

Tough calls in acute cardiology - Accept the challenge



UNIVERSITÄT
LEIPZIG

Cardiogenic shock: When to use an assist device?

Holger Thiele

Heart Center Leipzig at University of
Leipzig

Declaration of interest

- I have nothing to declare

Disclosures

Funding:

German Research Foundation

German Heart Research Foundation

German Cardiac Society

European Union

Arbeitsgemeinschaft Leitende Kardiologische Krankenhausärzte

Else Kröner Fresenius Foundation

Consulting:

None

Speaker Honoraria:

None

Patient – Case

72 years, male patient

Onset of angina 17:00 h, worsening symptoms and severe dyspnea

21:00 h

112 (911) call 21:30 h

Mechanical ventilation because of lung edema

Arrival Heart Center Leipzig 22:30 h

Blood pressure: 77/61 mmHg

Heart rate: 125/min

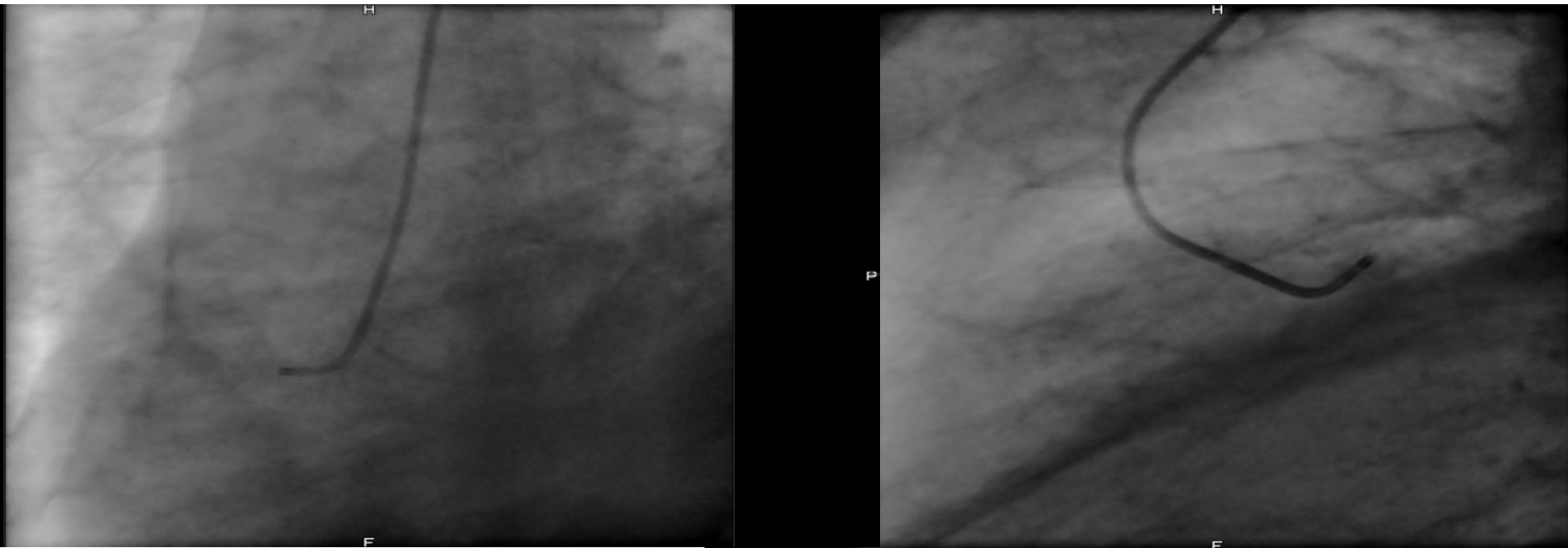
Arterial lactate: 5.8 mmol/l

Cold skin and extremities

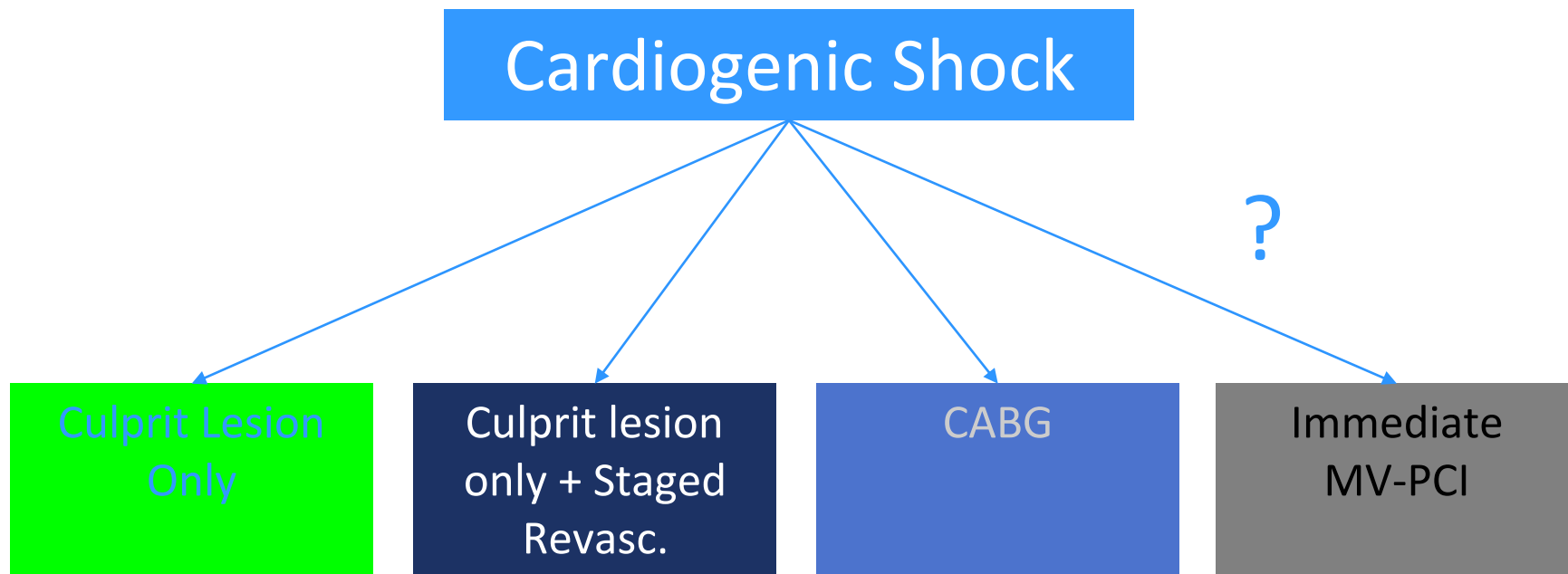
Catecholamines

CVRF: Hypertension, HLP, Diabetes

Anterior STEMI – Cardiogenic Shock



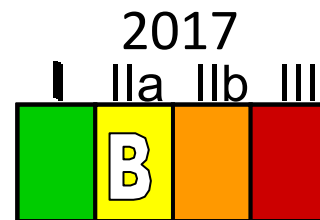
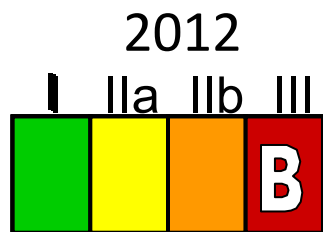
Revascularization Strategy?



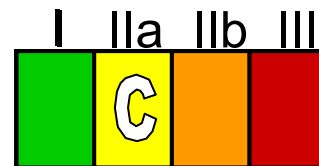
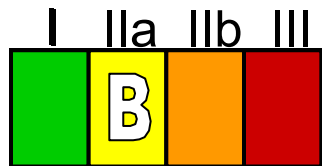
Multivessel PCI in STEMI?

ESC STEMI Guidelines 2017

STEMI, no shock

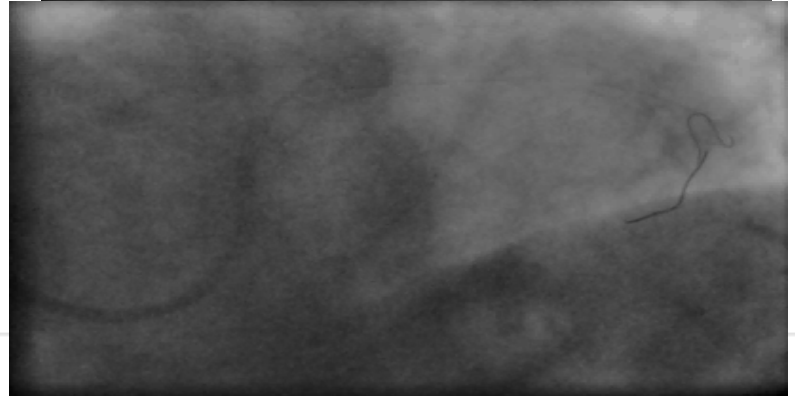
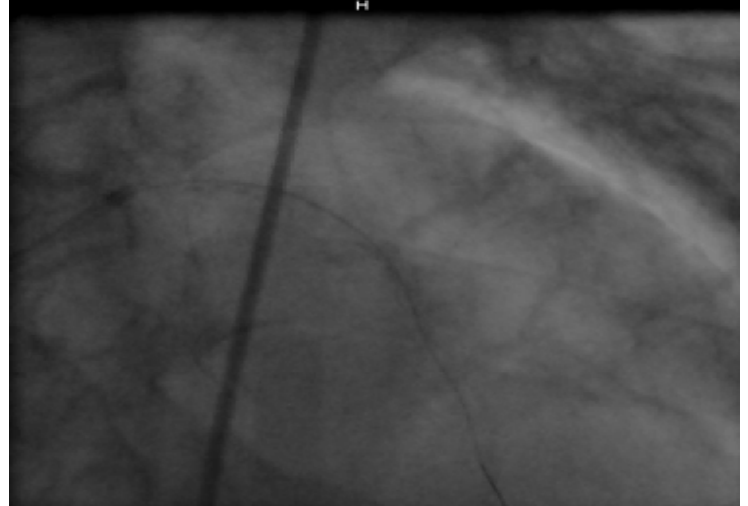


STEMI, shock



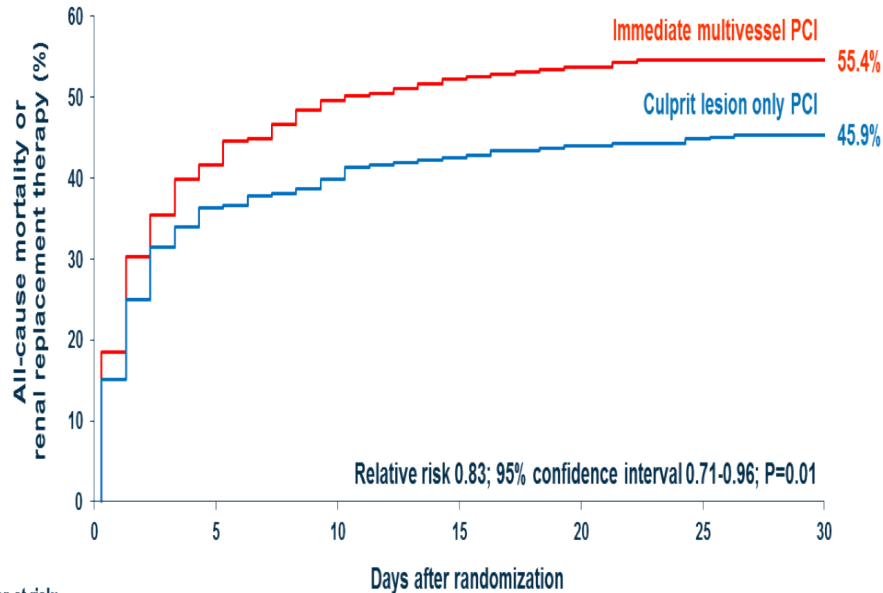
Together with

Anterior STEMI – Cardiogenic Shock



CULPRIT-SHOCK Trial – 30-Day Results

Primary study endpoint – 30 days
All-cause mortality or renal replacement therapy



