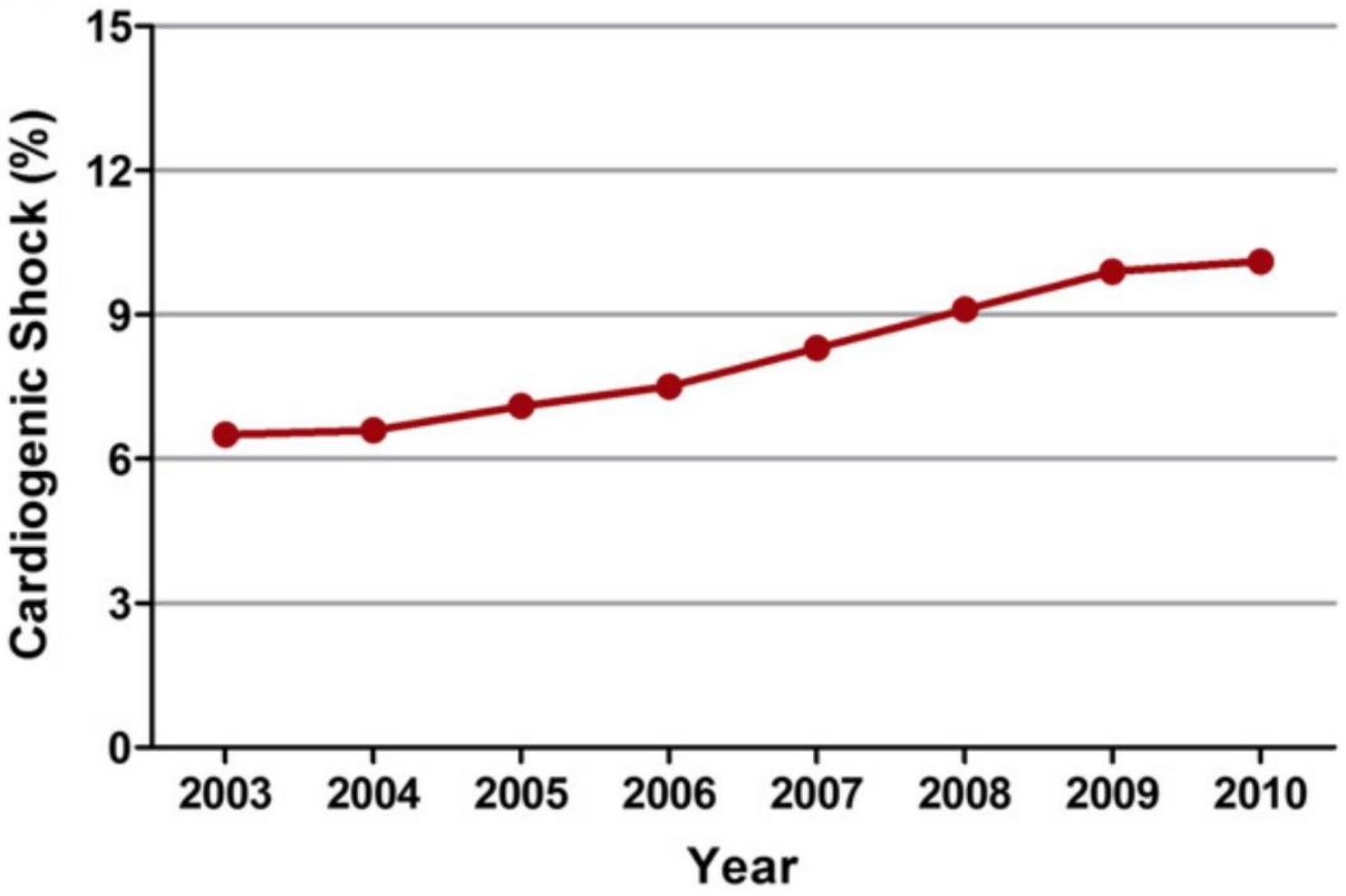
Incidence rate of STEMI is falling…



N Engl J Med 2010;362:2155-65

Admin claims data, multiple health plans
N = 46,086

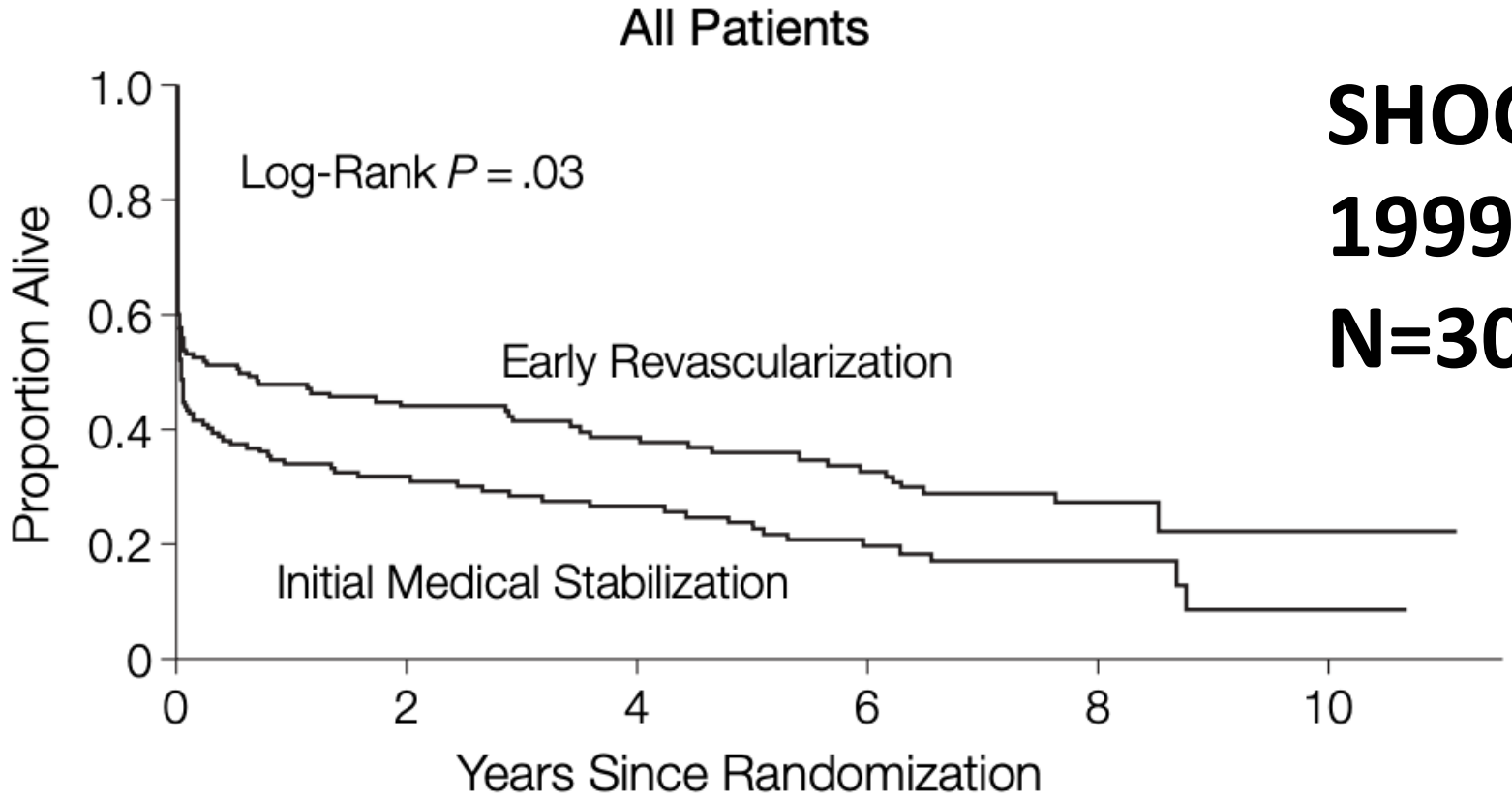
But… incidence rate of Cardiogenic Shock complicating STEMI is rising



n = 1 990 486
Nat'l IP Sample

J Am Heart Assoc. 2014;Vol 3, Issue 1. e000590 doi: 10.1161

EARLY MECHANICAL REVASCULARIZATION improves survival in AMI complicated by Cardiogenic Shock



SHOCK Trial
1999
N=302

JAMA. 2006;295:2511-2515

EARLY MECHANICAL REVASCULARIZATION improves survival in AMI complicated by Cardiogenic Shock

