

A Future for the IABP in Cardiogenic Shock?

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Disclosures

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EU

Arbeitsgemeinschaft Leitende Kardiologische Krankenhausärzte

Terumo

Lilly

Maquet Cardiovascular

Teleflex Medical

Consulting:

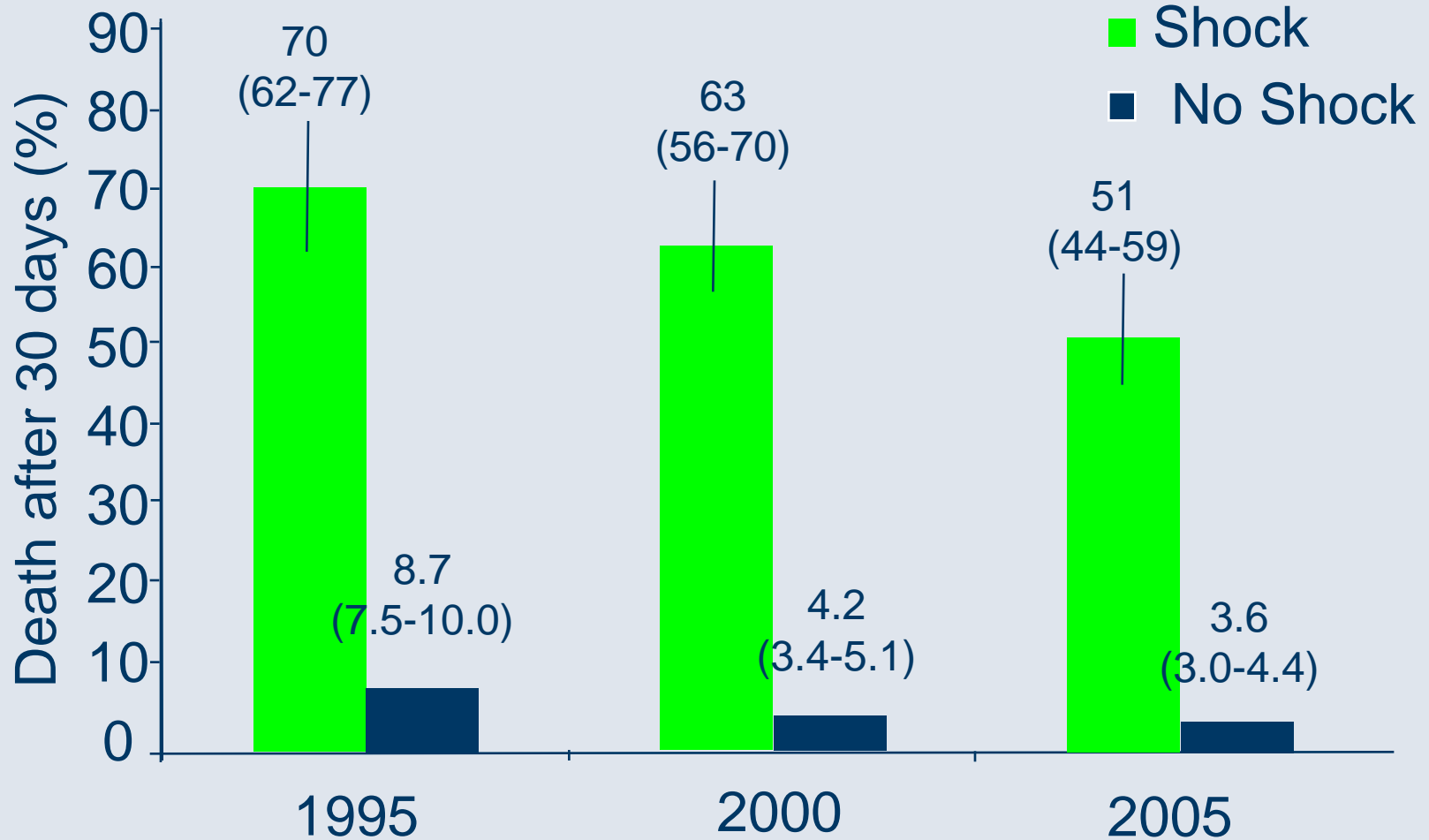
Maquet Cardiovascular, Lilly

Speaker Honoraria:

Lilly, Astra Zeneca, Daiichi Sankyo, Boehringer Ingelheim, Maquet Cardiovascular, Medicines Company

In-hospital Mortality

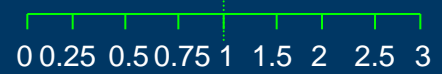
USIK 1995, USIC 2000, FAST-MI France National Registry



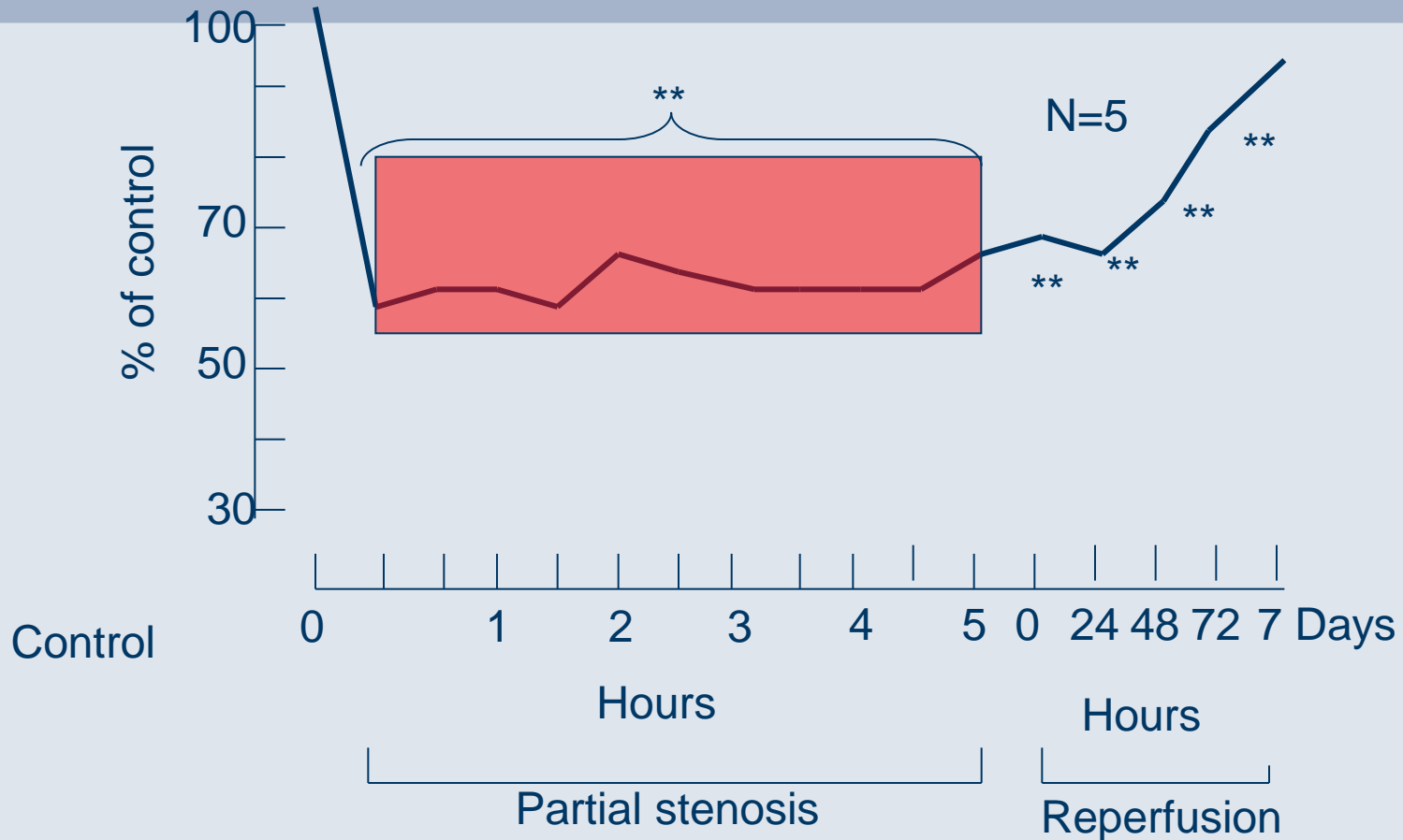
Randomized Trials in Cardiogenic Shock

Trial	Follow-up	n/N	n/N	Relative Risk 95% CI	Relative Risk 95% CI
Revascularization (PCI/CABG)					
SHOCK	1-year	76/152	83/149		0.80 (0.66;0.98)
SMASH	30 days	22/32	18/23		0.87 (0.66;1.29)
Total		103/184	117/172		0.82 (0.70;0.98)

Early revascularization better Medical therapy better



„Stunned“ Myocardium



**P<0,05 vs. control

IABP History

History:

1962 Animal trials

Moulopoulos et al, Am Heart J 1962;63:669-675

1968 1. clinical description in shock

Kantrowitz et al, JAMA 1968;203:135-140

1973 Hemodynamic effects, mortality unchanged


Scheidt et al, NEJM 1973;288:979-984

> 40 years > 1 Million patients treated, low complication rate,
Benchmark registry