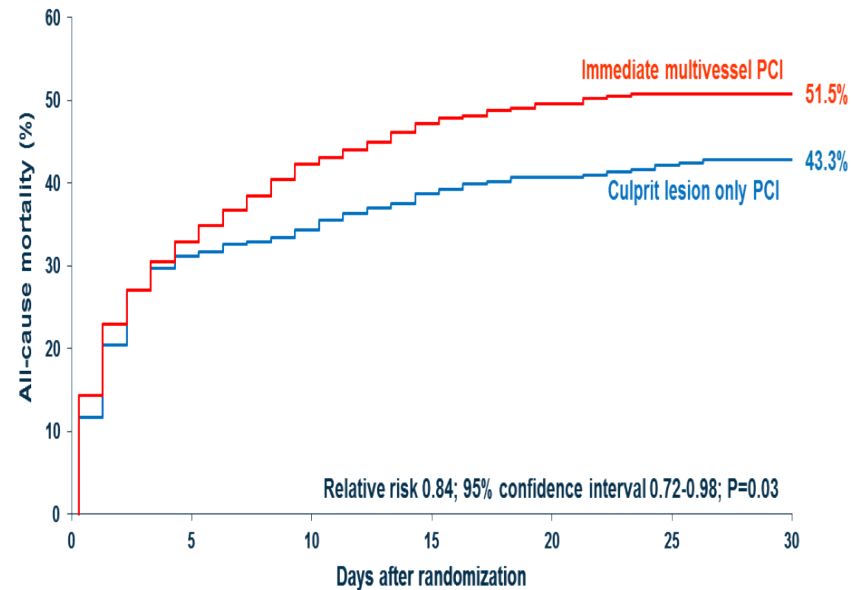
Number at risk:

Culprit lesion only PCI	344	219	207	198	192	189	184
Immediate multivessel PCI	341	219	172	162	156	153	152

Together with

ESC Congress Paris 2019 World Congress of Cardiology

All-cause mortality – 30 days



Number at risk:

Culprit lesion only PCI	344	237	226	211	203	198	193
Immediate multivessel PCI	341	229	197	179	170	166	165

Multivessel PCI in Shock - Guideline Evolution

ESC STEMI Guidelines 2017 → Revascularization Guidelines 2018

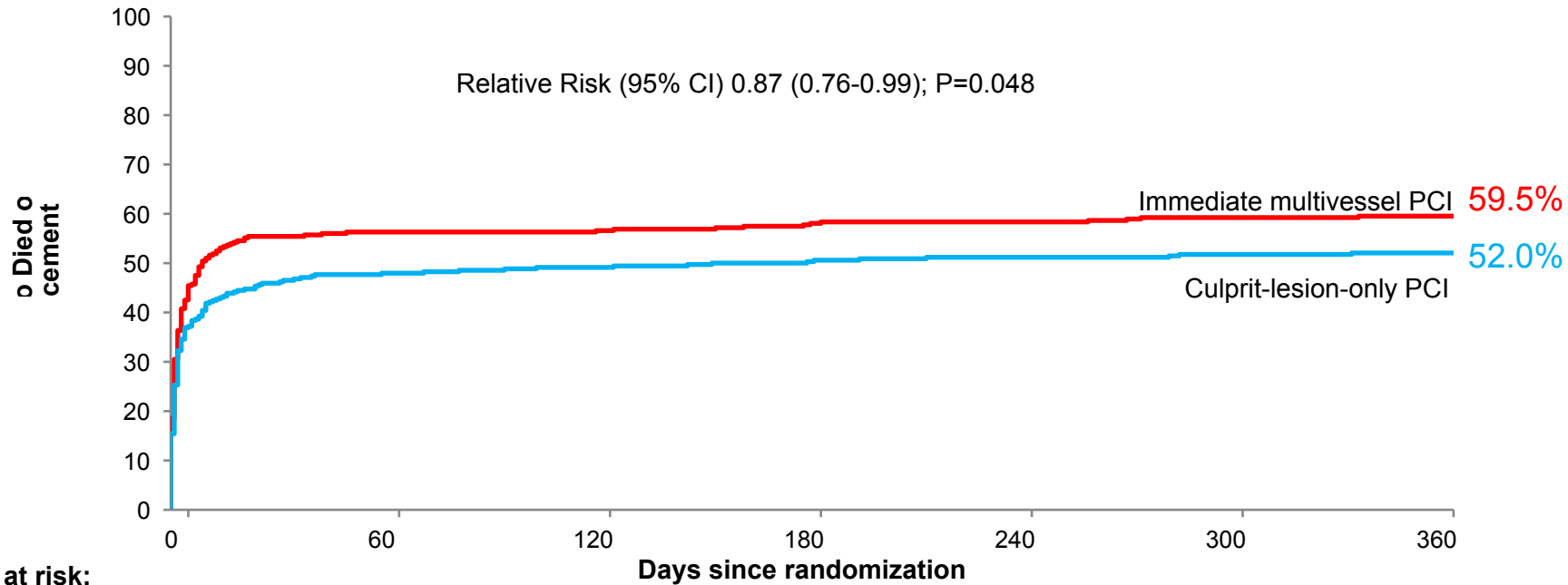
STEMI (NSTEMI), Cardiogenic Shock

2017

2018



1-Year Mortality/Renal Replacement Therapy

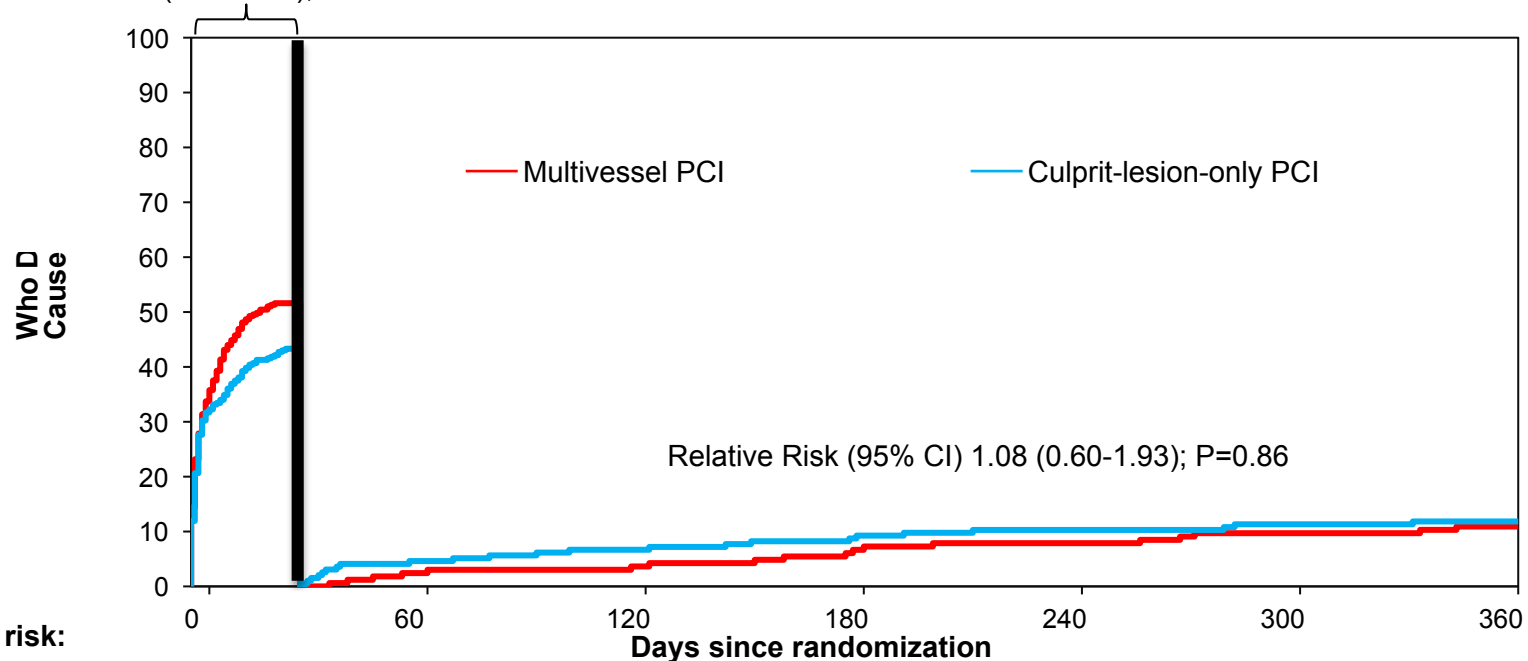


Number at risk:

Culprit-lesion-only PCI	344	179	174	171	167	165	142
Immediate multivessel PCI	341	149	149	145	142	139	122

1-Year Mortality – Landmark Analysis

Relative Risk (95% CI)
0.84 (0.72-0.98); P=0.03



Number at risk:

Multivessel PCI 165 161 160 156 152 149 131

Culprit-lesion-only PCI 195 186 181 178 174 172 147

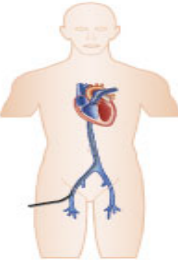
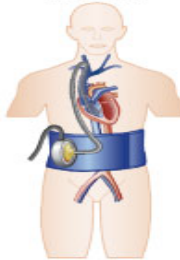
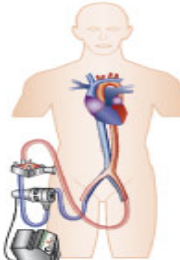
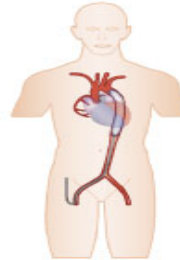
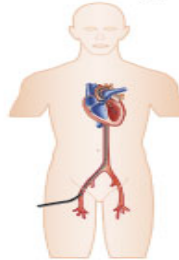
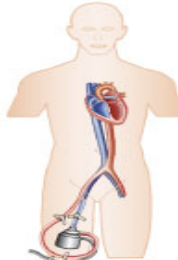
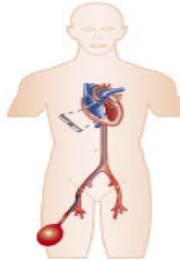
Together with
ESC Congress World Congress
Paris 2019 of Cardiology

MCS?

