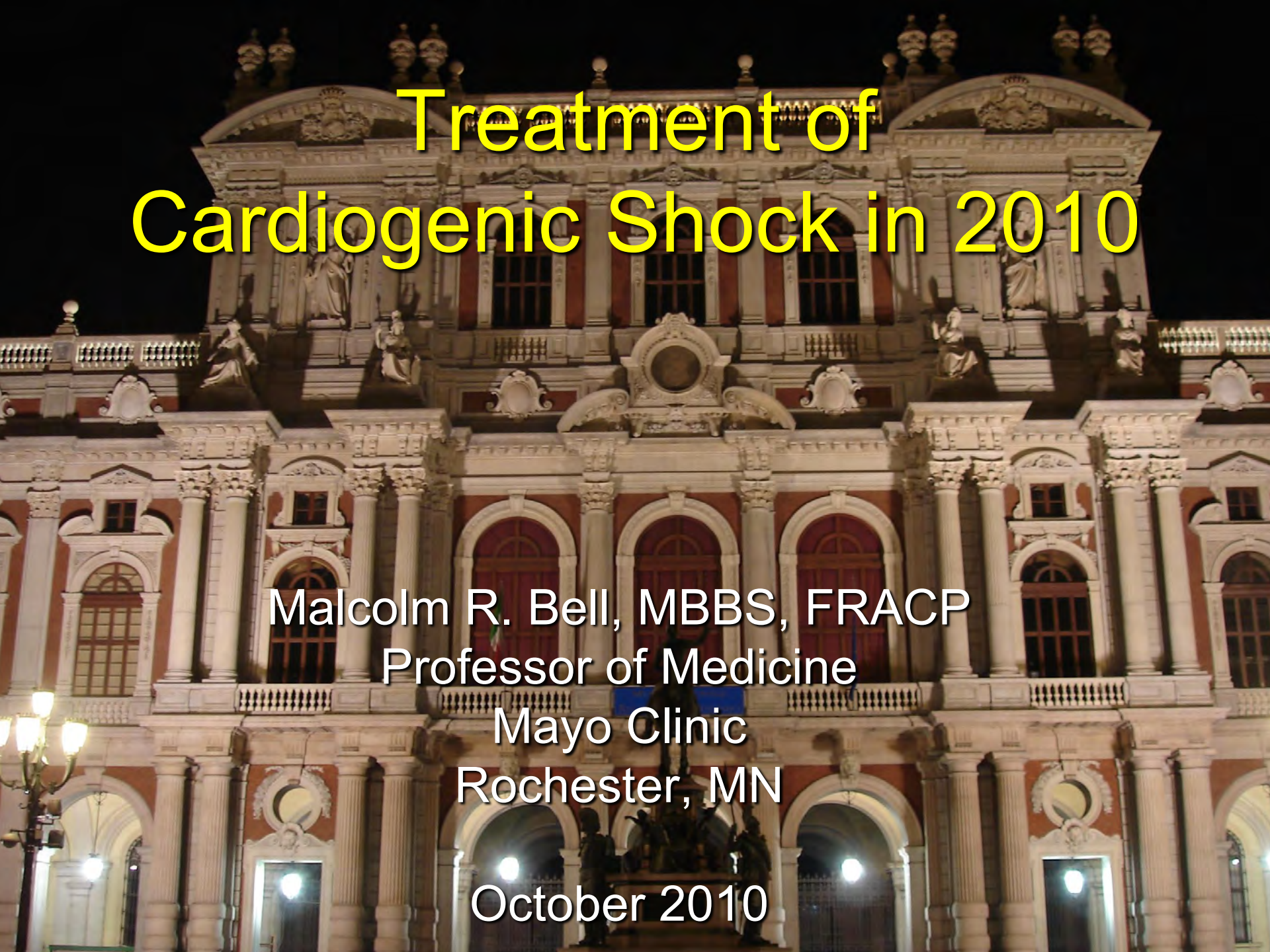