Ferguson et al, JACC 2001;38:1456-1462



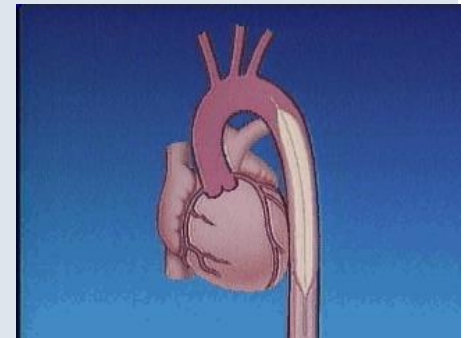
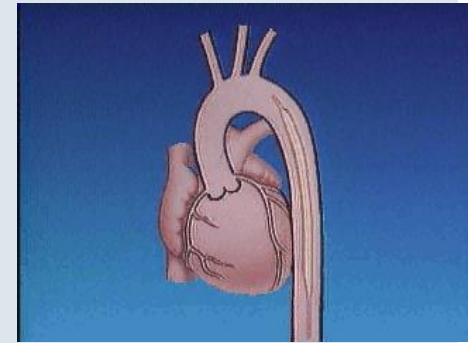
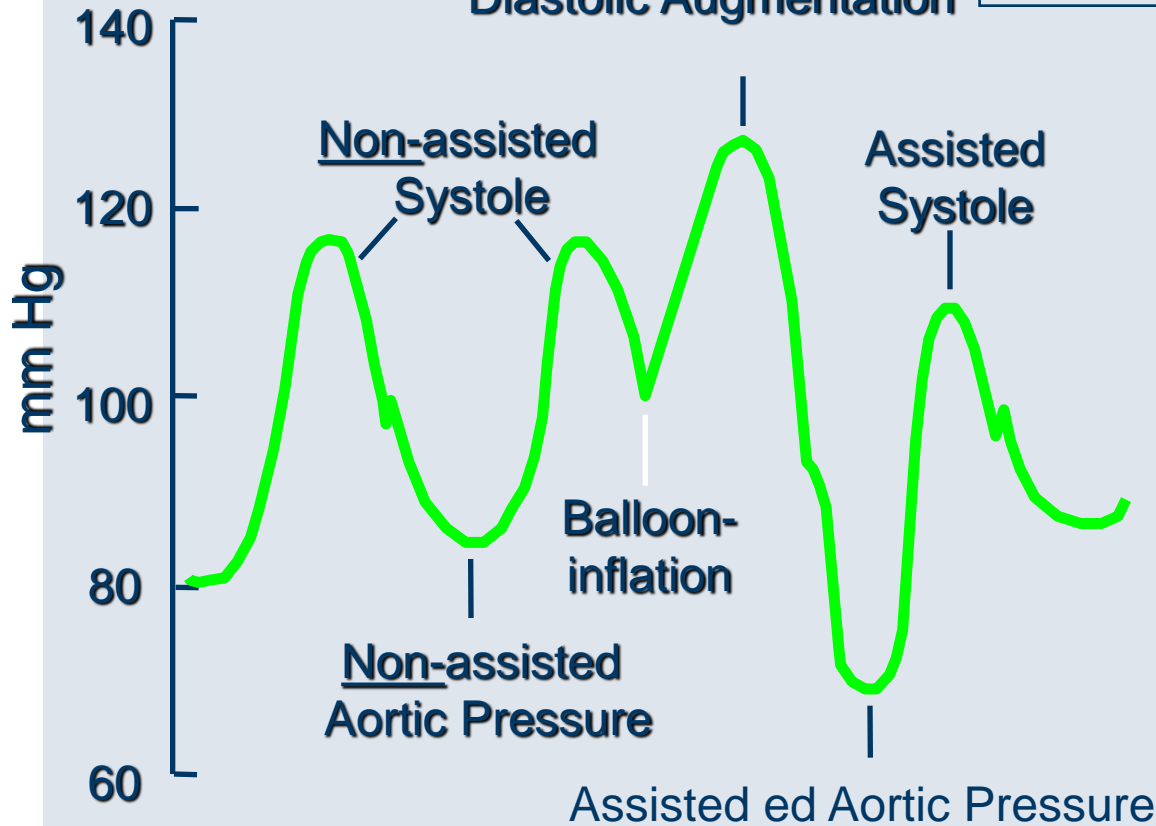
Overview

- 
- IABP – Hemodynamic effects
 - IABP in cardiogenic shock

IABP – Arterial Pressure Curves

Improvement of coronary perfusion
Reduction afterload
Myocardial O₂-consumption ↓