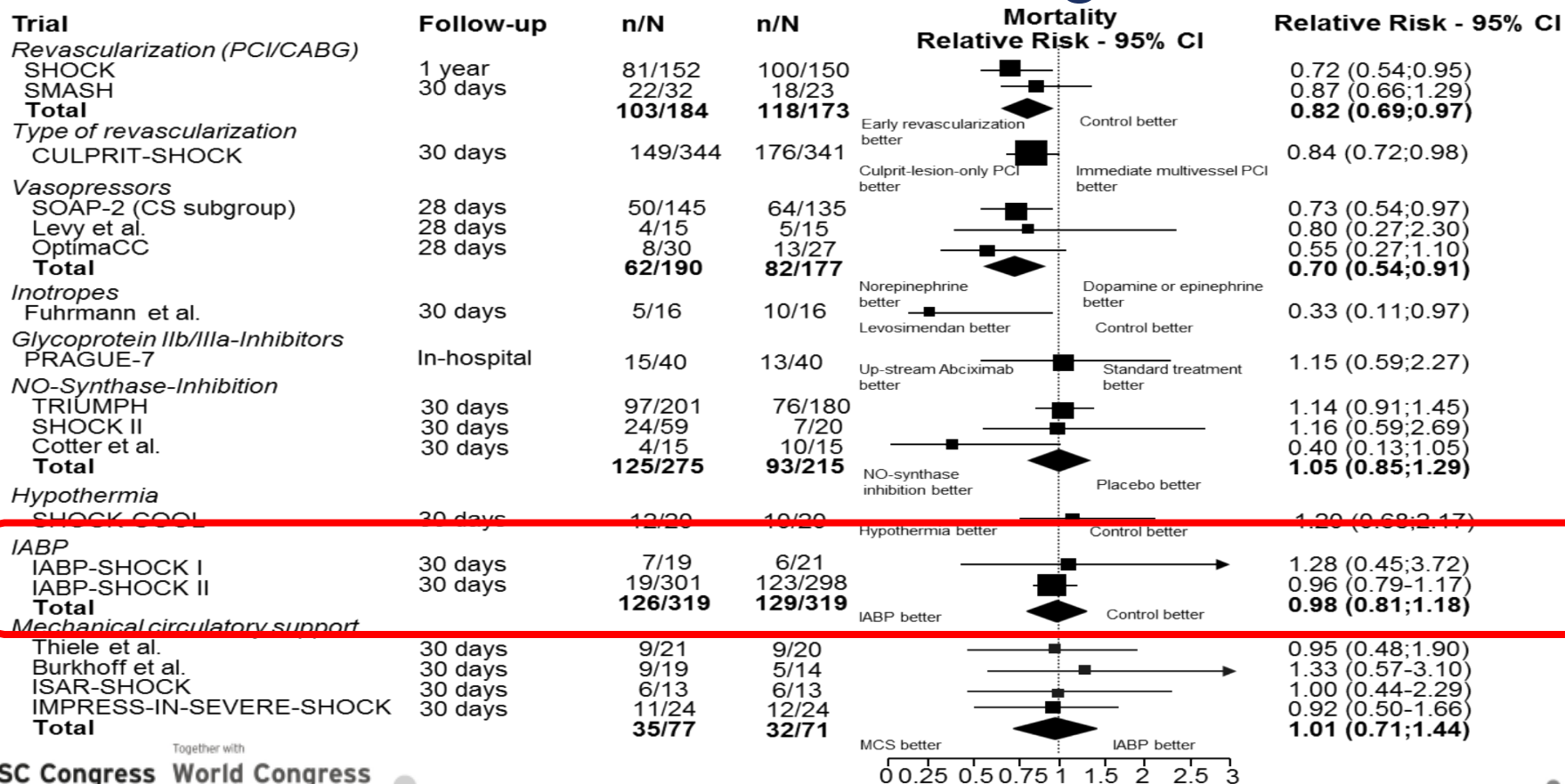
1. IABP?
2. Impella?
3. TandemHeart?
4. ECMO?
5. No MCS?



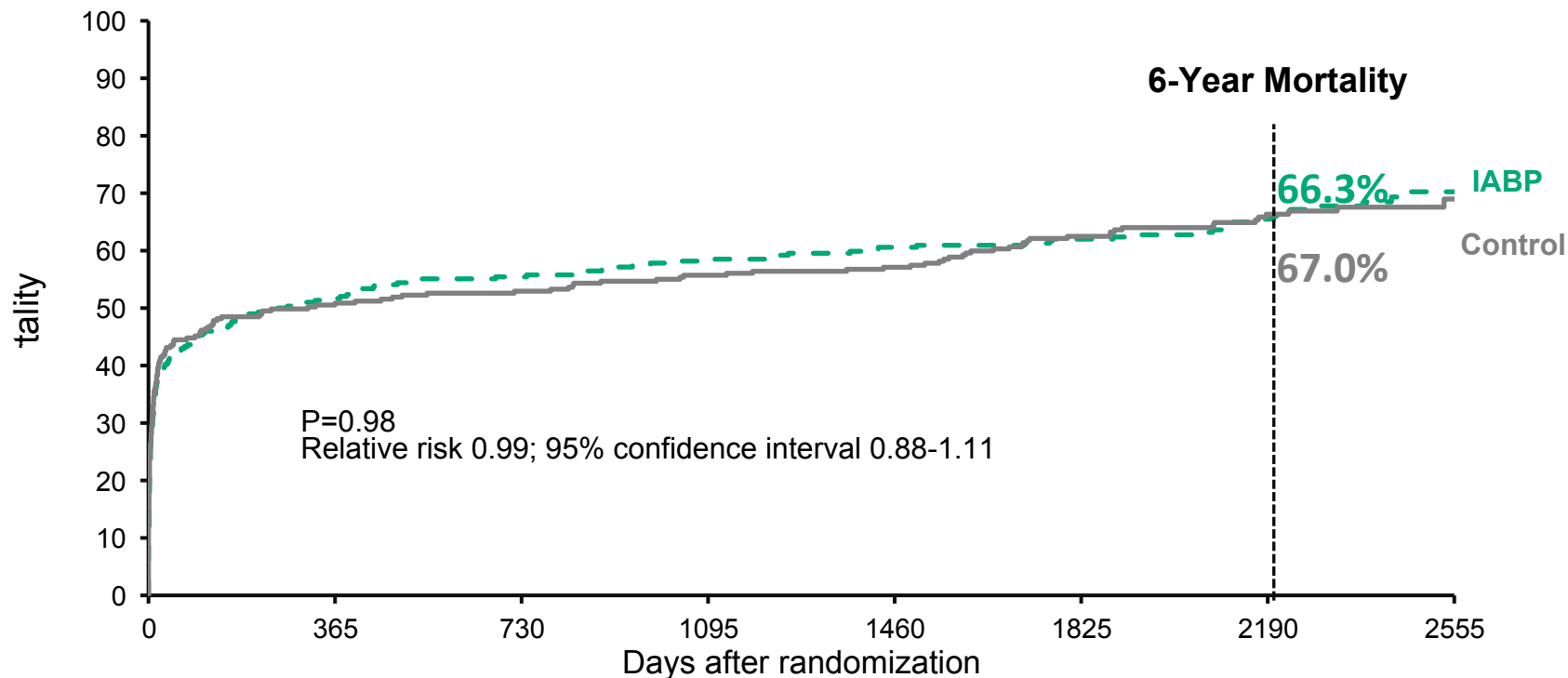
Currently Available MCS

	Right ventricular support			Left ventricular support			
	a) Impella RP	b) TandemHeart RA-PA	c) VA-ECMO	d) IABP	e) Impella $\left. \begin{matrix} 2.5 \\ 3.5 \\ 5.0 \end{matrix} \right\}$	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
Insertion/ Placement	Femoral vein	Internal jugular vein	Femoral artery Femoral vein	Femoral artery	Femoral artery	Femoral artery Femoral vein for LA access	Femoral artery
LV Unloading	-	-	-	(+)	++	++	+
RV Unloading	+	+	++	-	-	-	-

Randomized Trials – Cardiogenic Shock



Long-Term Mortality – ITT-Population



No. at risk

	0	365	730	1095	1460	1825	2190	2555
IABP	301	144	130	122	114	105	63	24
Control	299	145	136	128	122	102	69	20

ESC and AHA/ACC Guidelines 2012-2018

IABP in cardiogenic shock



Class IC → IIb B → III



Class IB → IIa B

Van de Werf et al. Eur Heart J. 2008;29:2909-2945

Roffi et al. Eur Heart J. 2016;37:267-315

Windecker et al. Eur Heart J. 2014;35:2541-2619

Ponikowski et al. Eur Heart J. 2016;37:2129-2200

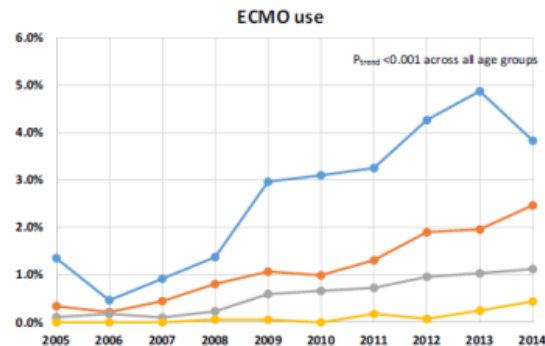
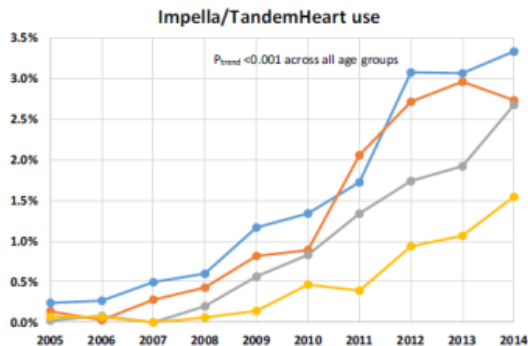
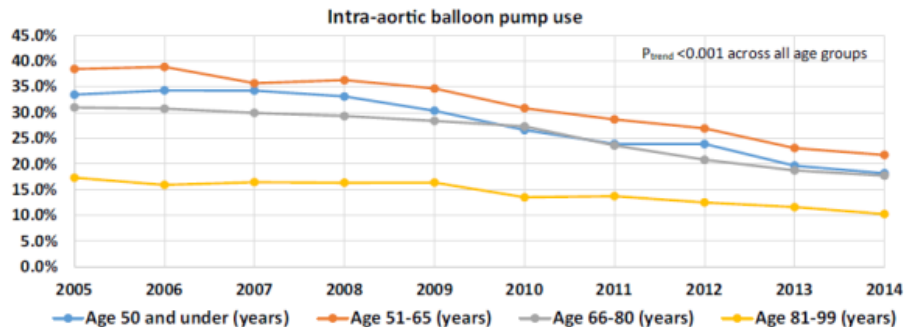
Ibanez et al. Eur Heart J 2018;39:119-177

Antman et al. Circulation. 2004;110:82-292

O'Gara et al. Circulation. 2013;127:e362-e425

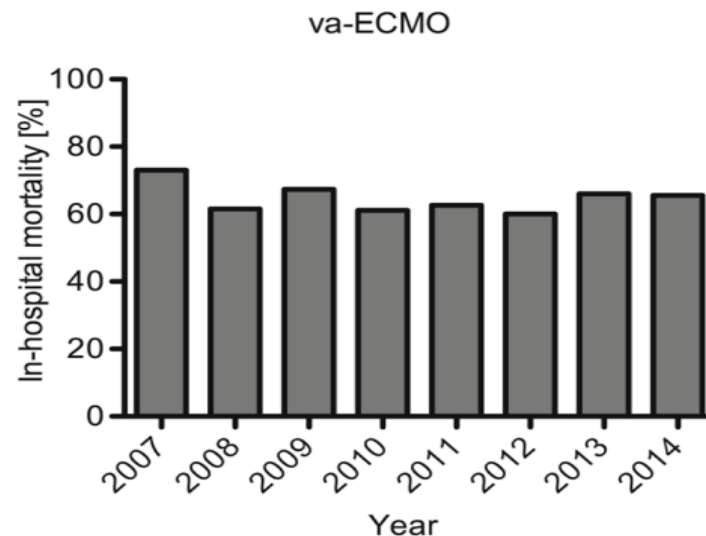
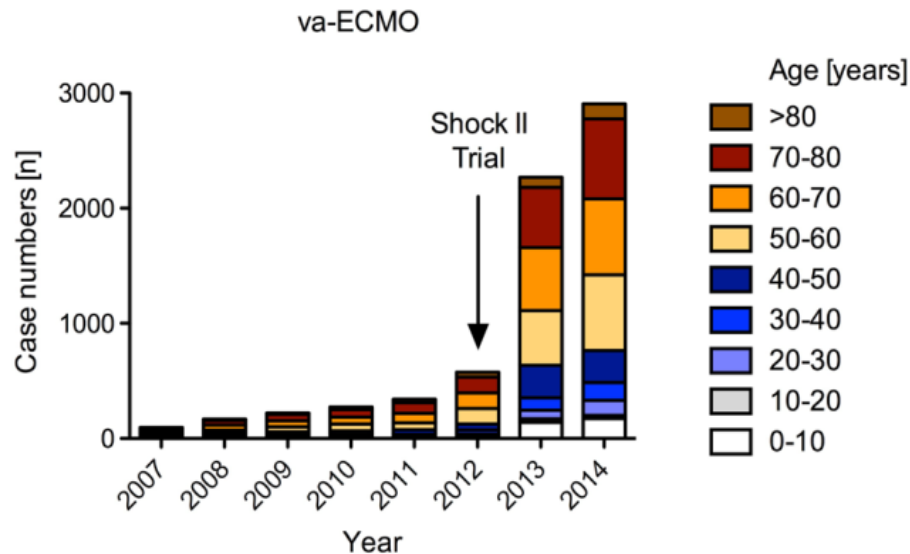
IABP + Other Devices Use