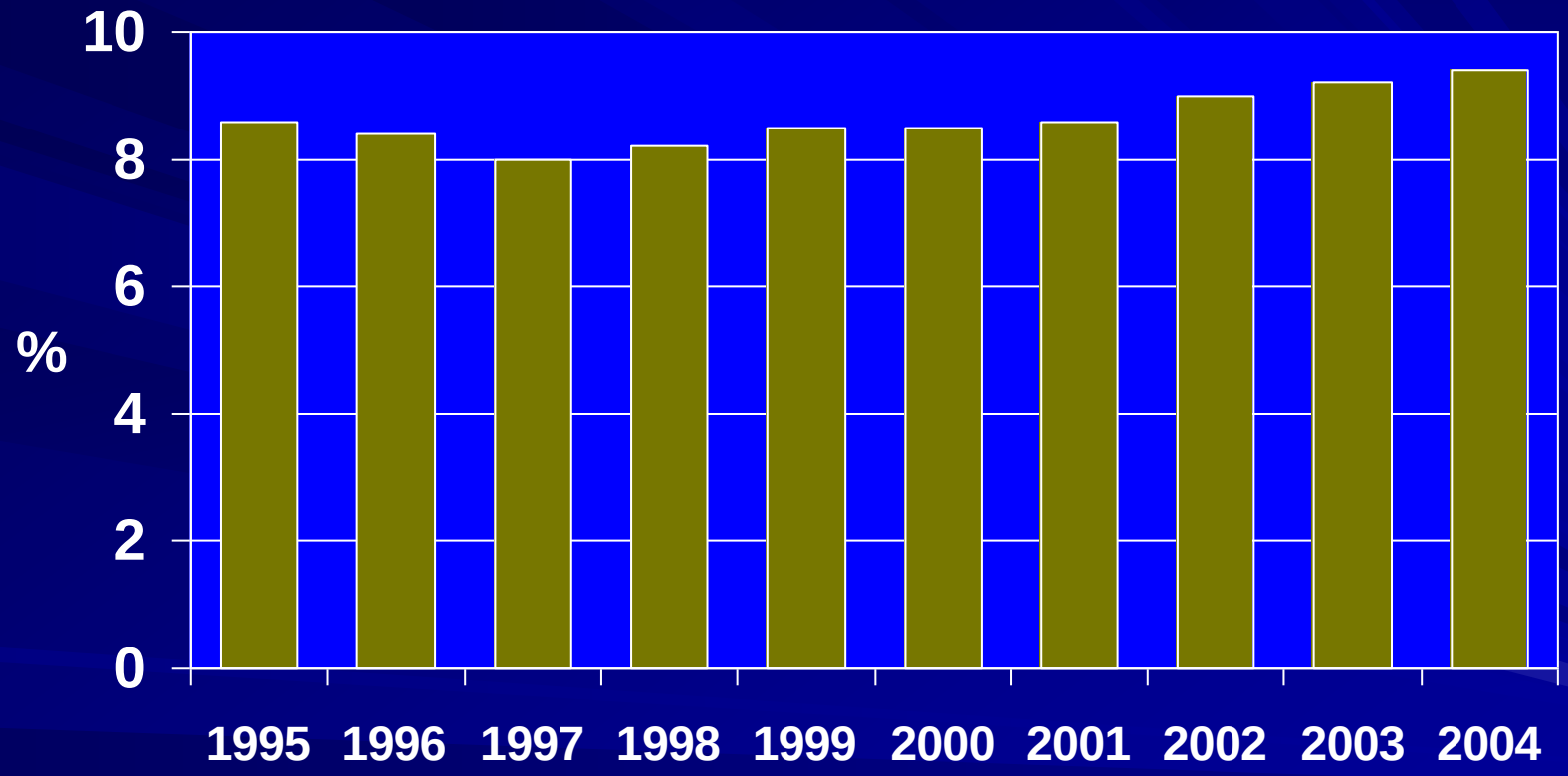