ACC (2013) STEMI Guideline

ESC (2017) STEMI Guideline

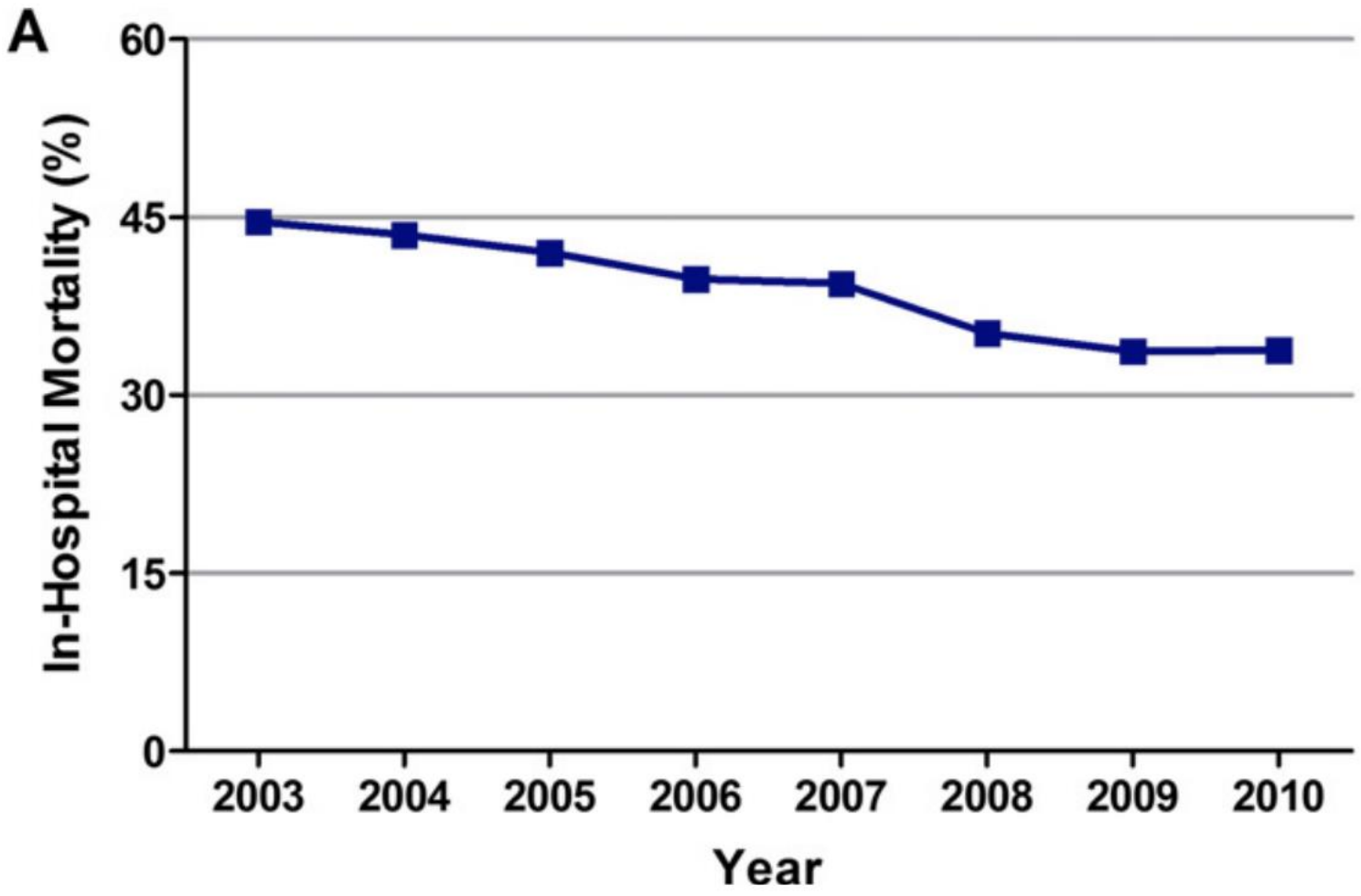
ACC (2014) NSTEMI Guideline

ESC (2015) NSTEMI Guideline

Early mechanical revasc

Class I