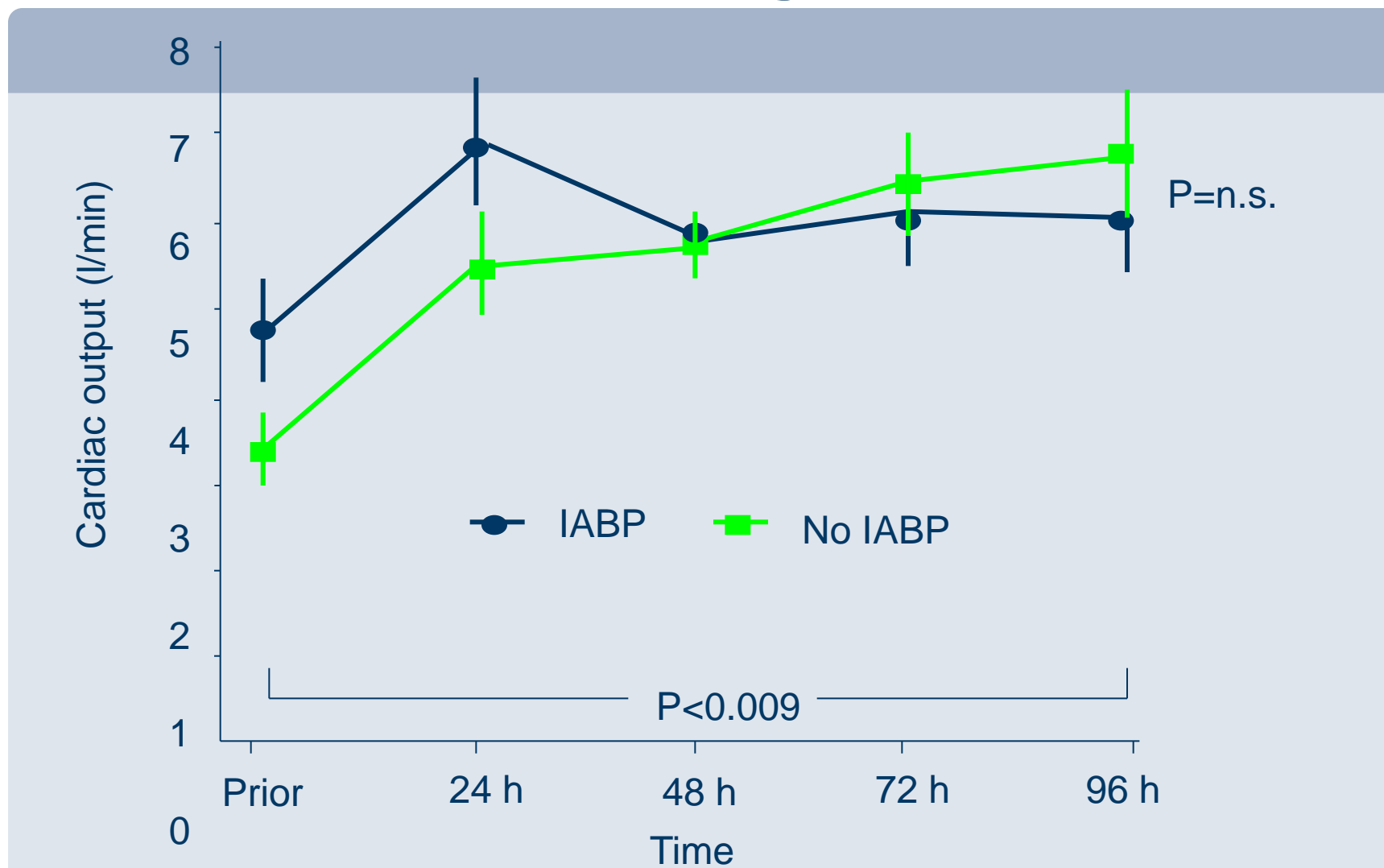
Diastolic Augmentation



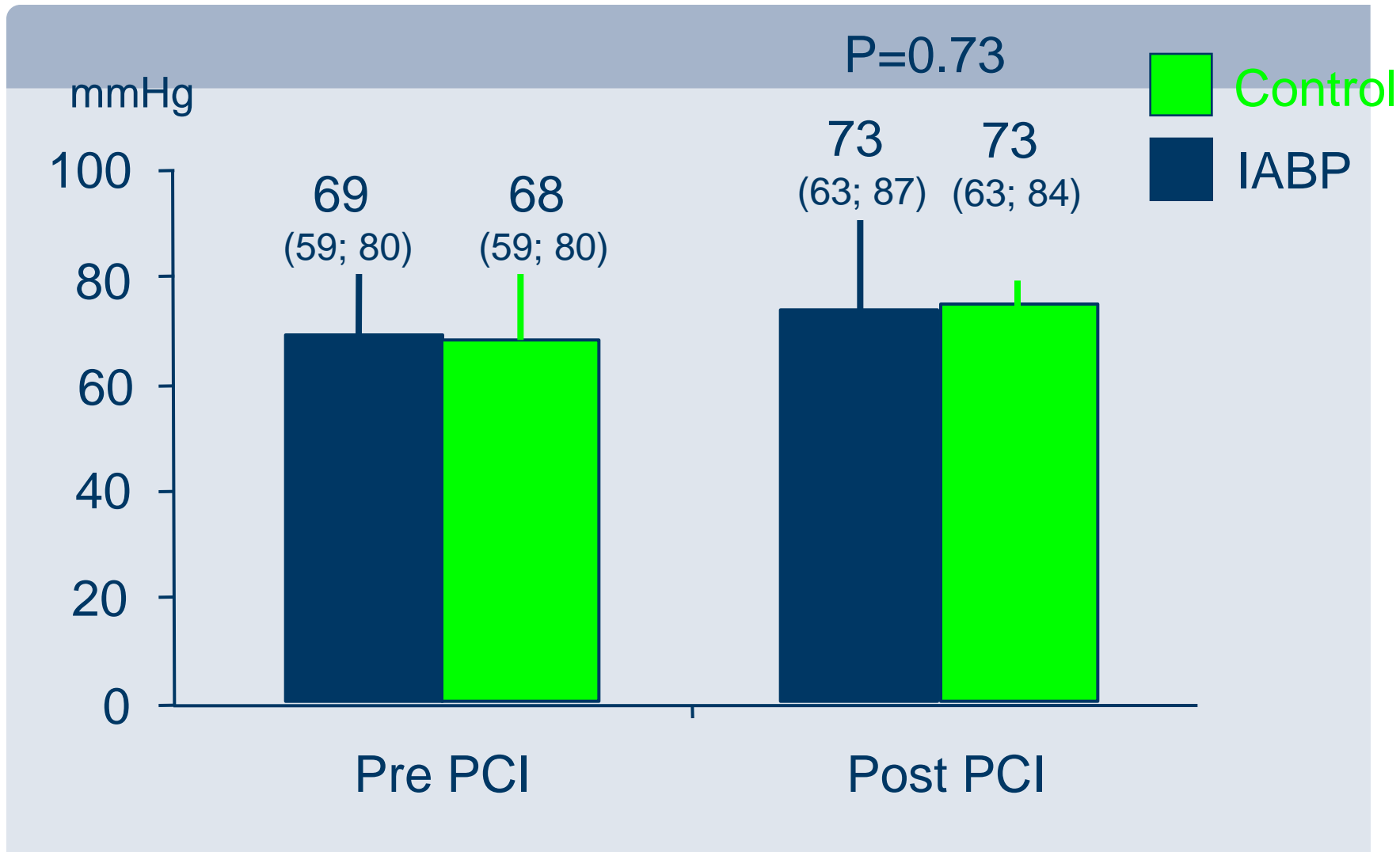
IABP Hemodynamics Cardiogenic Shock (n=78)

	Pre IABP	Post IABP	P-Value
Heart rate (1/min)	110 ± 24	103 ± 21	n.s.
BP syst. (mmHg)	76 ± 22	57 ± 17	< 0.001
BP diast (mmHg)	53 ± 12	83 ± 19	< 0.001
BP mean (mmHg)	62 ± 18	64 ± 21	n.s.
CO (l/min)	2.4	2.9	< 0.01

IABP vs. Control Cardiogenic Shock (n=40)



Mean Blood Pressure pre + post PCI



Overview

- IABP – Hemodynamic effects
- ▪ IABP in cardiogenic shock

Guidelines

IABP in STEMI complicated by cardiogenic shock

American Heart
Association 



Class 1B → IIa B



Class IC → IIb B

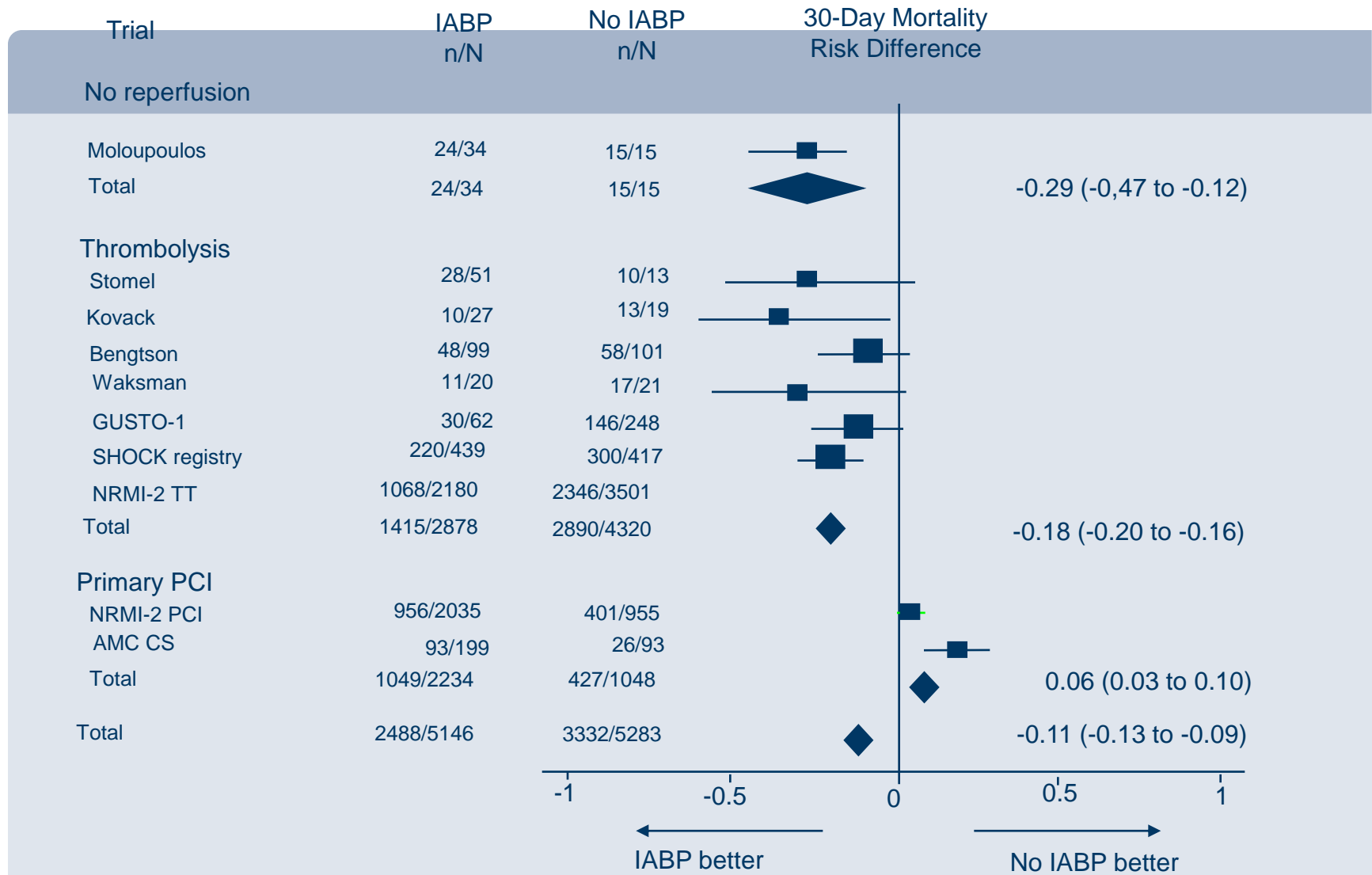
Antman et al. Circulation 2004;110:82-292

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

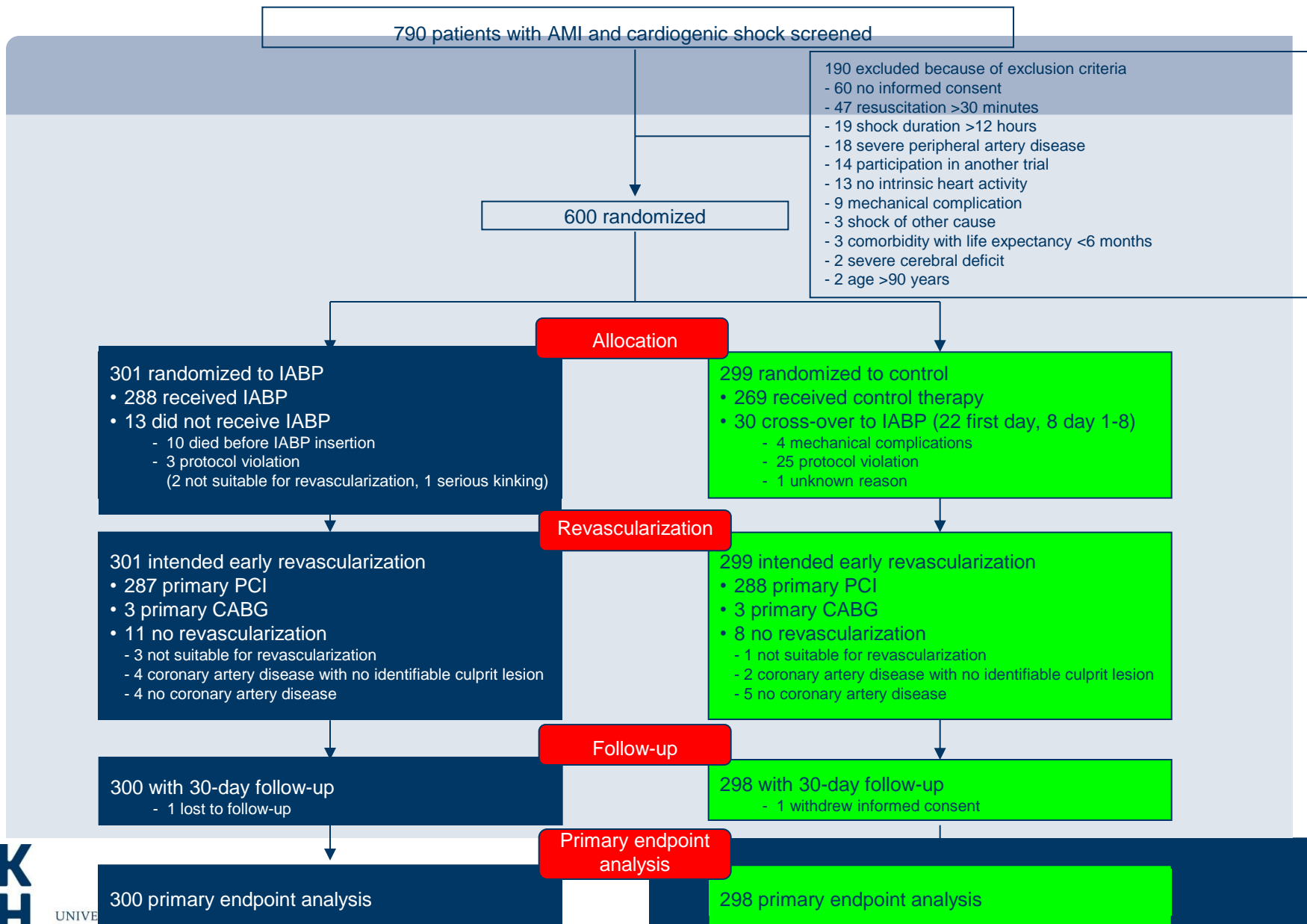
Van de Werf et al. Eur Heart J 2008;29:2909-2945