US Registry: 144,254 patients with cardiogenic shock

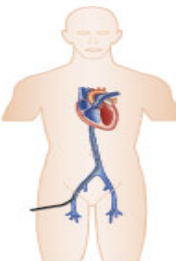
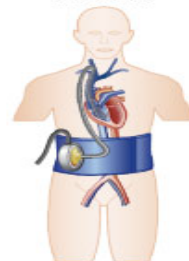
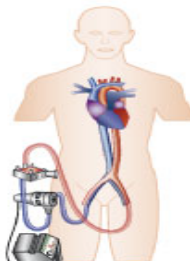
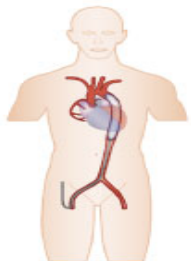
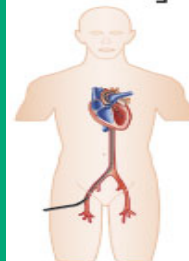
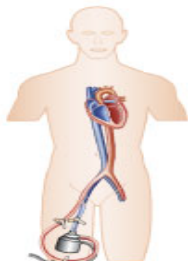
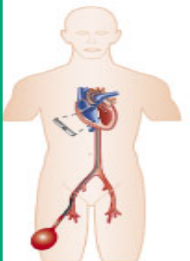


Together with

ECMO Use in Germany

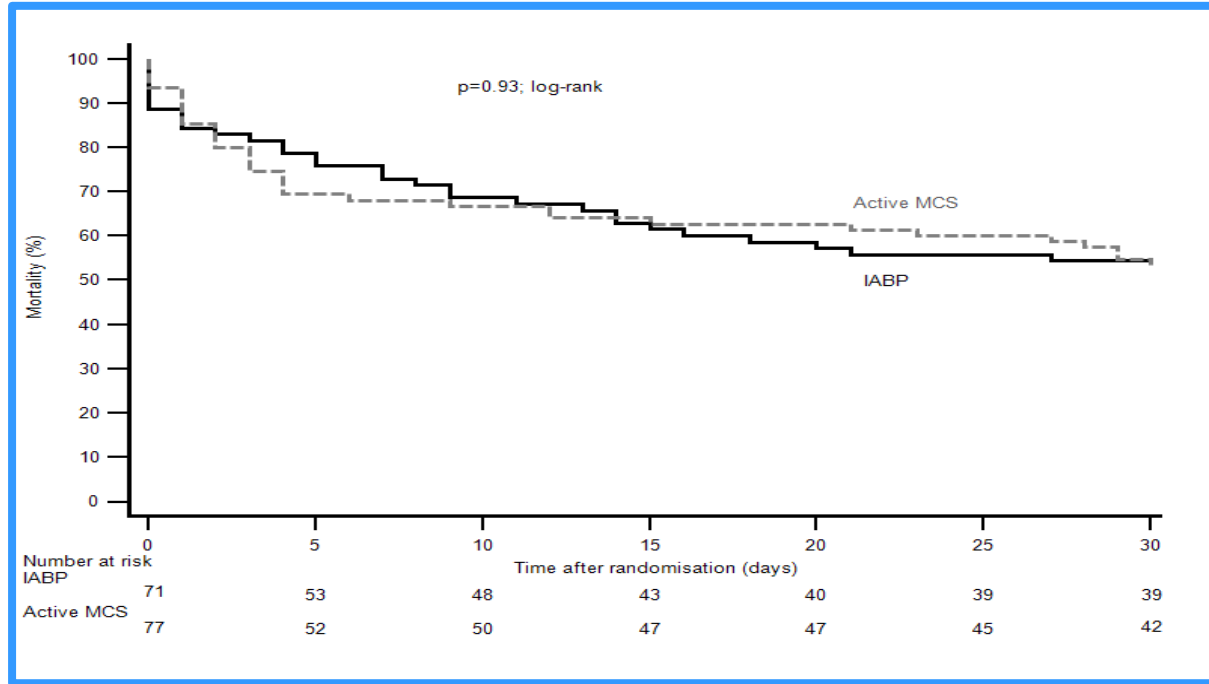


Currently Available MCS

Right ventricular support			Left ventricular support			
a) Impella RP	b) TandemHeart RA-PA	c) VA-ECMO	d) IABP	e) Impella	f) TandemHeart	g) iVAC 2L
						
max. 4.0 L 33.000 rpm 22 F	max. 4.0 L max. 7.500 rpm 29 F	max. 7.0 L max. 5000 rpm 14-19 F arterial 17-21F venous		2.5-5.0 L max. 51.000 rpm 12-14 F	max. 4.0 L max. 7.500 rpm 12-19 F arterial 21F venous	max. 2.8 L 40 ml/beat 17 F
Femoral vein	Internal jugular vein	Femoral artery Femoral vein	Femoral artery	Femoral artery	Femoral artery Femoral vein for LA access	Femoral artery
- +	- +	- ++	(+) -	+ - ++ -	++ -	+ -