IP Mortality of AMI complicated by Cardiogenic Shock fell 2003-2010



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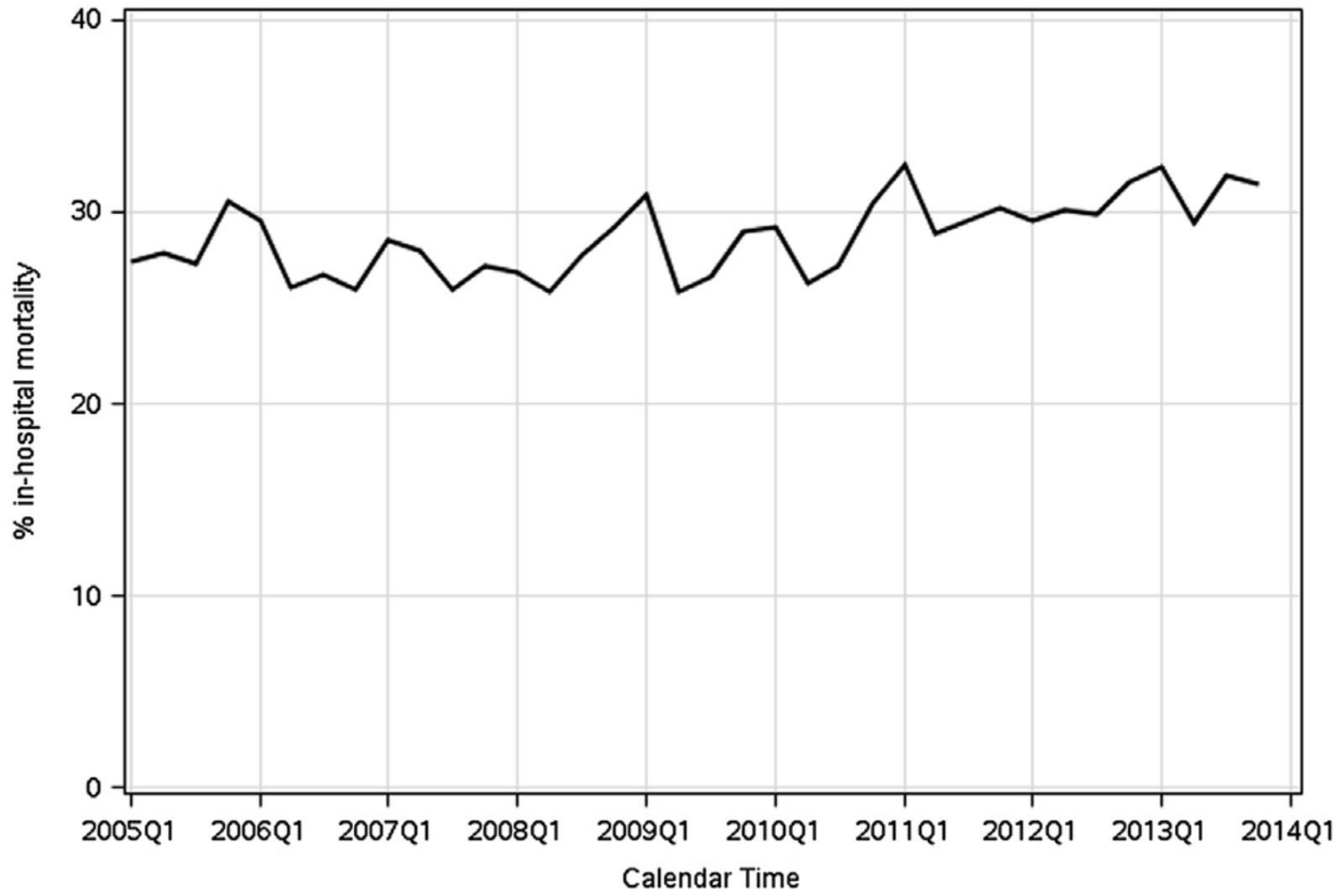
No change 2005 – 2014 IP Mortality
AMI and Cardiogenic Shock treated with PCI