Steg et al. Eur Heart J.2012;33:2569-2619

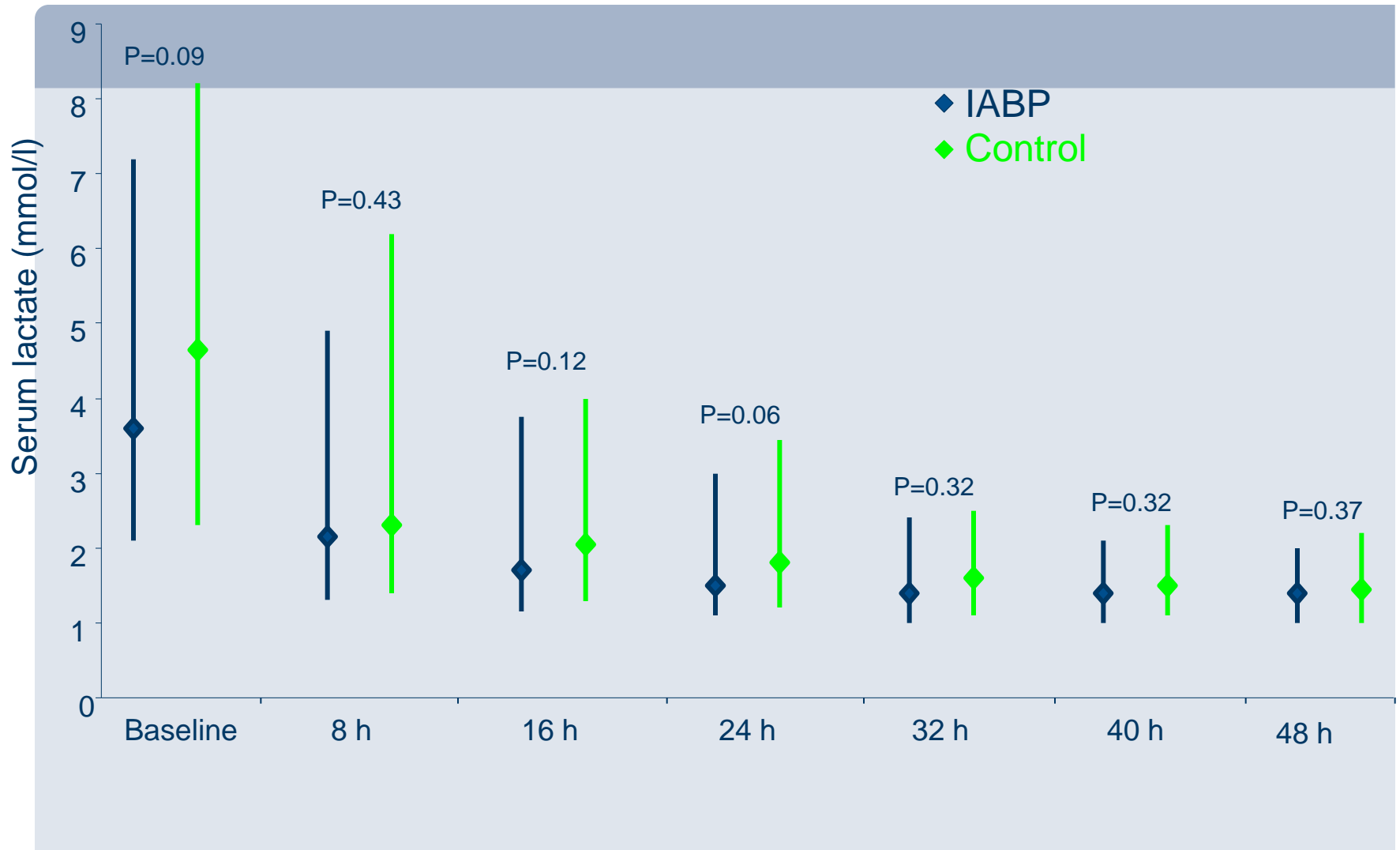
Mortality IABP vs \emptyset IABP - Metaanalysis