Actual Metaanalysis MCS

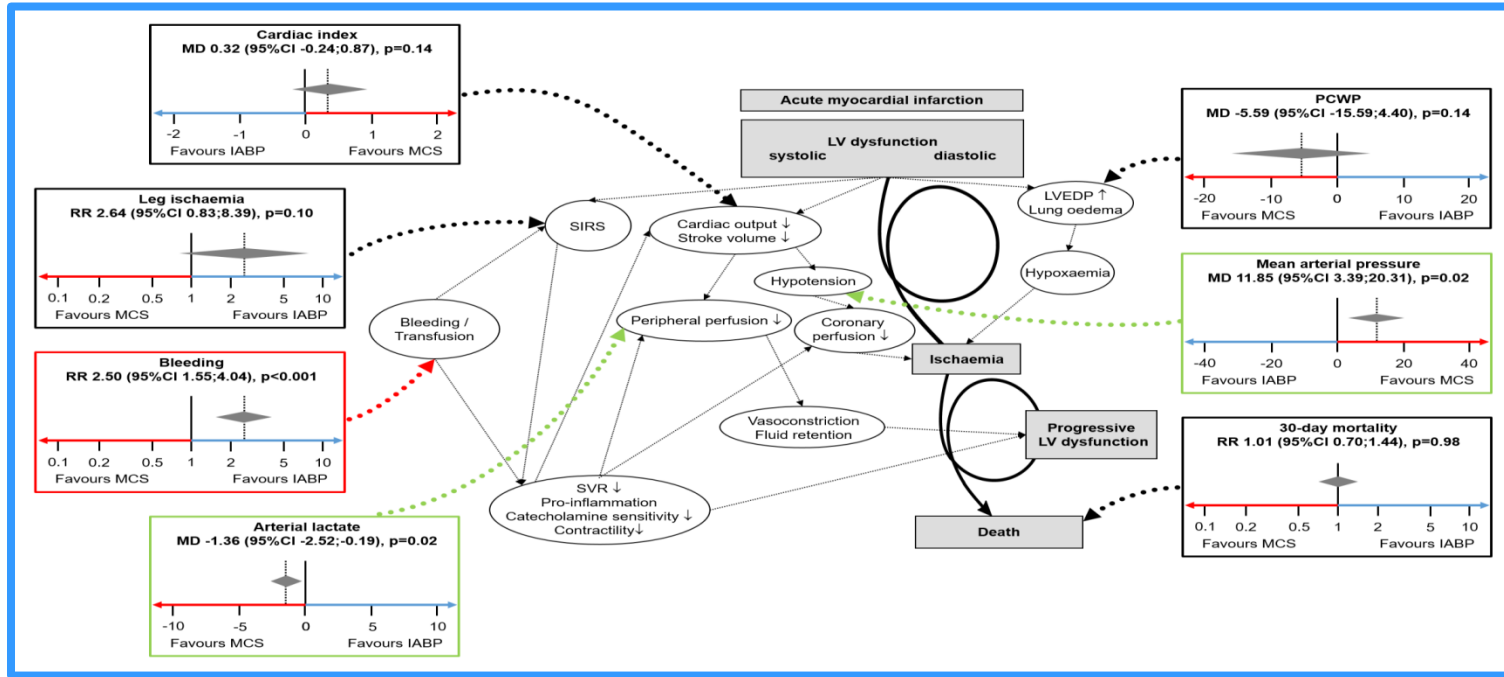
Mortality, N=148



Together with

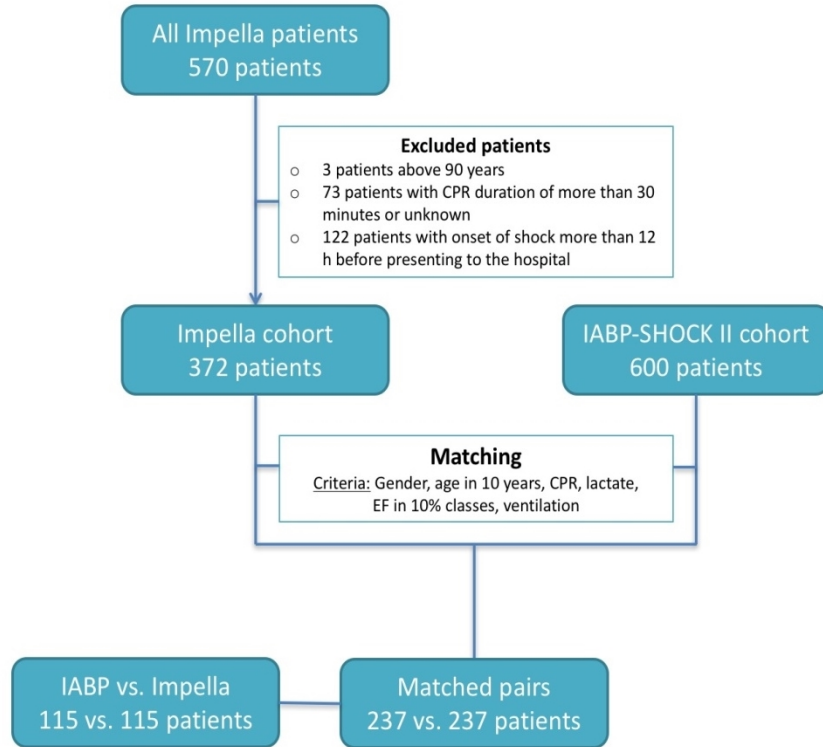
Actual Metaanalysis MCS

Summary Effects

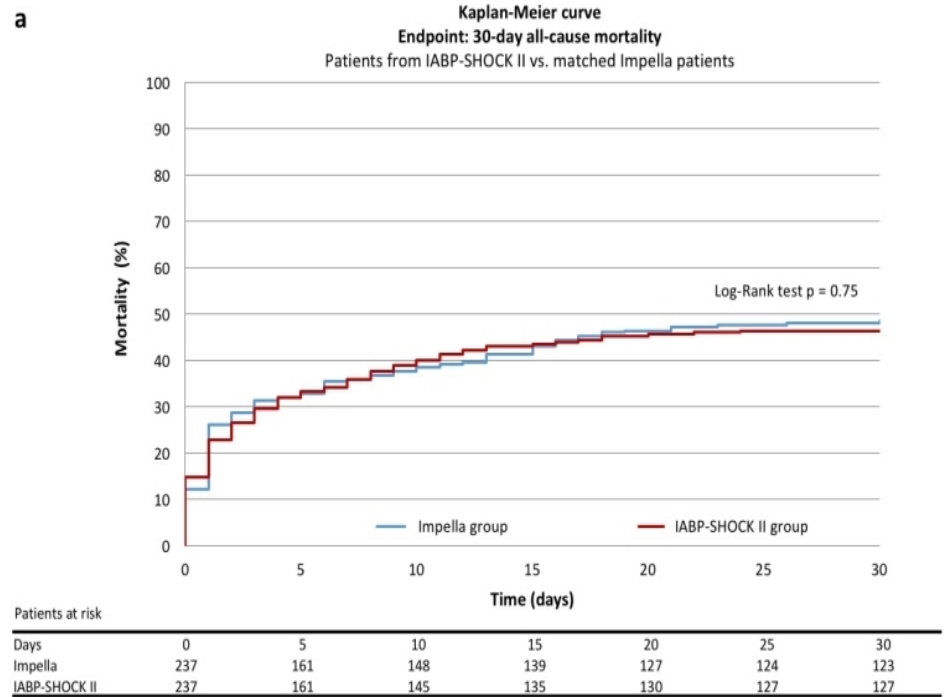


Together with

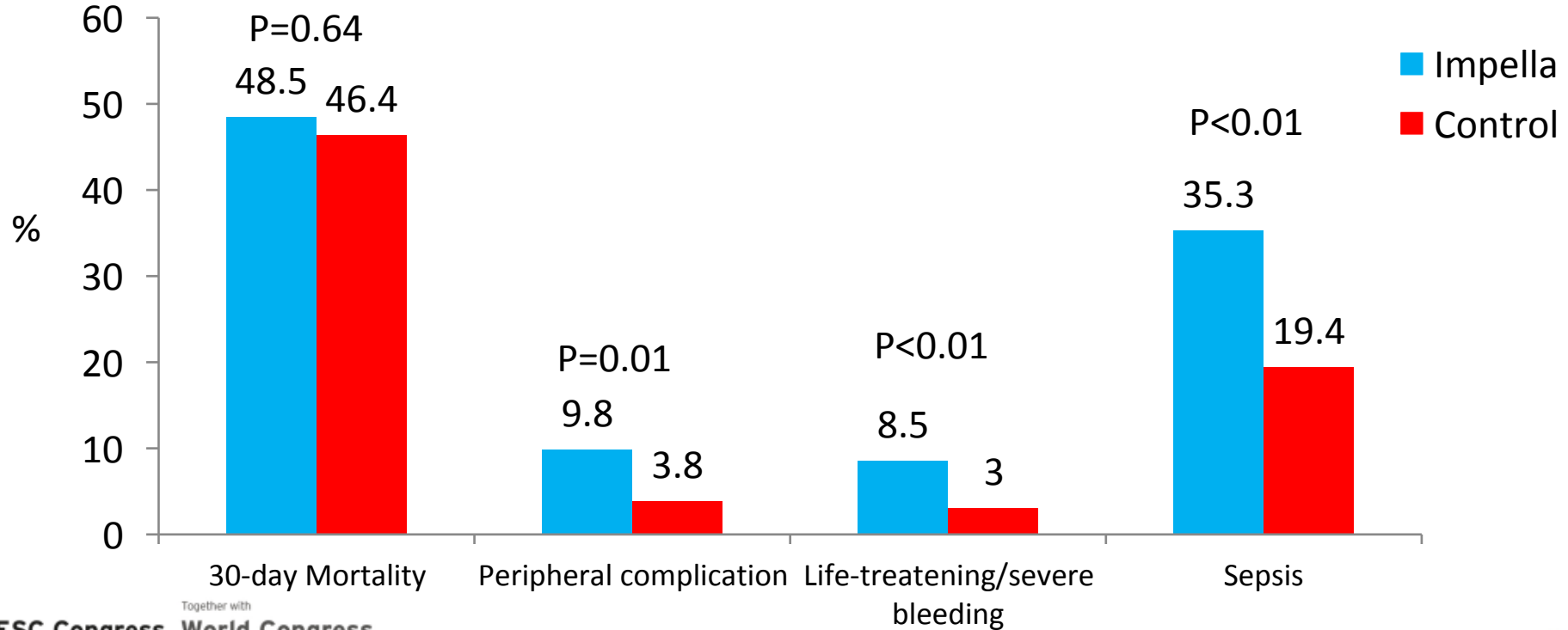
Impella vs IABP – Matched Comparison



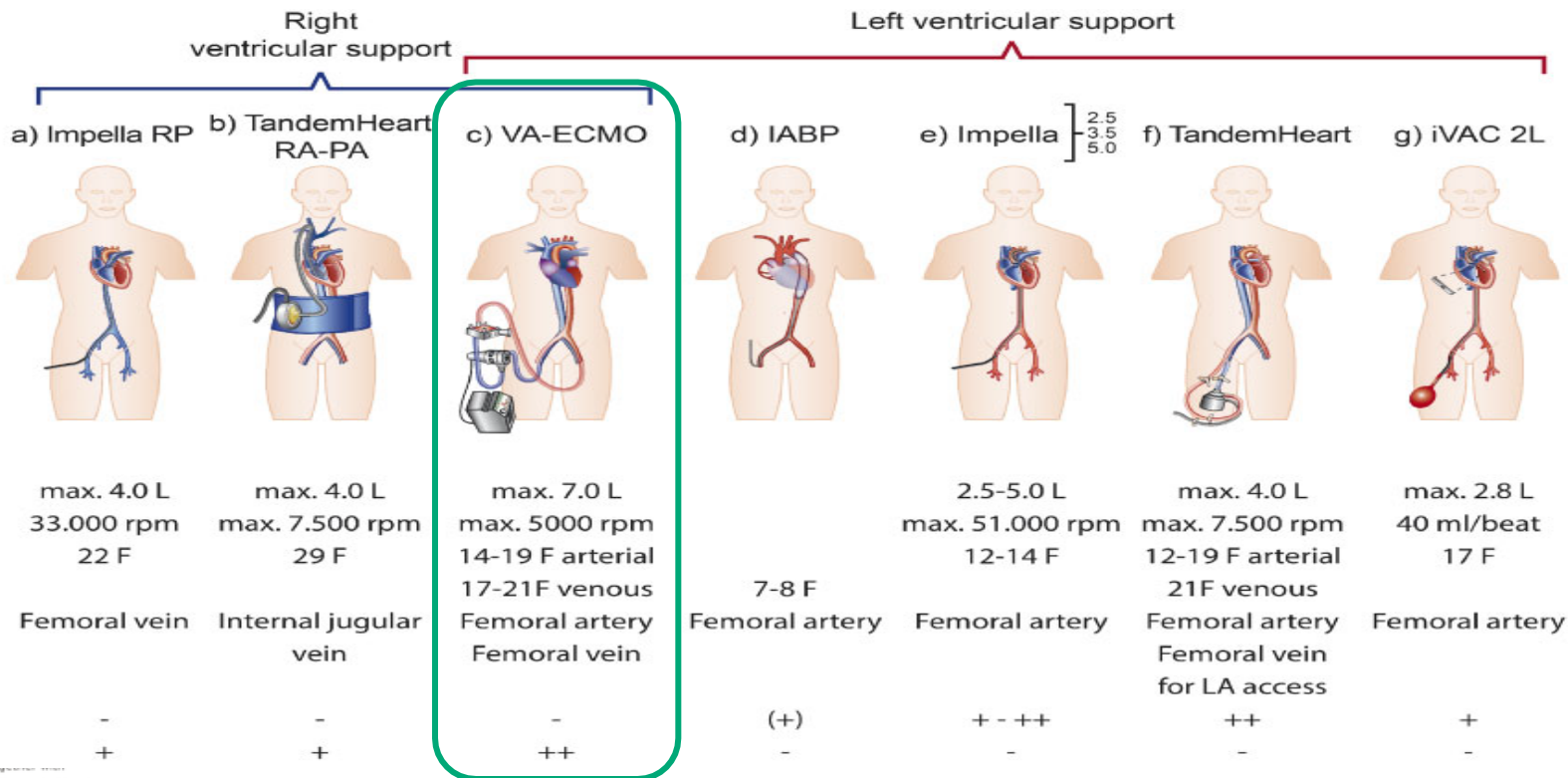
a



Impella vs IABP – Complications



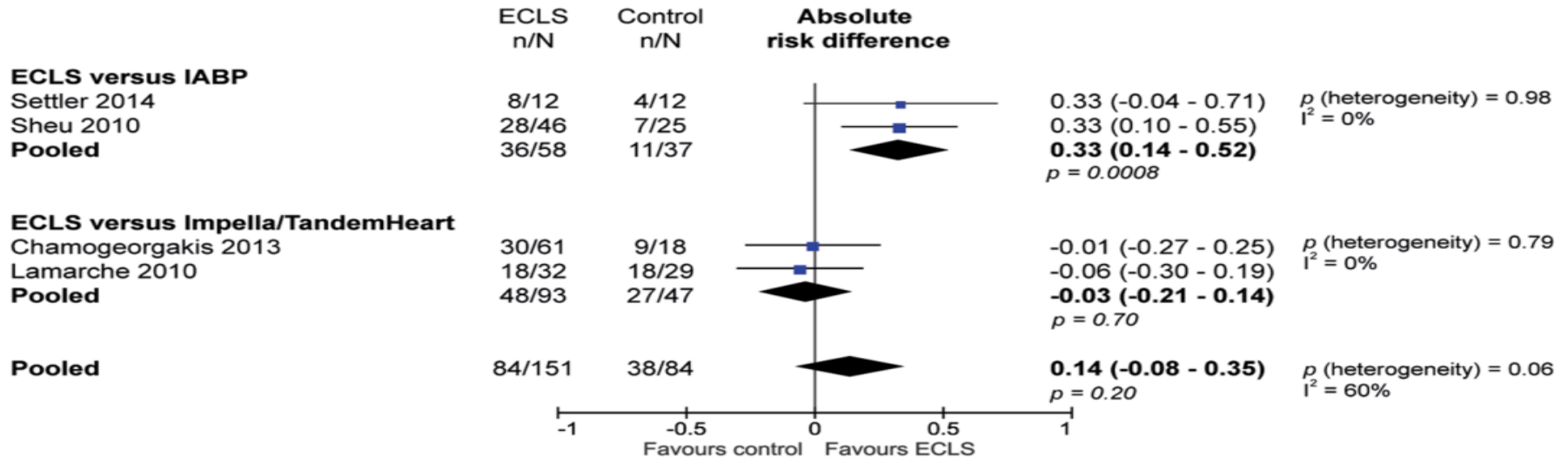
Currently Available MCS



ECMO in Cardiogenic Shock

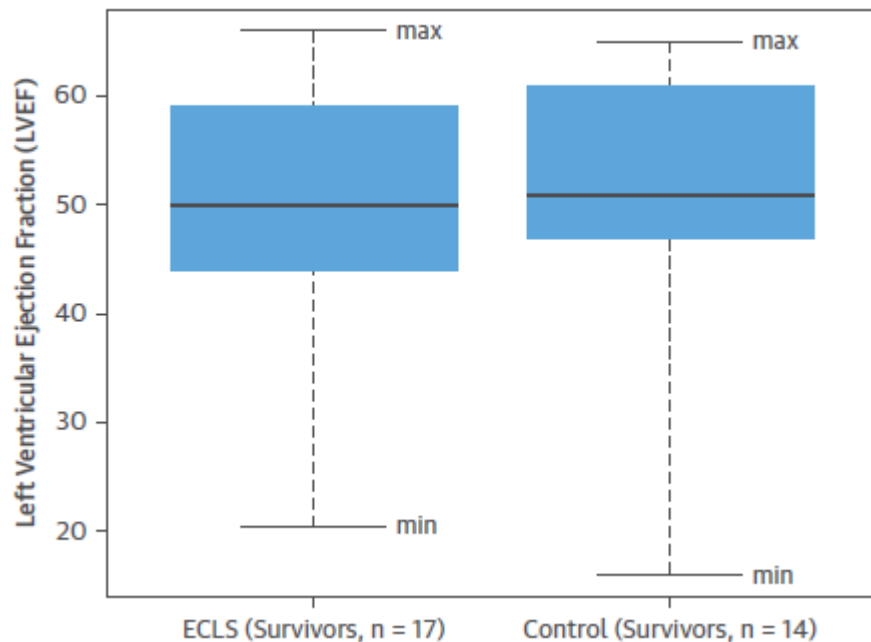
Metaanalysis

Cardiogenic shock - 30-day survival