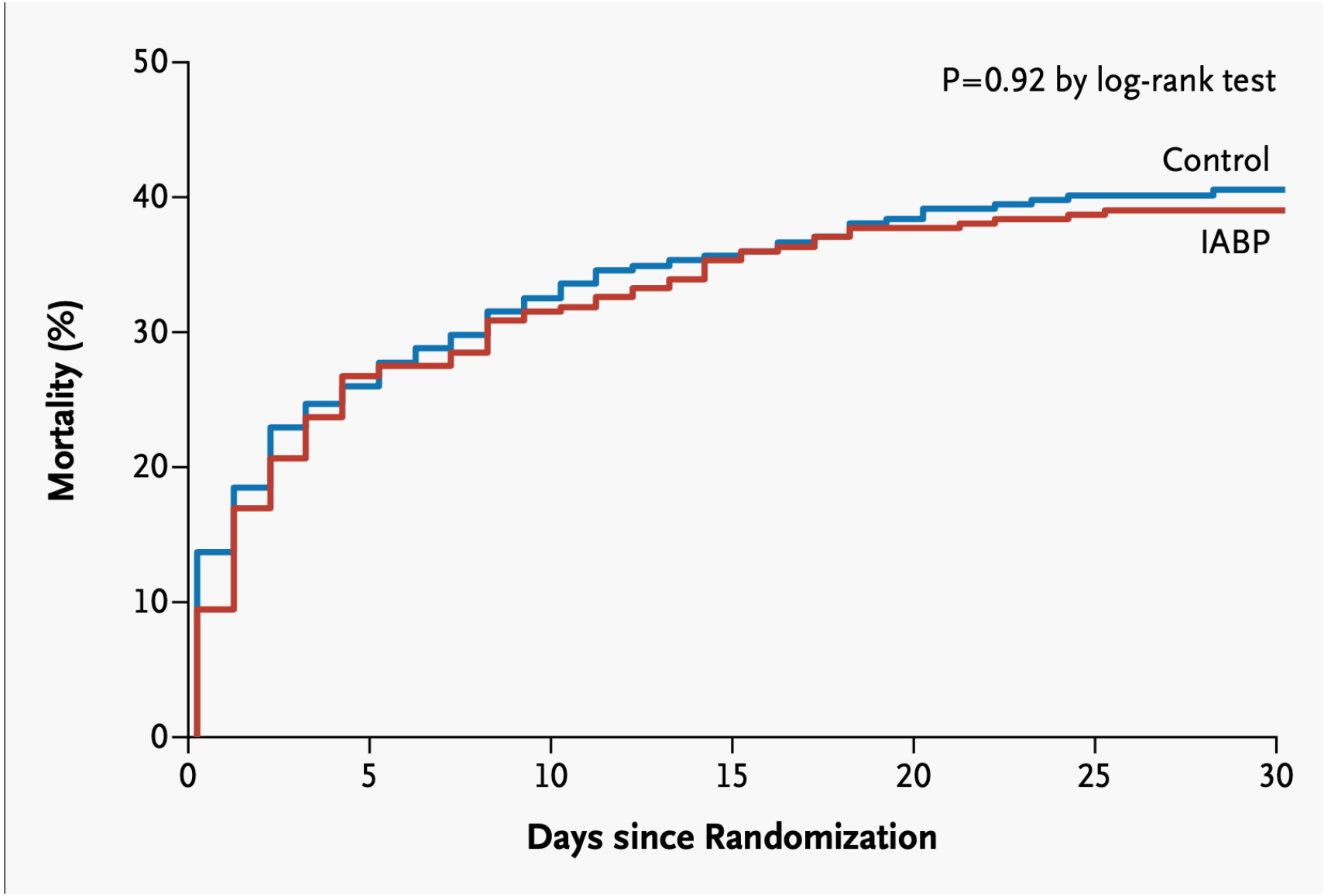
n =56,497
Nat'l Cardiovasc Data Registry
82% STEMI

JACC: CV Interventions
Volume 9, Issue 4
February 2016

FIGURE 1 Rate of In-Hospital Mortality Over Time



IABP Shock 2 – Routine IABP in AMI-Shock lacks benefit



SHOCK II
n = 600
STEMI &
NSTEMI

NEJM 367;
14 (2012)