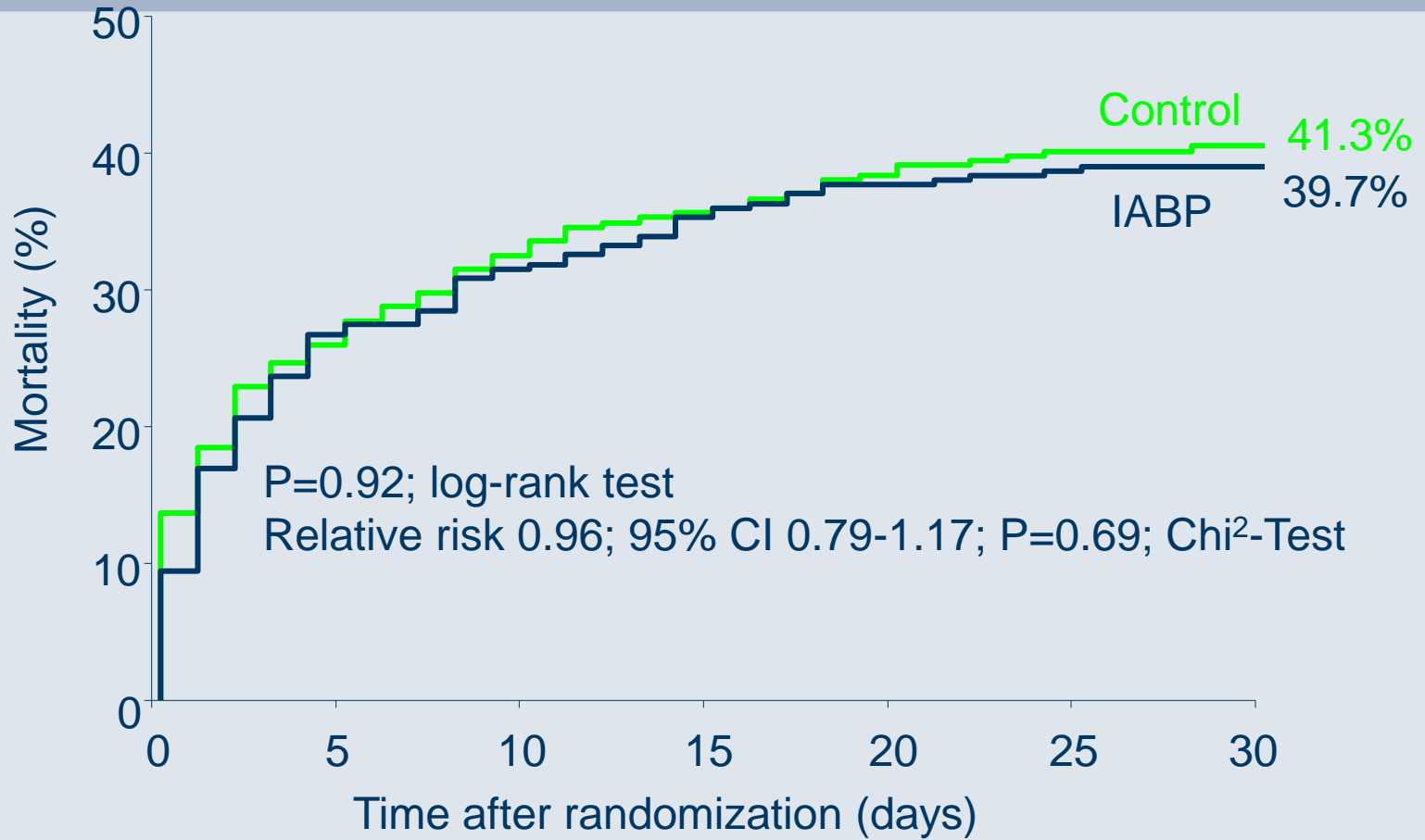
Trial Flow and Treatment



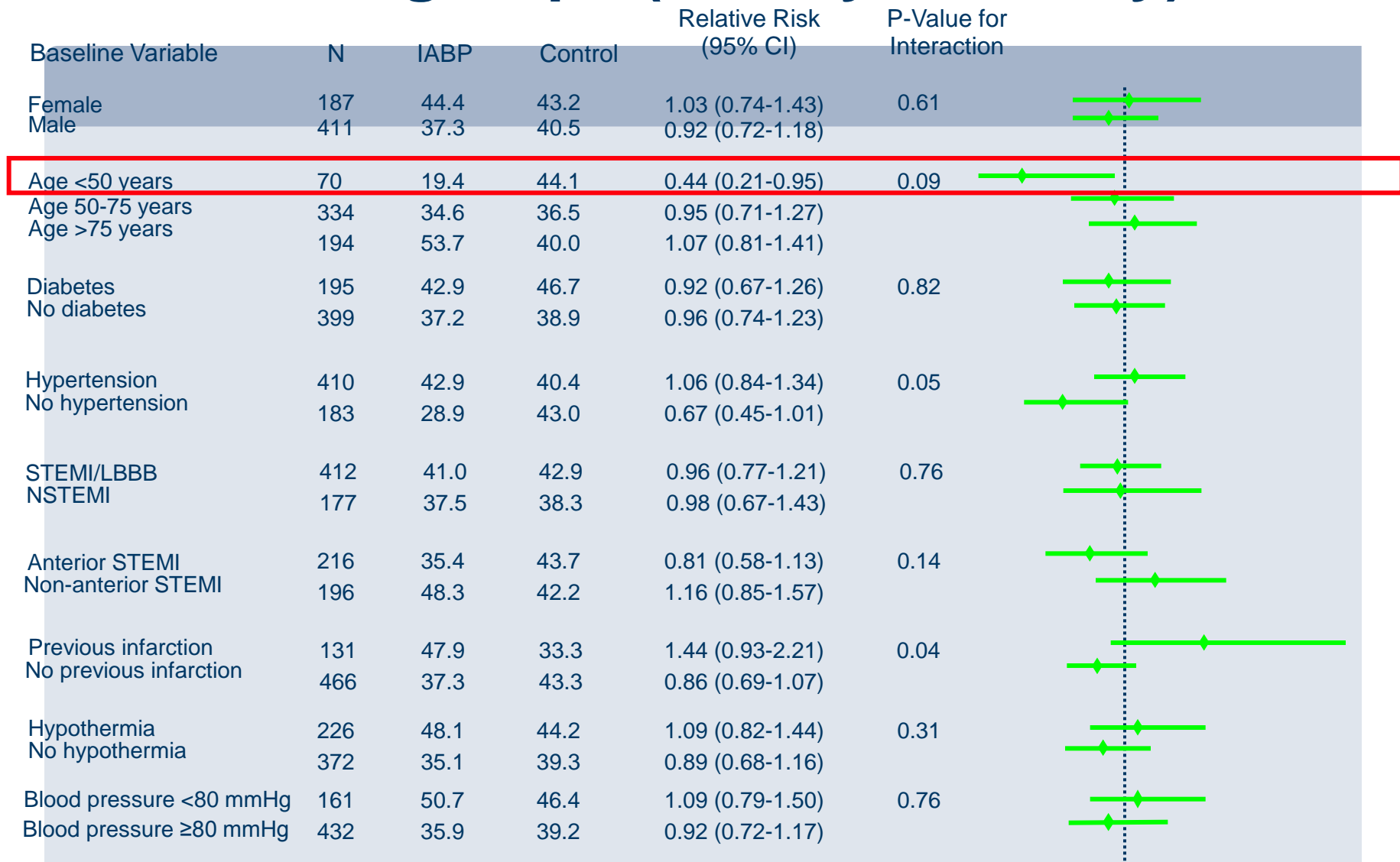
Serum Lactate



Primary Study Endpoint (30-Day Mortality)

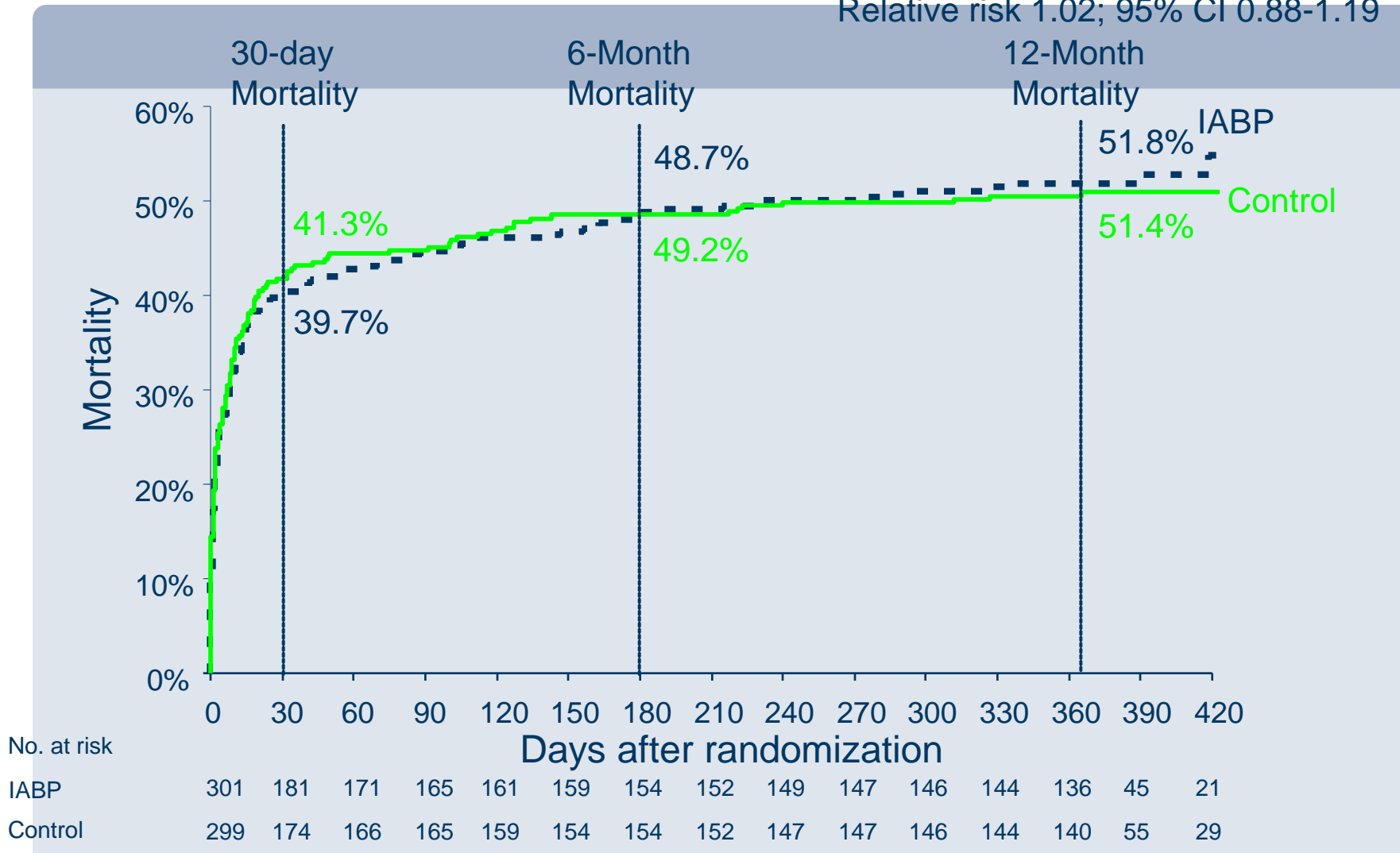


Subgroups (30-Day Mortality)