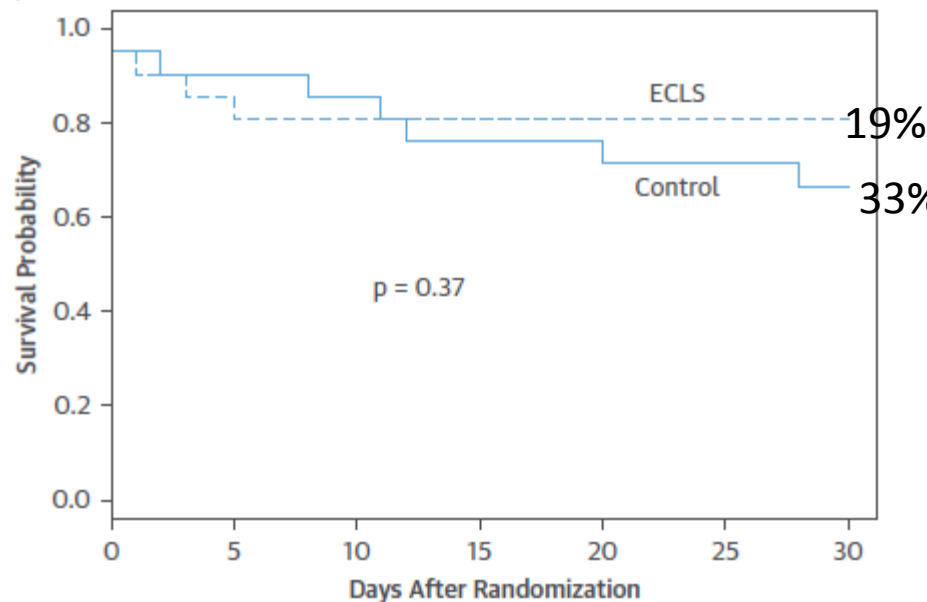


ECLS-SHOCK I (n=42)

LV EF



Mortality



Estimated Mortality?

In Cath Lab post PCI

1. 20-30%
2. 40-50%
3. 50-60%
4. 60-70%
5. 70-80%

Mortality Prediction

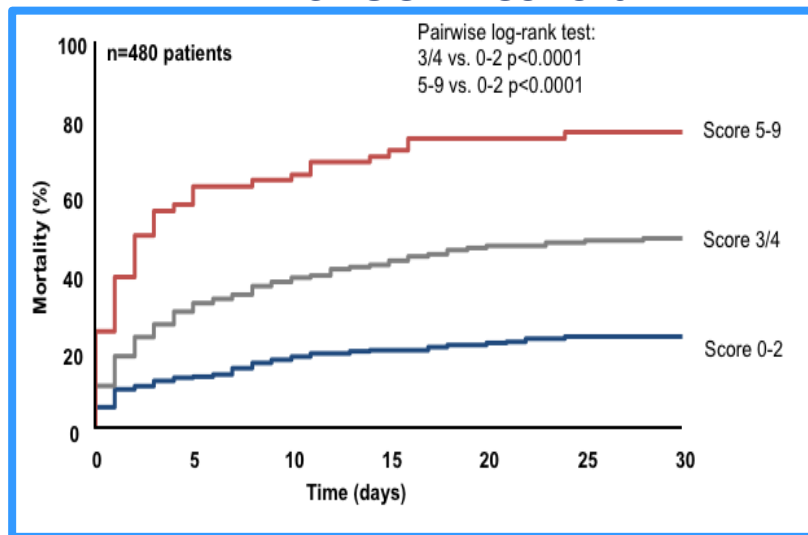
Patient Selection for MCS?

<u>Score</u>		<u>Risk categories</u>	
Variable	Points	Category	Points
Age >73 years	1	Low	0-2
History of stroke	2	Intermediate	3/4
Glucose >10.6 mmol/l *	1	High	5-9
Creatinine >132.6 µmol/l *	1		
Serum lactate >5 mmol/l *	2		
TIMI flow after PCI <3	2		
Maximum	9		

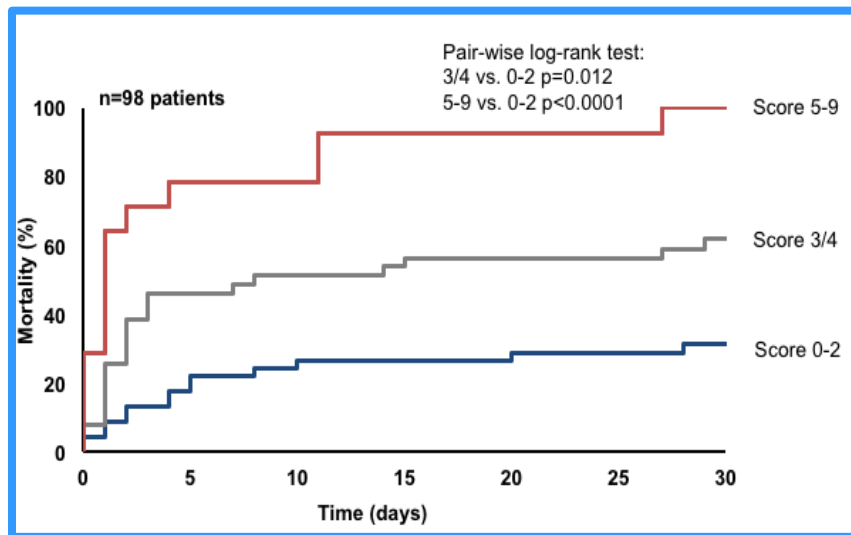
Mortality Prediction

Patient Selection for MCS?