IABP Shock 2 – Routine IABP in AMI-Shock lacks benefit

ESC (2017) STEMI Guideline

ESC (2015) NSTEMI Guideline

Routine IABP use Class III

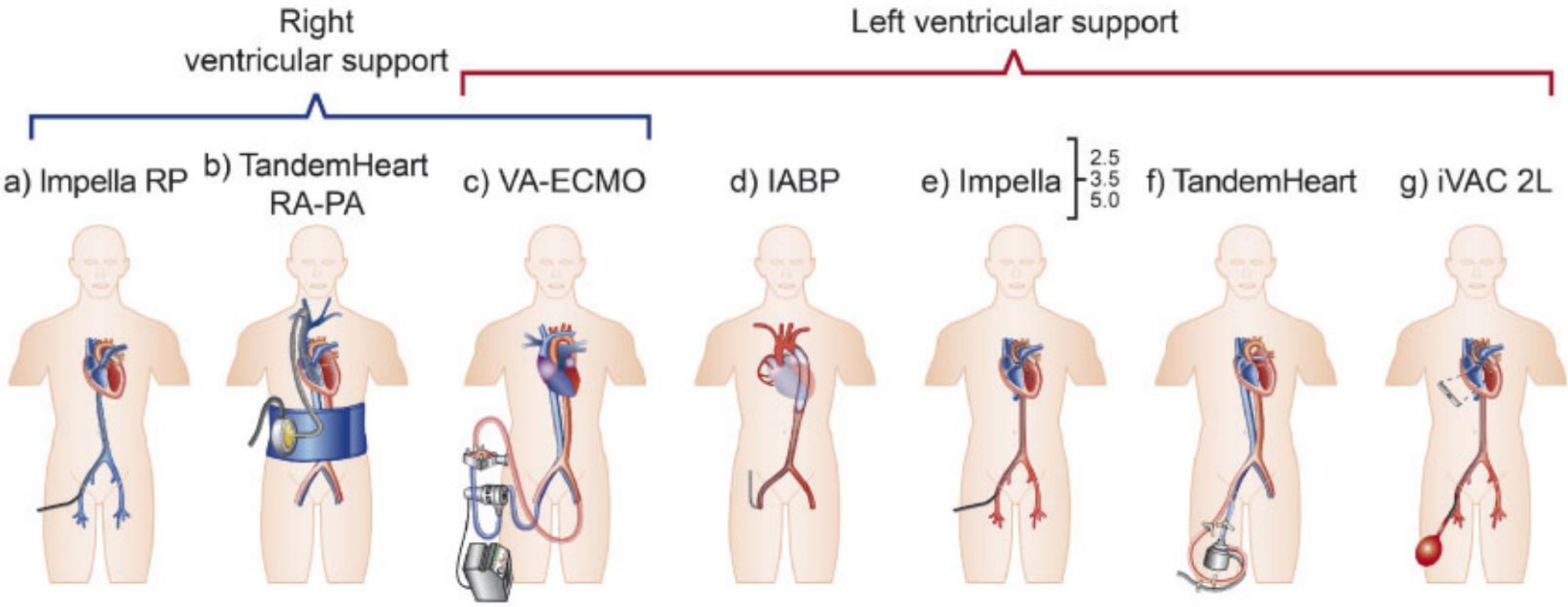
[ACC (2013) STEMI Class IIa]

?