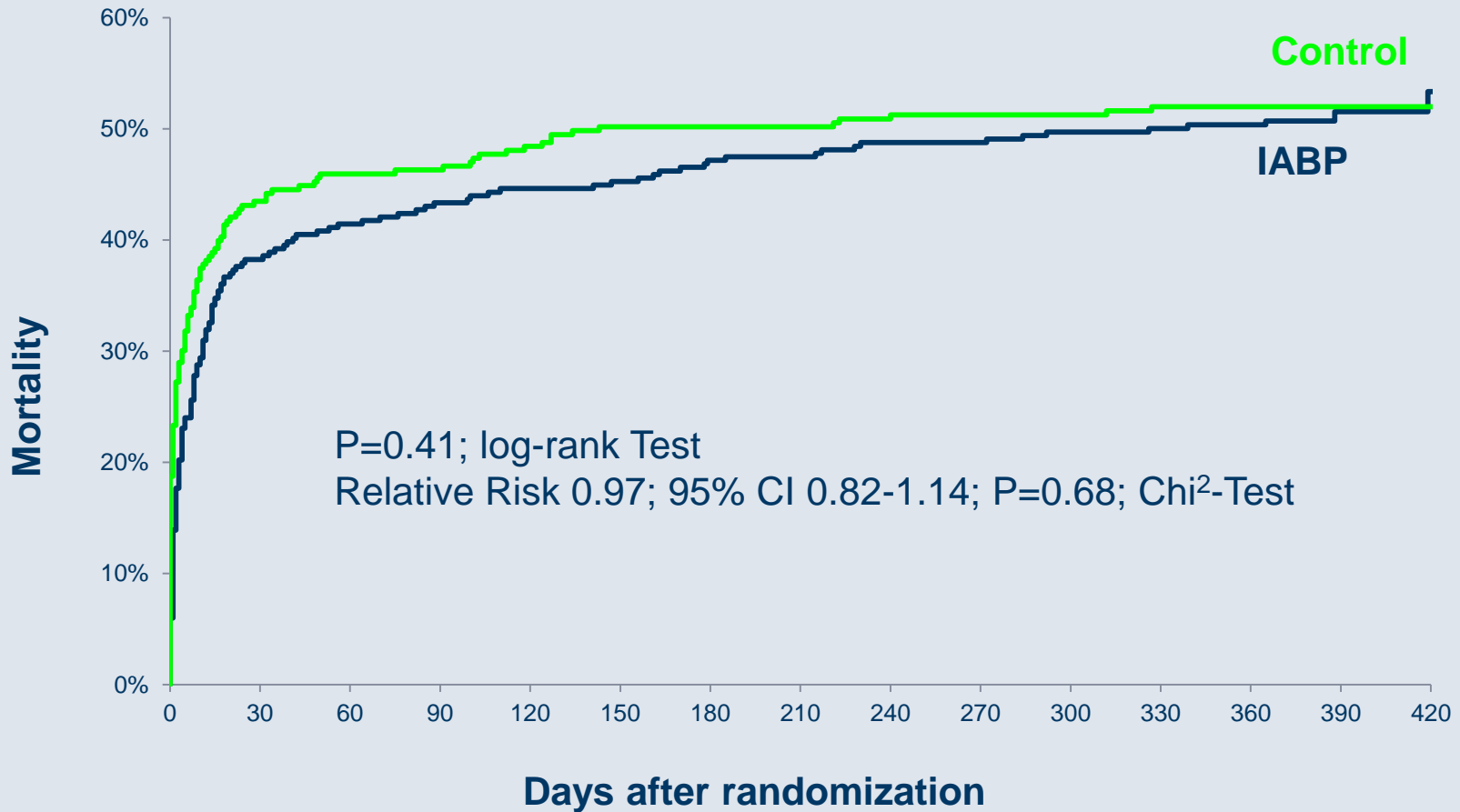
Mortality 12-Month Follow-up

P=0.94; log-rank test
Relative risk 1.02; 95% CI 0.88-1.19

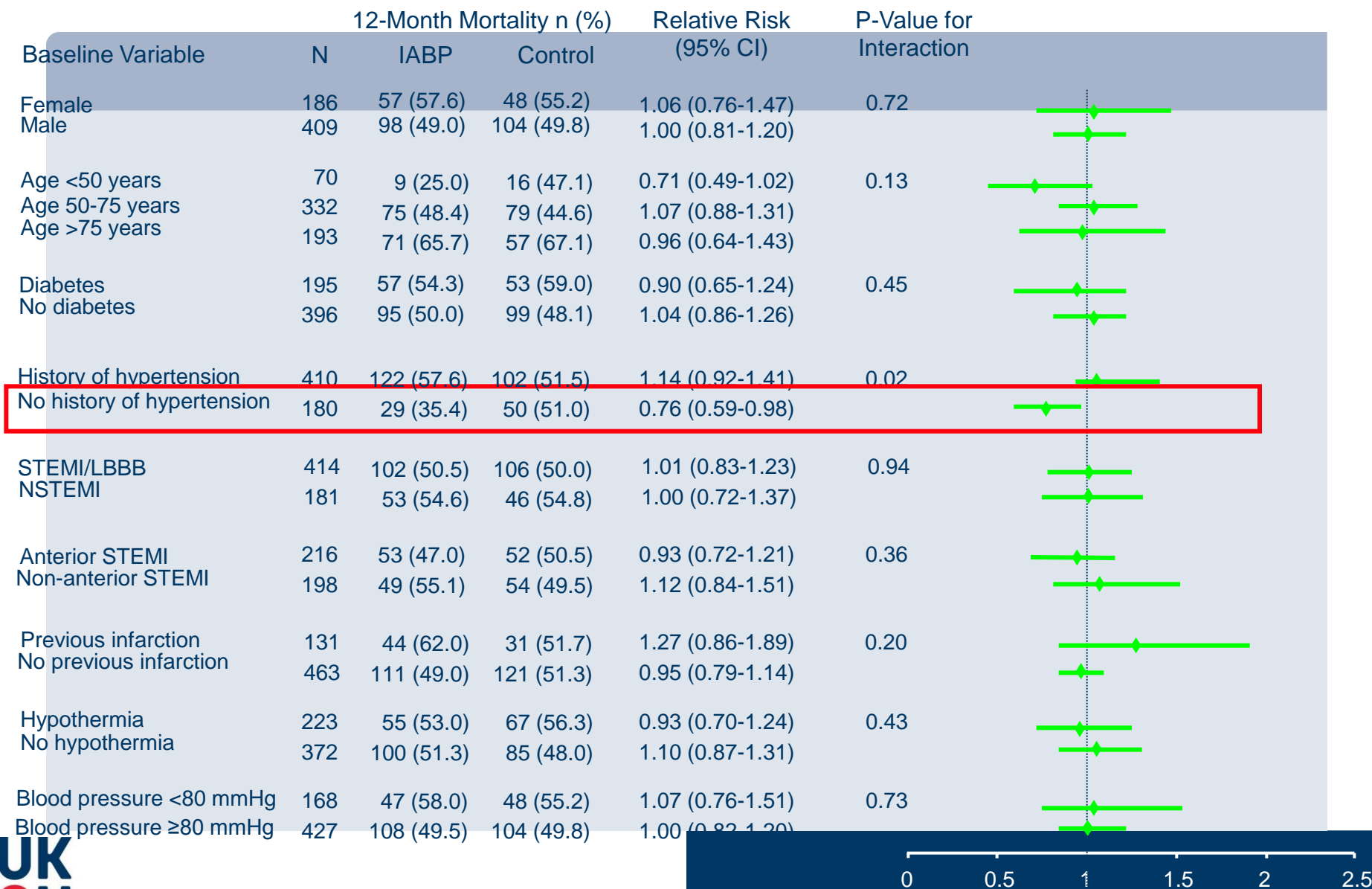


IABP SHOCK II Mortality 12-Month Follow-up – As Treated

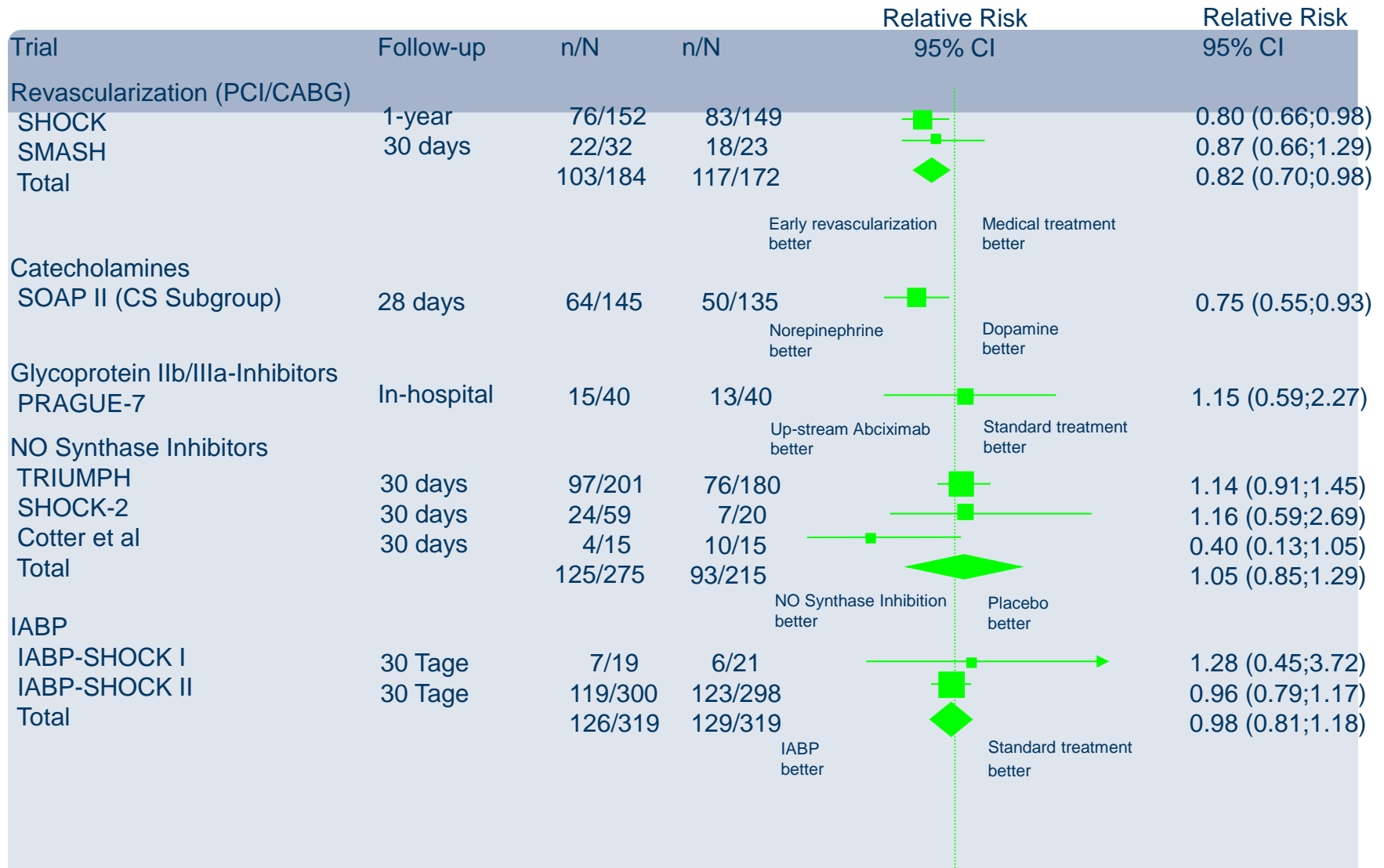
P=0.94; log-rank test
Relative risk 1.02; 95% CI 0.88-1.19



Subgroups (12-Month Mortality)