IABP-SHOCK II Cohort

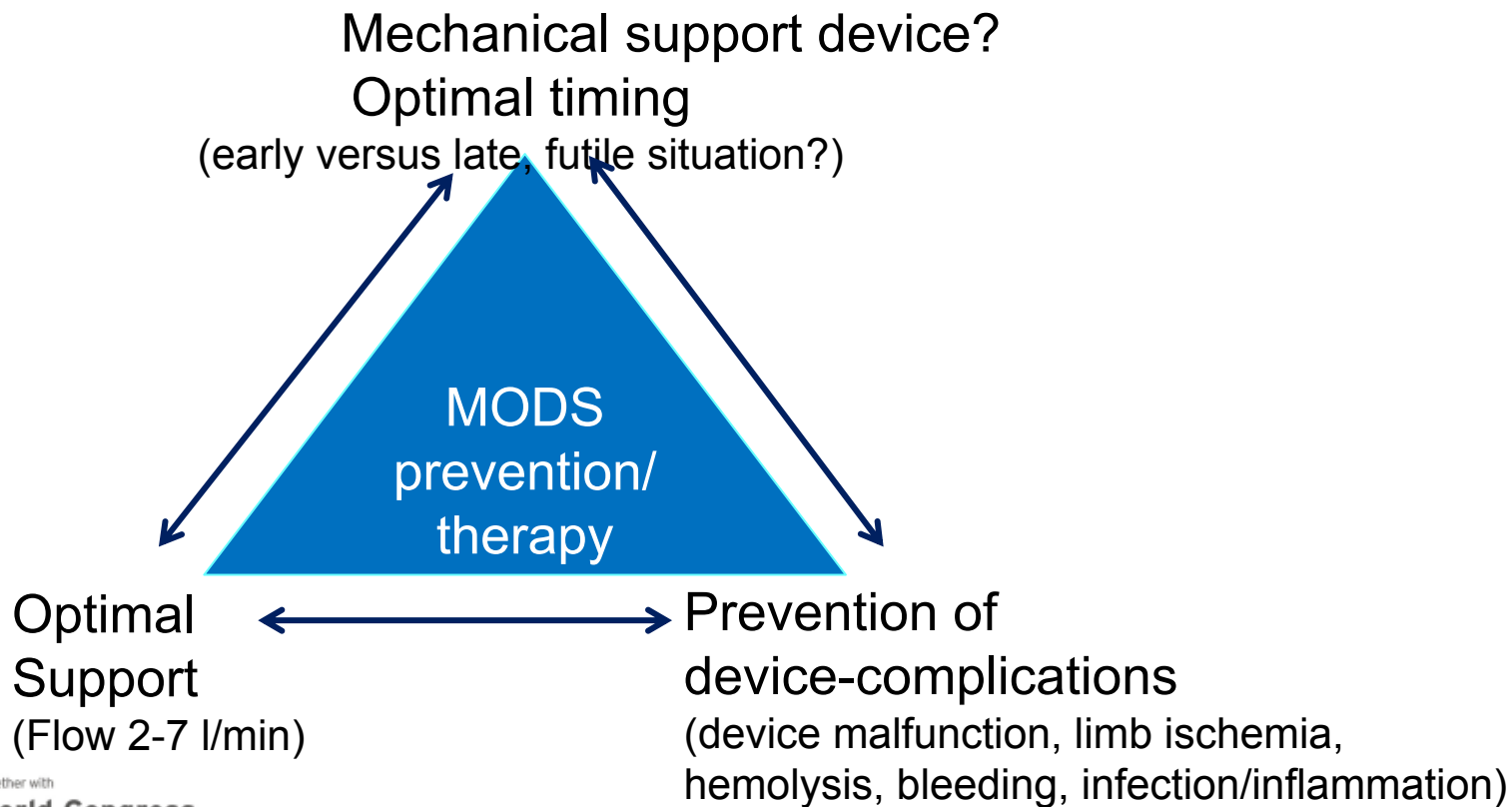


CardSHOCK Validation Cohort

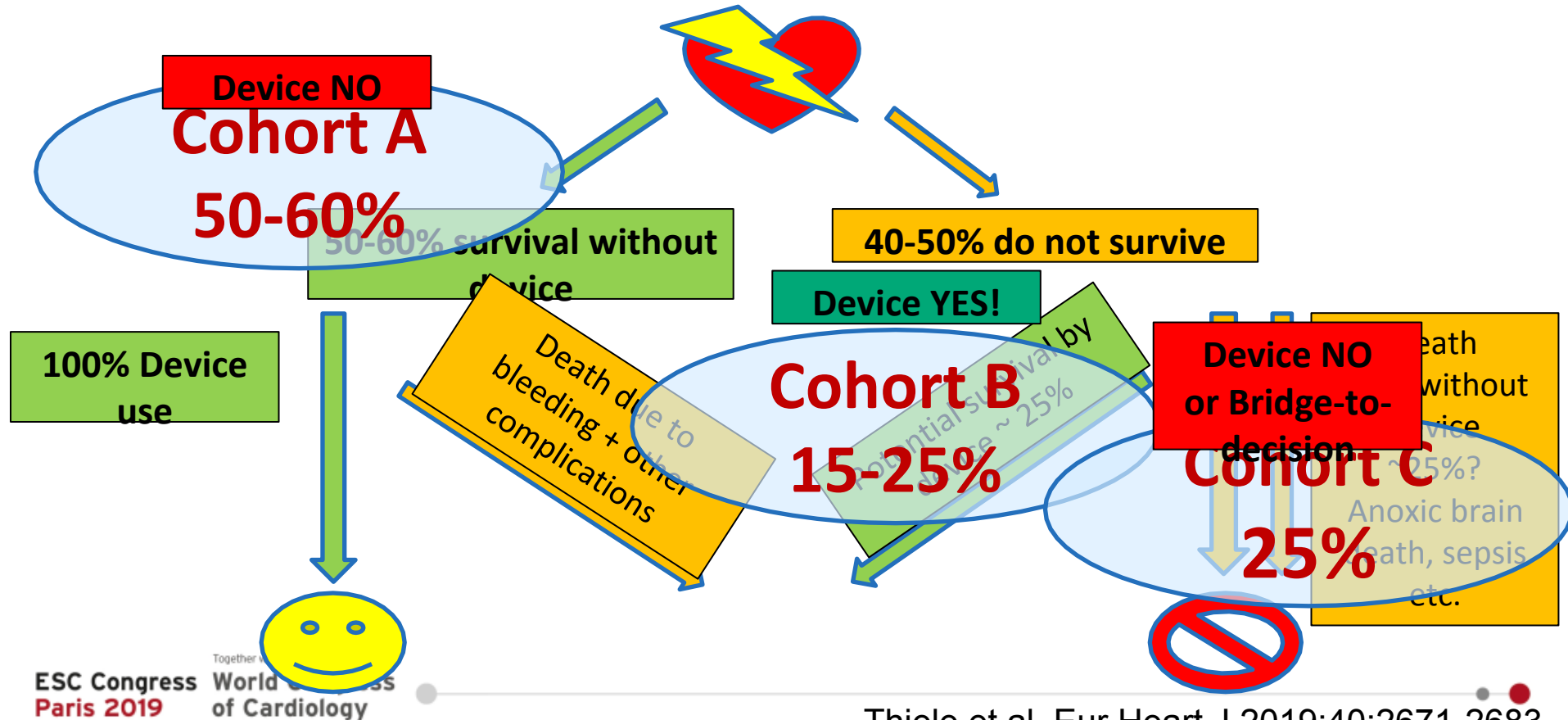


Together with

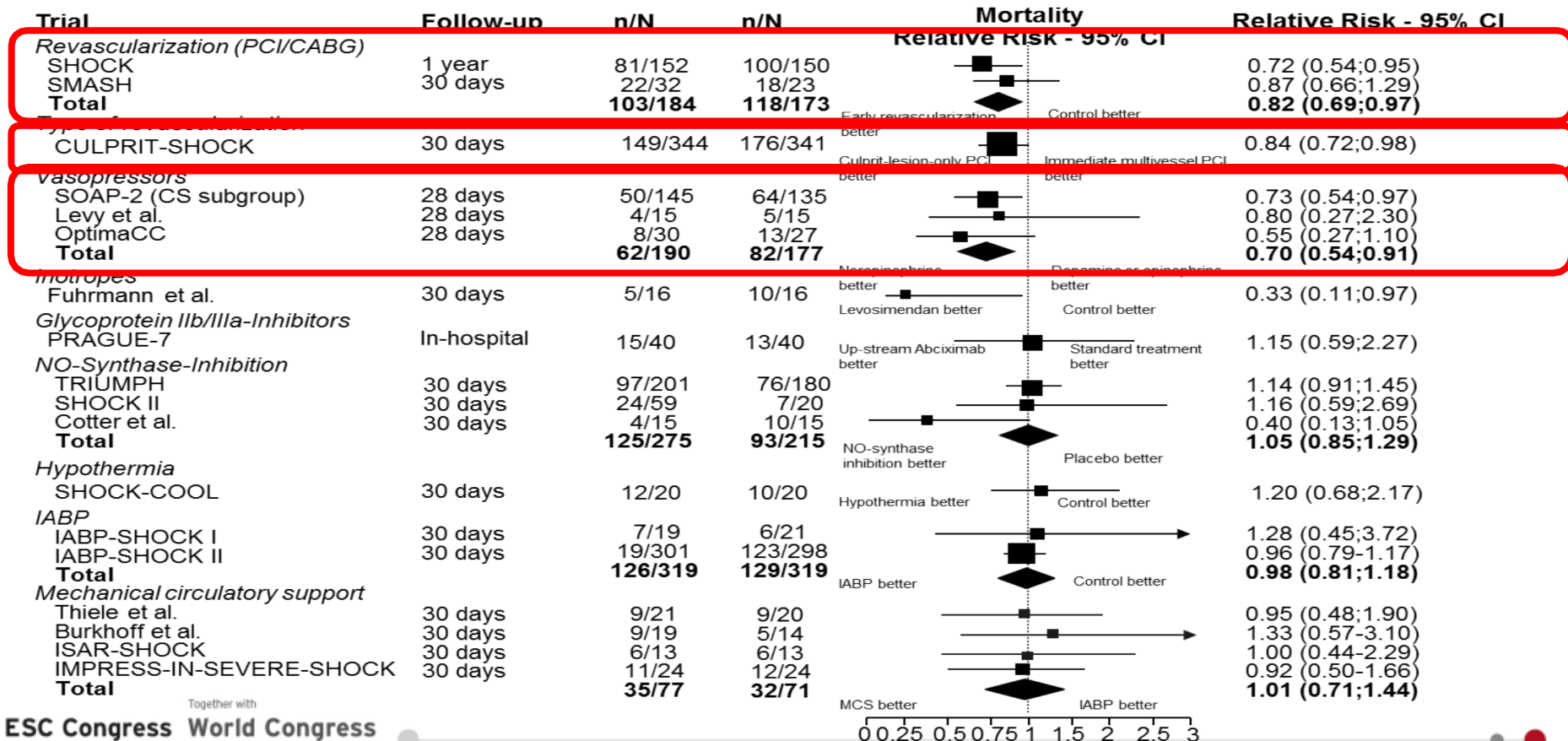
How to Prevent MODS?



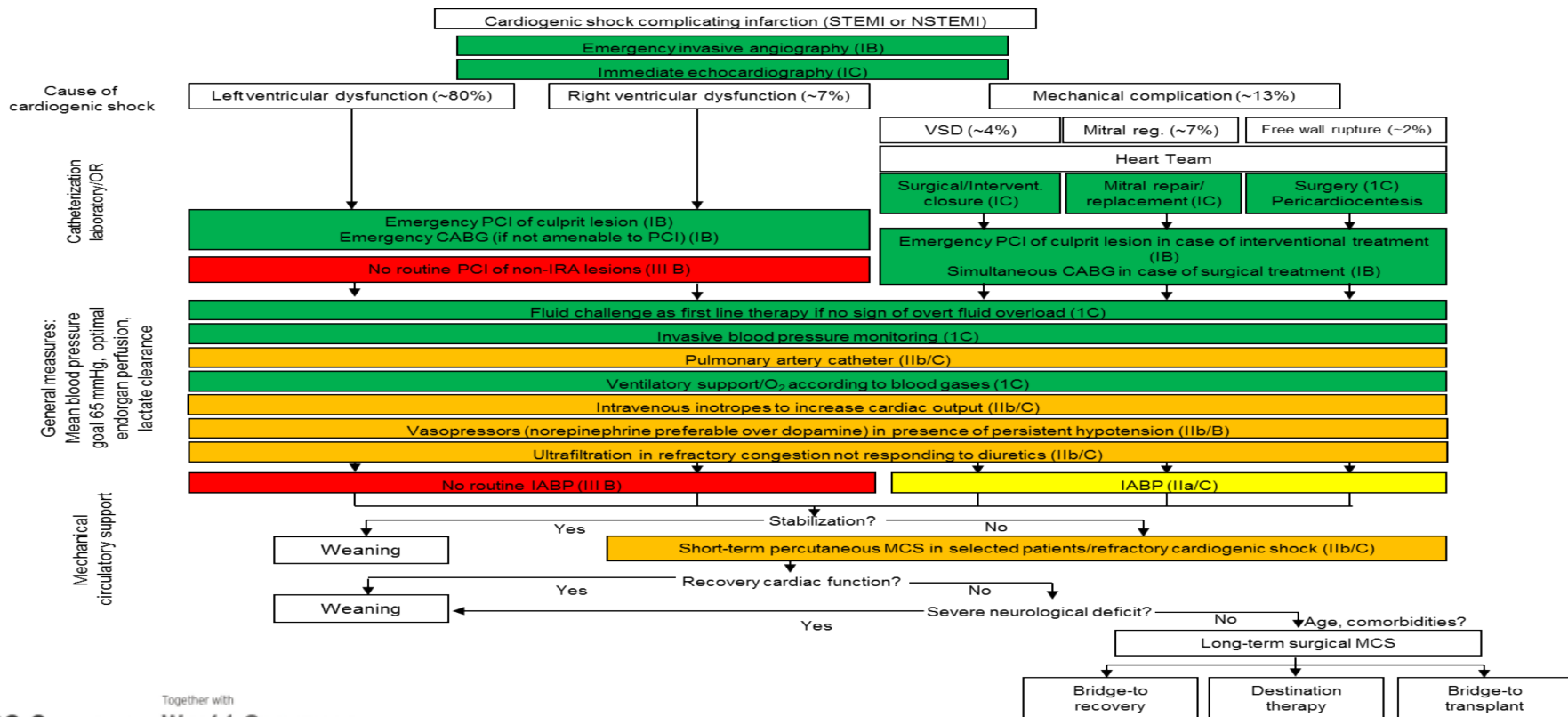
Patient Selection?