0 5 10 15 20 25 30

Days since Randomization

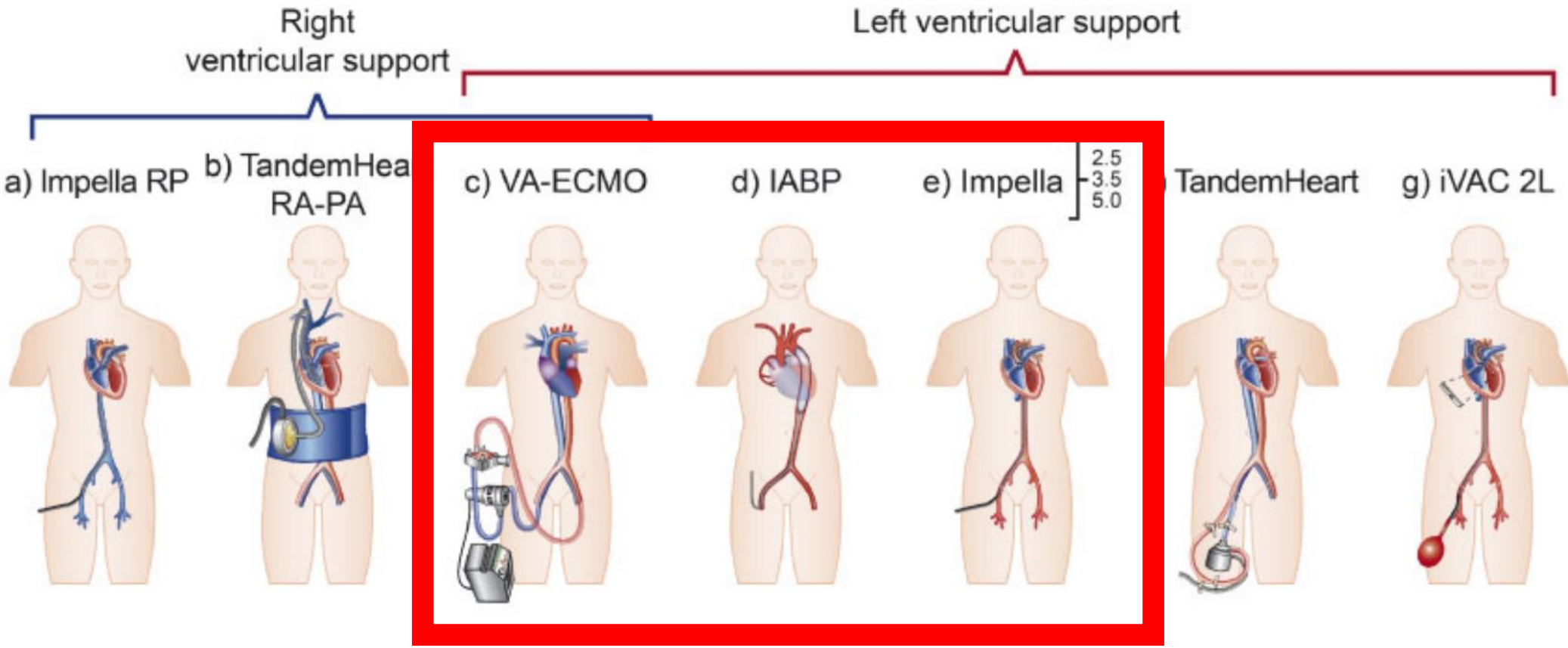
Currently available MCS devices



	a) Impella RP	b) TandemHeart RA-PA	c) VA-ECMO	d) IABP	e) Impella 2.5 3.5 5.0	f) TandemHeart	g) iVAC 2L
Flow:	max. 4.0 L	max. 4.0 L	max. 7.0 L		2.5-5.0 L	max. 4.0 L	max. 2.8 L
Pump speed:	33.000 rpm	max. 7.500 rpm	max. 5000 rpm		max. 51.000 rpm	max. 7.500 rpm	40 ml/beat
Cannula size:	22 F	29 F	14-19 F arterial 17-21F venous	7-8 F	12-14 F	12-19 F arterial 21F venous	17 F

EHJ (2019) 40, 2671–2683

Currently available MCS devices



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EHJ (2019) 40, 2671–2683

RCTs of MCS devices in AMI-CS are very challenging…

Randomization in Cardiogenic Shock is Challenging

Attempted Randomized Impella® Trials In Emergent Settings

Study	Trial ID	Condition	Pts Required (n)	Pts Enrolled (n)	Duration (months)	Status	Discontinuation Reason/ comment
FRENCH TRIAL (2006)	NCT00314847	AMI CS	200	19	52	Discontinued	Low Enrollment
ISAR-SHOCK (2006)	NCT00417378	AMI CS	26	26	19	Completed	Non-Randomized Execution; Cardiac Output Study
IMPRESS in STEMI (2007)	NTR1079 trialregister.nl	STEMI Pre-CS	130	21	42	Discontinued	Low Enrollment
RECOVER I FDA (2008)	NCT00596726	PCCS	Up to 20	17	28	Completed	Feasibility Study
RECOVER II FDA (2009)	NCT00972270	AMI CS	384	1	18	Discontinued	Low Enrollment; 50 IRBs approved
RELIEF I (2010)	NCT01185691	ADHF	20	1	33	Discontinued	Low Enrollment
IMPRESS in CA (2016)	NTR3450	Cardiac Arrest Mechanical Ventilation	>100	48	52	Discontinued	Low Enrollment; Non-Randomized Execution
DanGer SHOCK (2012)	NCT01633502	AMI CS	360	147	85	Enrolling	ABMD funded, ongoing

MCS in AMI with CS: A field in its infancy
What you think depends on where you sit

"Without data you're just another person with an opinion"