Randomized Trials in Cardiogenic Shock



Overview

Mechanical Placebo

- 1/
- 1/



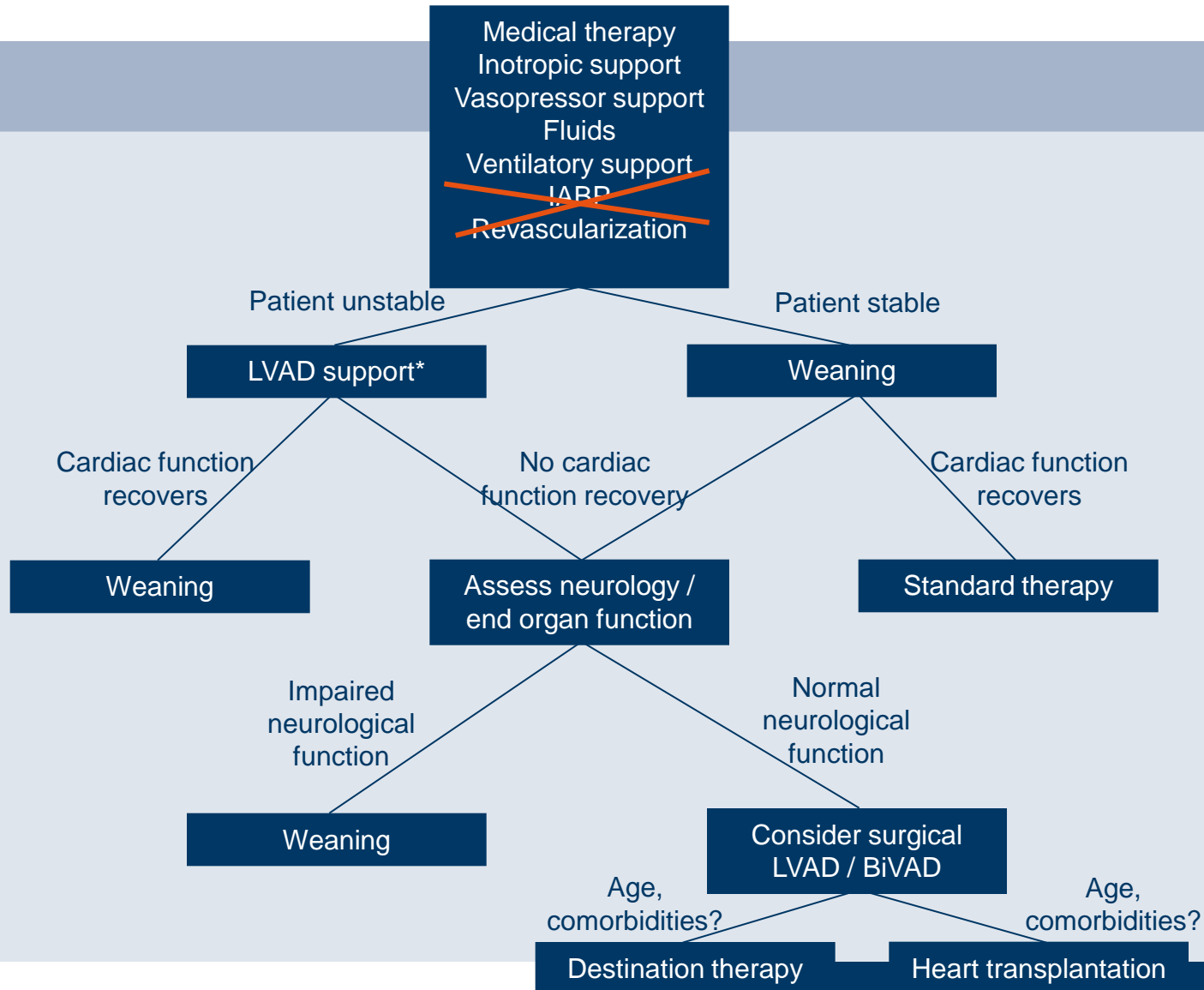
ESC Revascularization Guidelines 2014

IABP in cardiogenic shock



Class IC → IIb B → III?

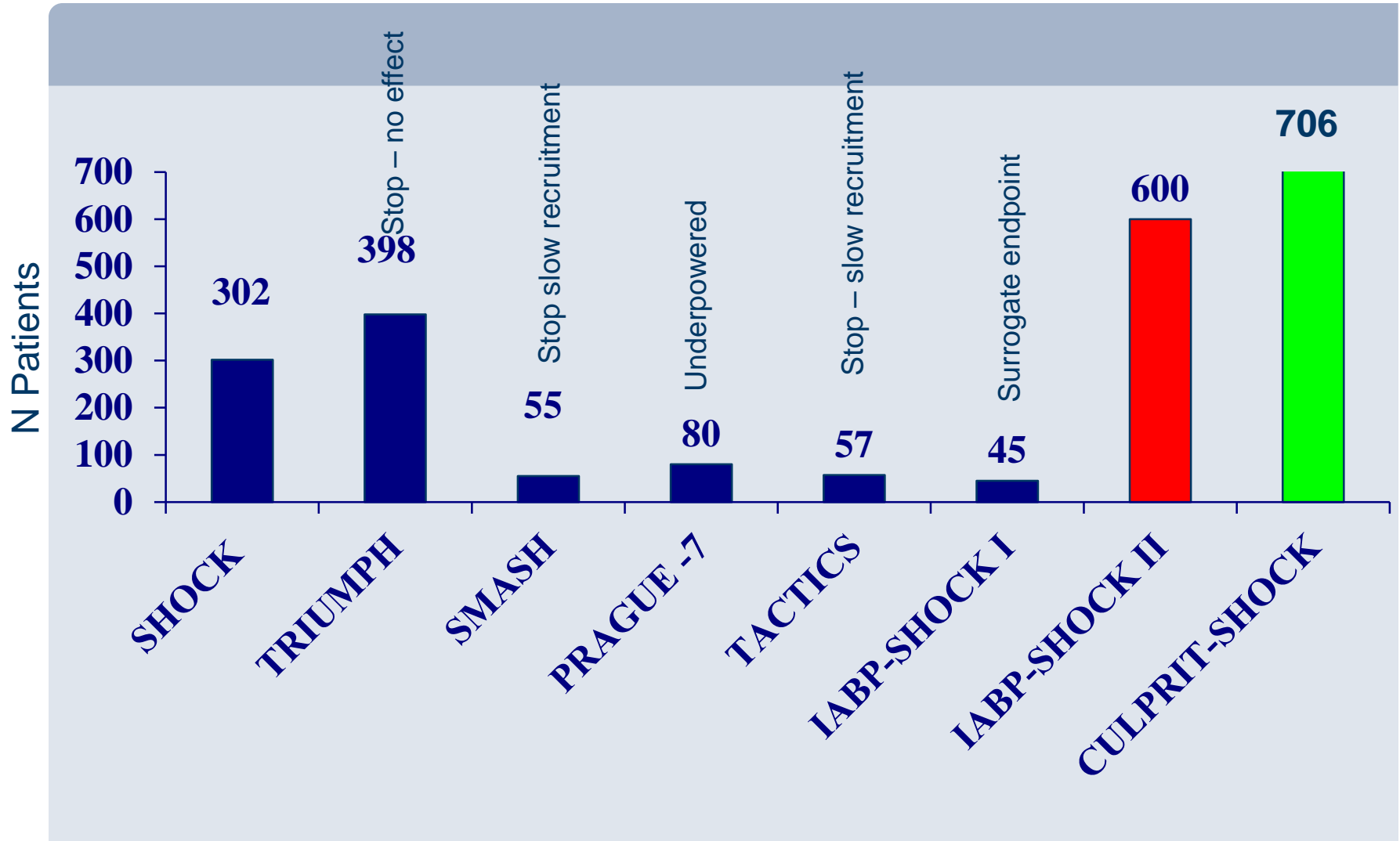
Treatment Algorithm



Cardiogenic Shock - Guidelines

Oxygen/mechanical respiratory support is indicated according to blood gasses.	I	C
Urgent echocardiography/Doppler must be performed to detect mechanical complications, assess systolic function and loading conditions.	I	C
High-risk patients must be transferred early to tertiary centres.	I	C
Emergency revascularization with either PCI or CABG in suitable patients must be considered.	I	B
Fibrinolysis should be considered if revascularization is unavailable.	IIa	C
Intra-aortic balloon pumping may be considered.	IIb	B
LV assist devices may be considered for circulatory support in patients in refractory shock.	IIb	C
Haemodynamic assessment with balloon floating catheter may be considered.	IIb	B
Inotropic/vasopressor agents should be considered:	IIa	C
• Dopamine		
• Dobutamine	IIa	C
• Norepinephrine (preferred over dopamine when blood pressure is low).	IIb	B