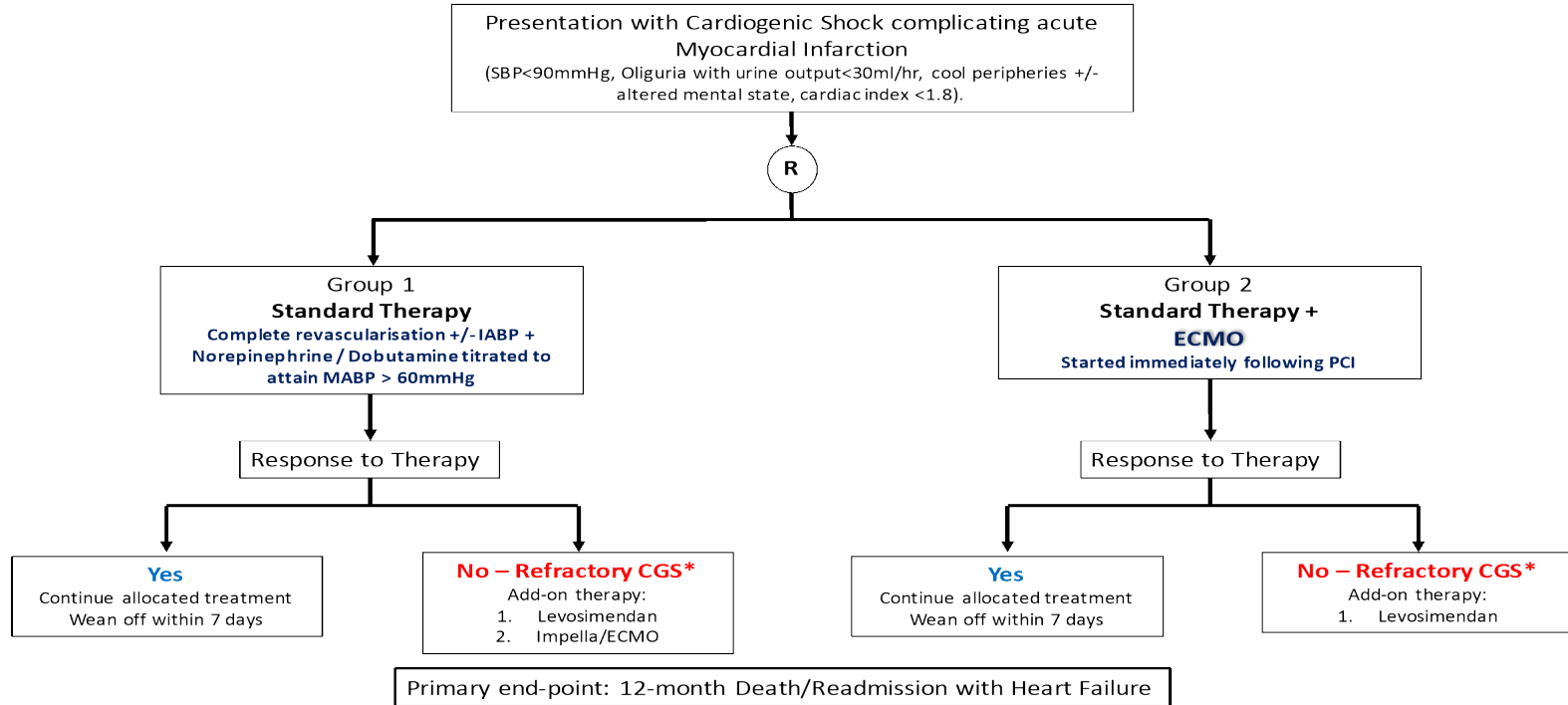
Randomized Trials – Cardiogenic Shock



Treatment Algorithm – Cardiogenic Shock



EURO SHOCK Initiative



* - Defined as SBP<75mmHg and Urine Output <30ml/ hr for 36hrs

Together with

ECLS-SHOCK

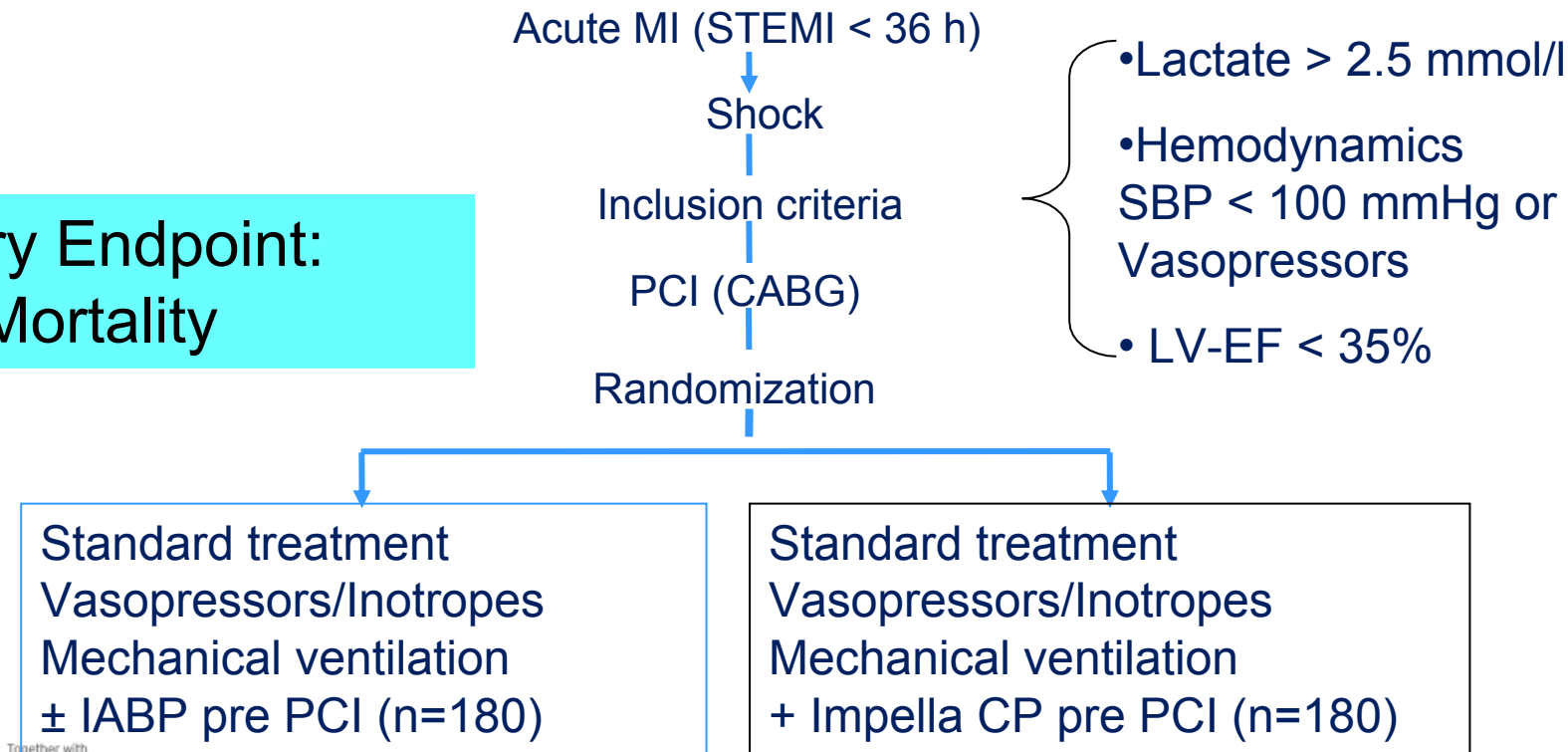


ECLS-SHOCK - Centers

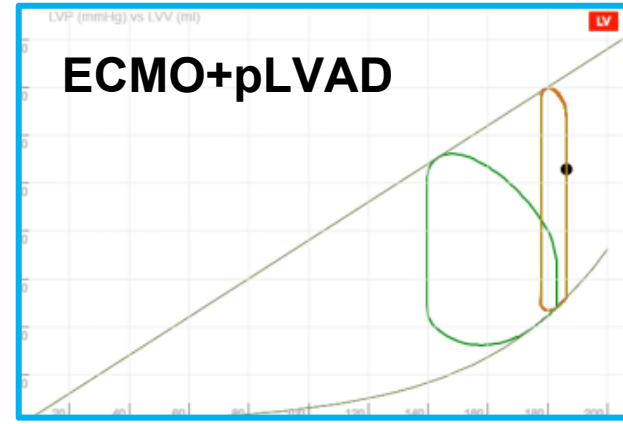
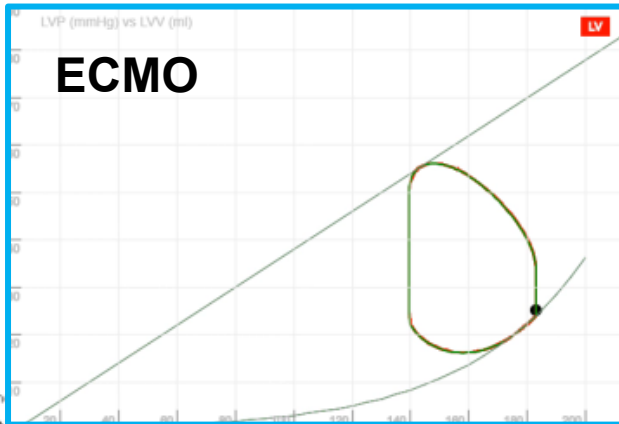
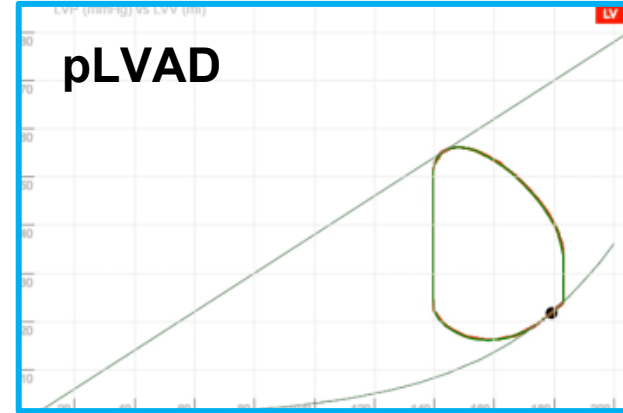
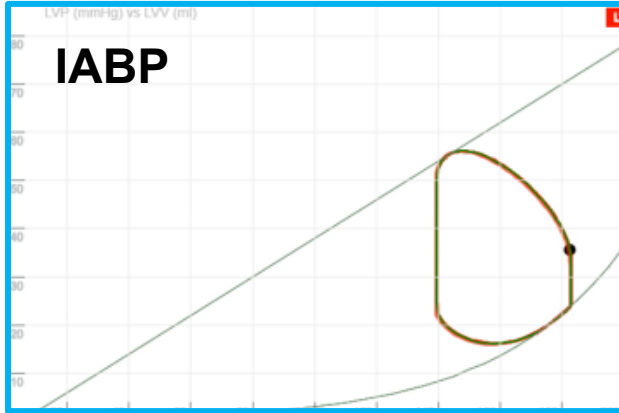


DanShock goes DANGER Trial

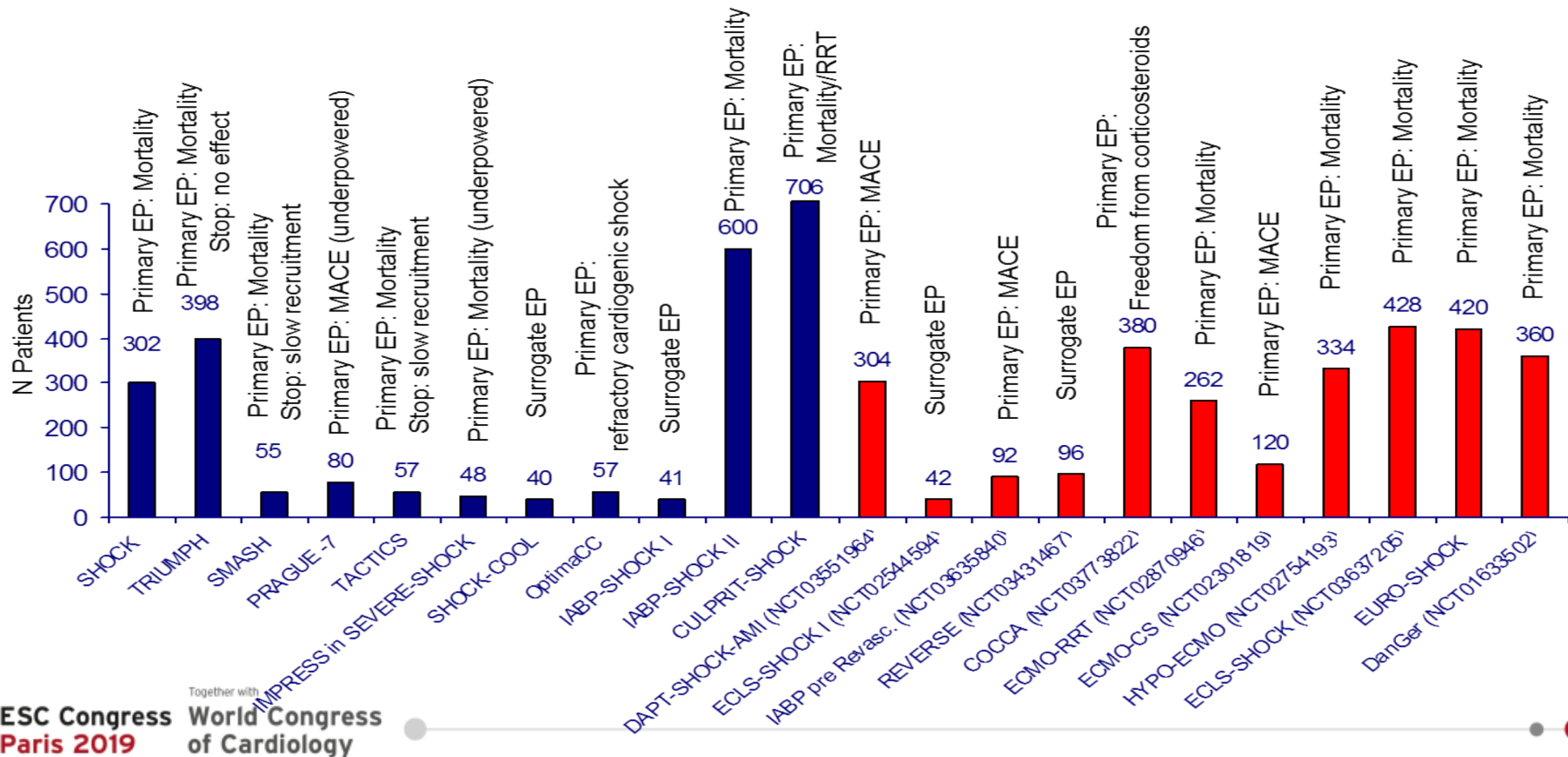
**Primary Endpoint:
Total Mortality**



Hemodynamics MCS Cardiogenic Shock



Inclusion in Cardiogenic Shock Trials



Thank you!
holger.thiele@medizin.uni-leipzig.de

**HERZZENTRUM
LEIPZIG**

Leipzig
Heart Institute



**UNIVERSITÄT
LEIPZIG**