- W. Edwards Deming

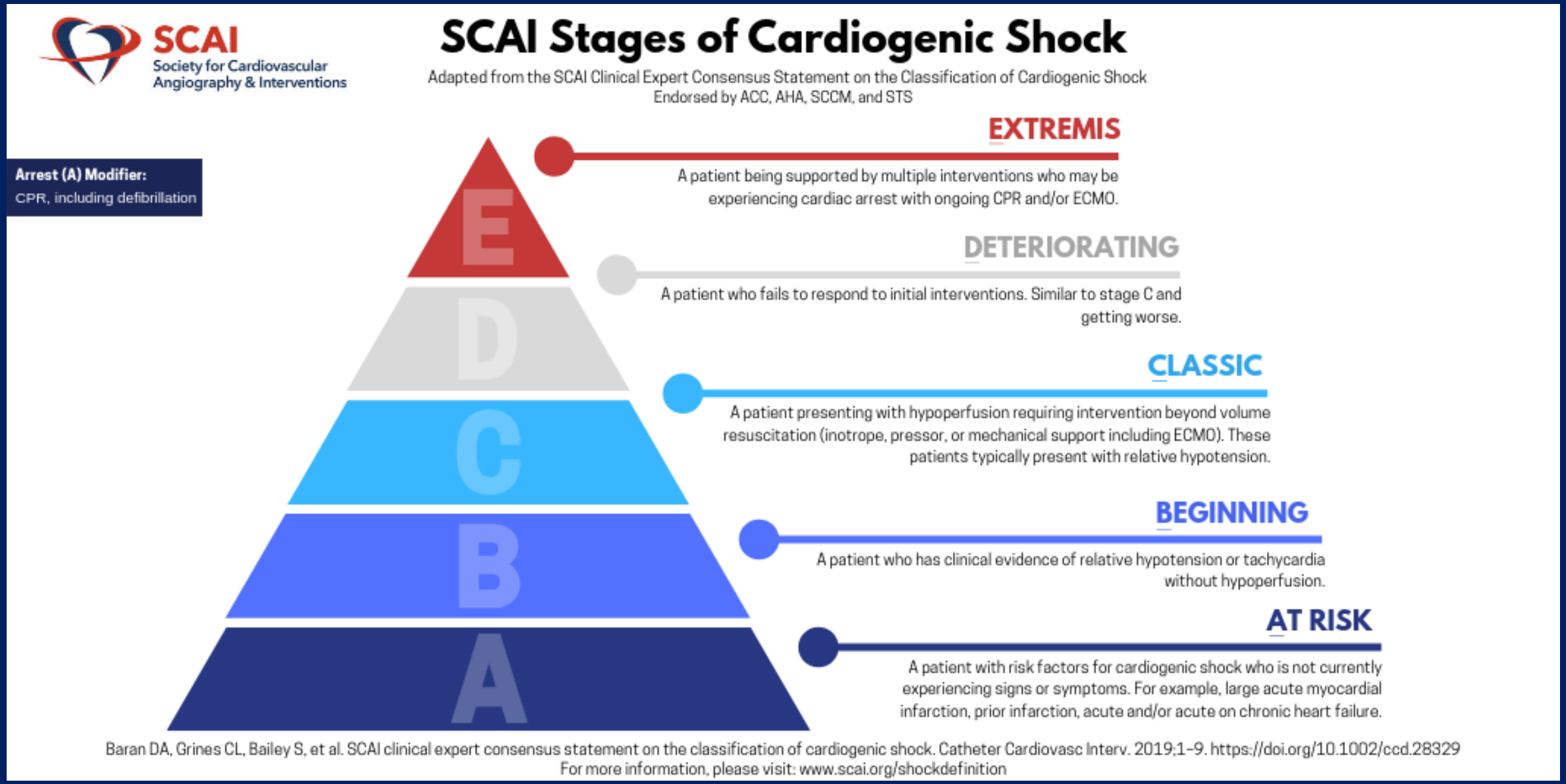
RCTs of MCS devices in AMI-CS are very challenging…

RANDOMIZATION IN CARDIOGENIC SHOCK IS CHALLENGING

ESC (2017) STEMI Guideline
ACC (2013) STEMI Guideline
Mechanical Circulatory Support (other than IABP)
Class IIb

DanGer SHOCK (2012)	NCT01633502	AMI CS	360	147	85	Enrolling	ABMD funded, ongoing

Multisocietal agreement on staging/definition of CS – 2019



- STEMI regional systems of care will mature
- Systematize care of AMI with Cardiogenic Shock
- Treatment protocols for NSTEMI will mature
- Technique, technology, pharmacology of PCI for ACS will continue to evolve

CROZER KEYSTONE
HEALTH SYSTEM