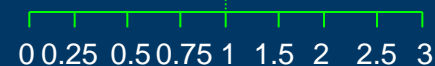
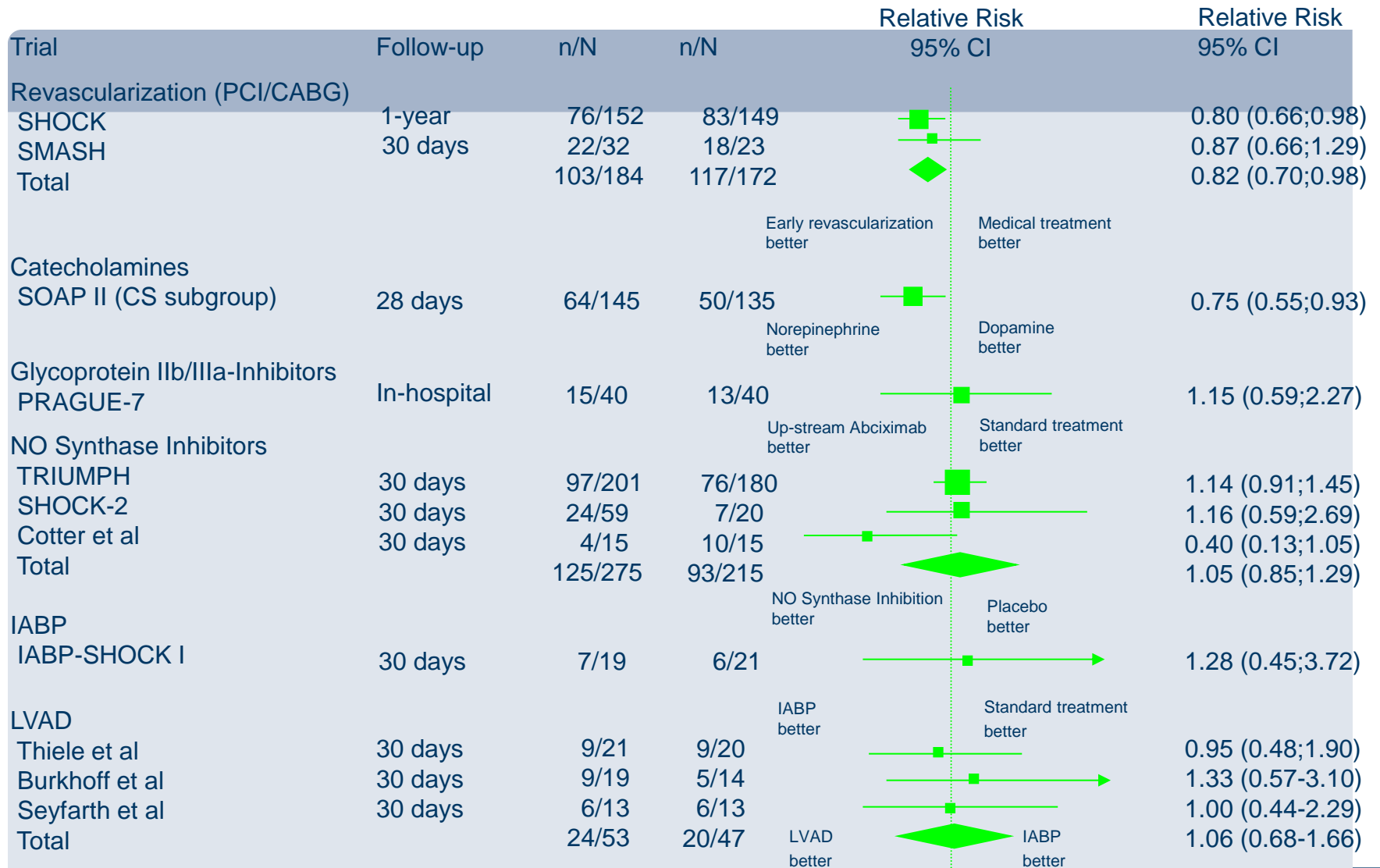
Patient Inclusion in Cardiogenic Shock Trials



Thank you for your attention

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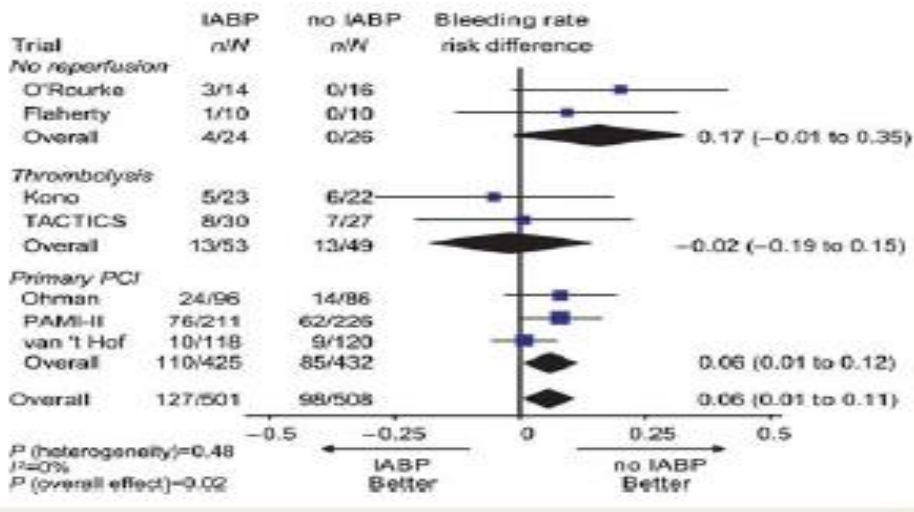
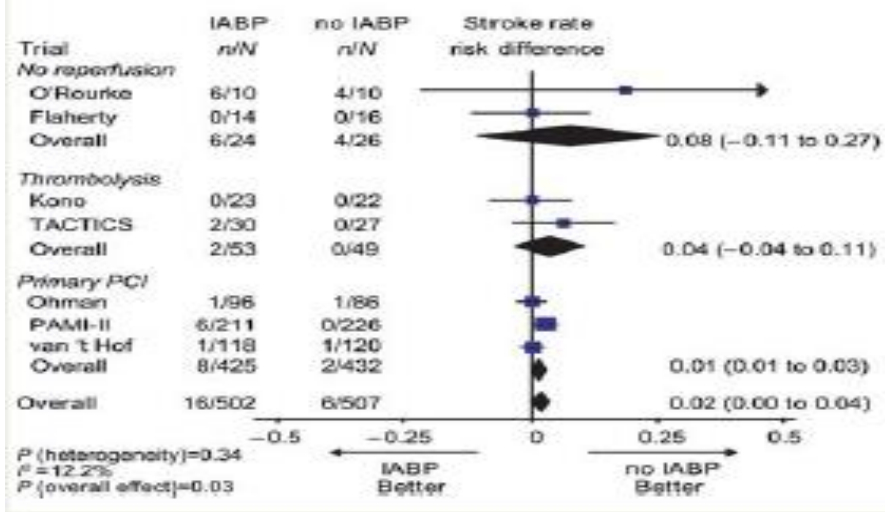
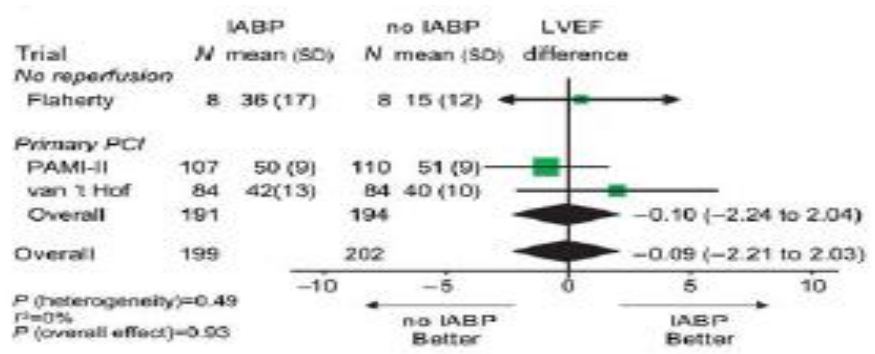
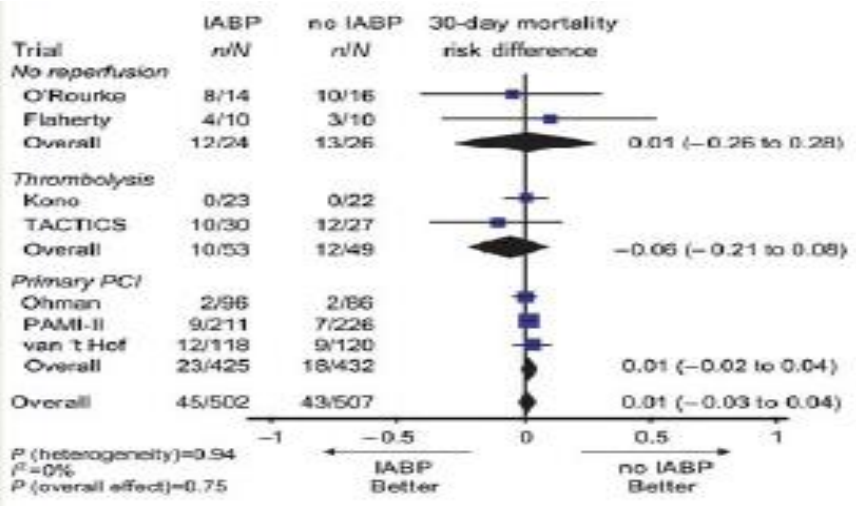
Randomized Trials in Cardiogenic Shock



Catecholamines

	IABP	Control	P-Value
Catecholamine; n/total (%)			
Dopamine	15/298 (5.0)	11/297 (3.7)	0.43
Norepinephrine	220/298 (73.8)	222/297 (74.8)	0.80
Epinephrine	76/298 (25.5)	80/297 (26.9)	0.69
Dobutamine	160/298 (53.7)	156/297 (52.5)	0.78
Catecholamine dose (µg/kg/min); median (IQR)			
Dopamine	4.1 (2.9-7.7)	4.2 (3.6-8.3)	0.76
Norepinephrine	0.3 (0.1-1.2)	0.4 (0.1-1.1)	0.73
Epinephrine	0.3 (0.1-1.3)	0.3 (0.2-1.4)	0.59
Dobutamine	10.2 (4.9-20.6)	9.0 (4.8-17.6)	0.25

STEMI - IABP versus no IABP - Metaanalysis



Study Design

MRI Core Lab – University of Leipzig – Heart Center

Anterior MI without Shock

Inclusion criteria

- Anterior STEMI
2 mm in 2 contiguous leads or
> 4 mm in anterior leads
- Planned primary PCI < 6 h

IABP pre PCI

Standard-PCI

Randomised
Open Label
(n ~ 300)

Routine Post PCI Treatment

Cardiac MRI Day 3-5 post PCI

Primary Endpoint: Infarct size in MRI

1. All Patients with MRI data
2. Patients with prox. LAD-occlusion TIMI 0/1 flow

Clinical Events – 6 Months

Primary Endpoint – Infarct Size

	All (N=337)	IABP (N=161)	Standard PCI (N=176)	P
Primary endpoint				
Infarct size (% LV), modified ITT all patients with MRI data				0.06
N	275	133	142	
Mean	39.8	42.1	37.5	
Median	38.8	42.8	36.2	
Infarct size (% LV), modified ITT patients prox. LAD + TIMI flow 0/1				0.110
N	192	93	99	
Mean	44.4	46.7	42.3	
Median	42.1	45.1	38.6	