Treatment of Cardiogenic Shock in 2010

Malcolm R. Bell, MBBS, FRACP
Professor of Medicine
Mayo Clinic
Rochester, MN

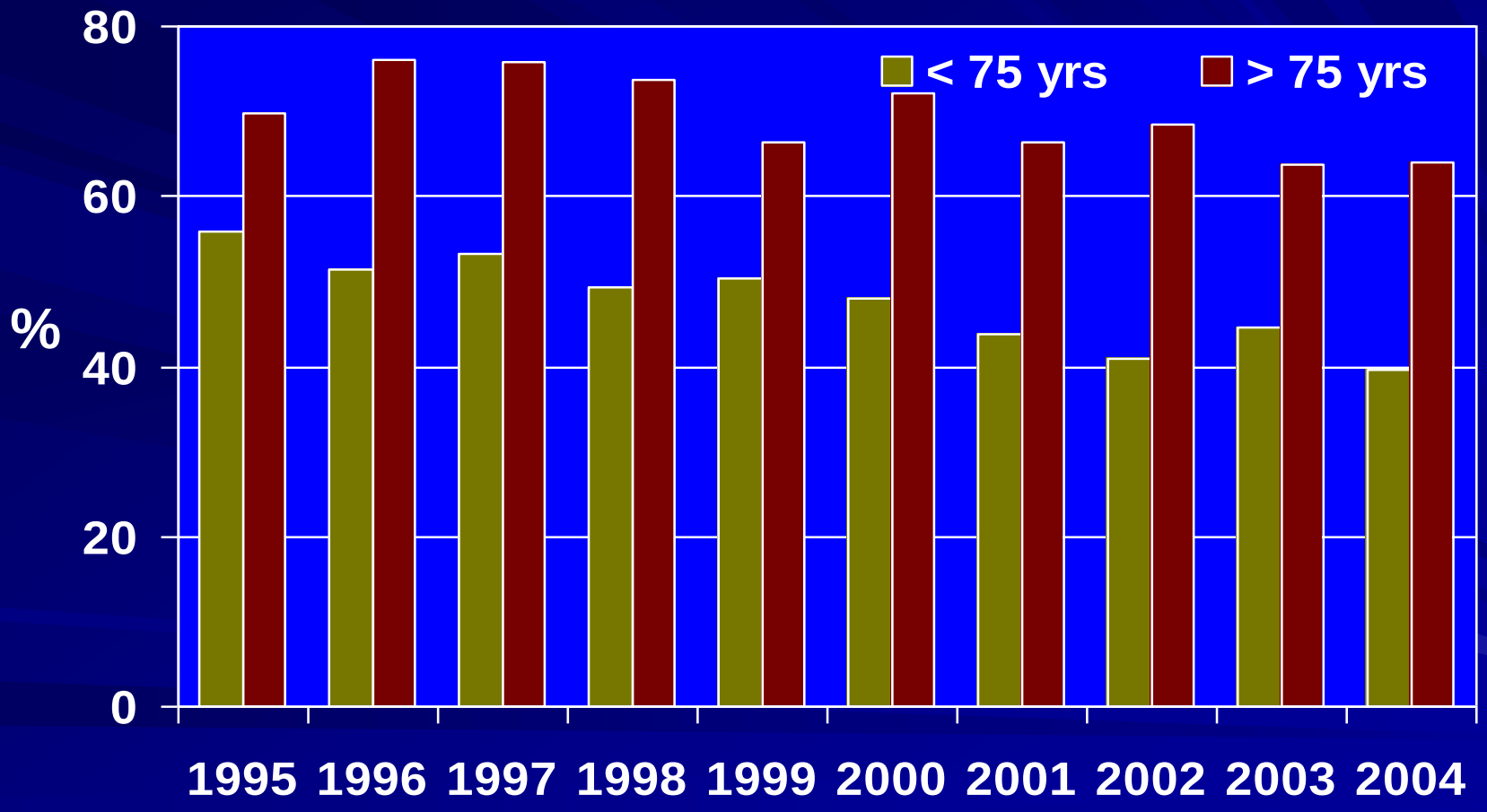
October 2010

Cardiogenic Shock Frequency in NRMI Registry



Babaev A: JAMA 2005

In-Hospital Mortality Rates
NRMI Registry

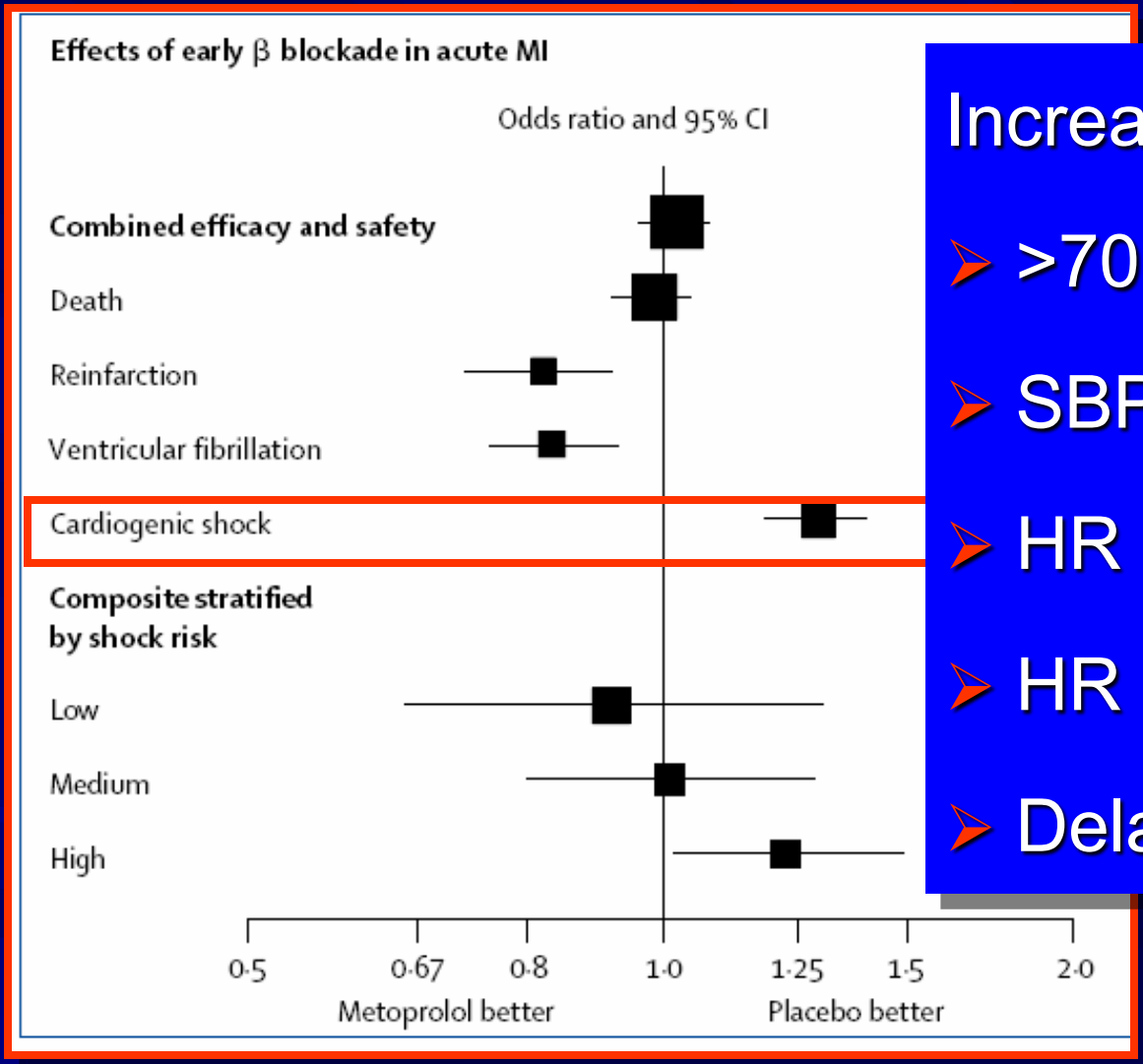


Babaev A: JAMA 2005

FACTS!!

- Cardiogenic shock is leading cause of death among hospitalized patients with AMI
- In majority, shock does not develop until after hospital admission
  - Look out for it!
  - Know the early warning signs

Beta-blockers in AMI – another look



Increased shock risk:

- >70 yrs
- SBP <120 mmHg
- HR >110 bpm
- HR <60 bpm
- Delayed presentation

Sabatine M: Lancet (editorial) 2005

Diagnosis and Management: Crucial Initial Steps

- Rule out volume depletion
  - Adequate volume expansion
- Rule out RV infarction if inferior MI
- Rule out mechanical causes (rupture)
  - Echocardiography or left ventriculography
- Swan Ganz catheter
  - Filling pressures

Shock Guidelines
Critical Initial Interventions

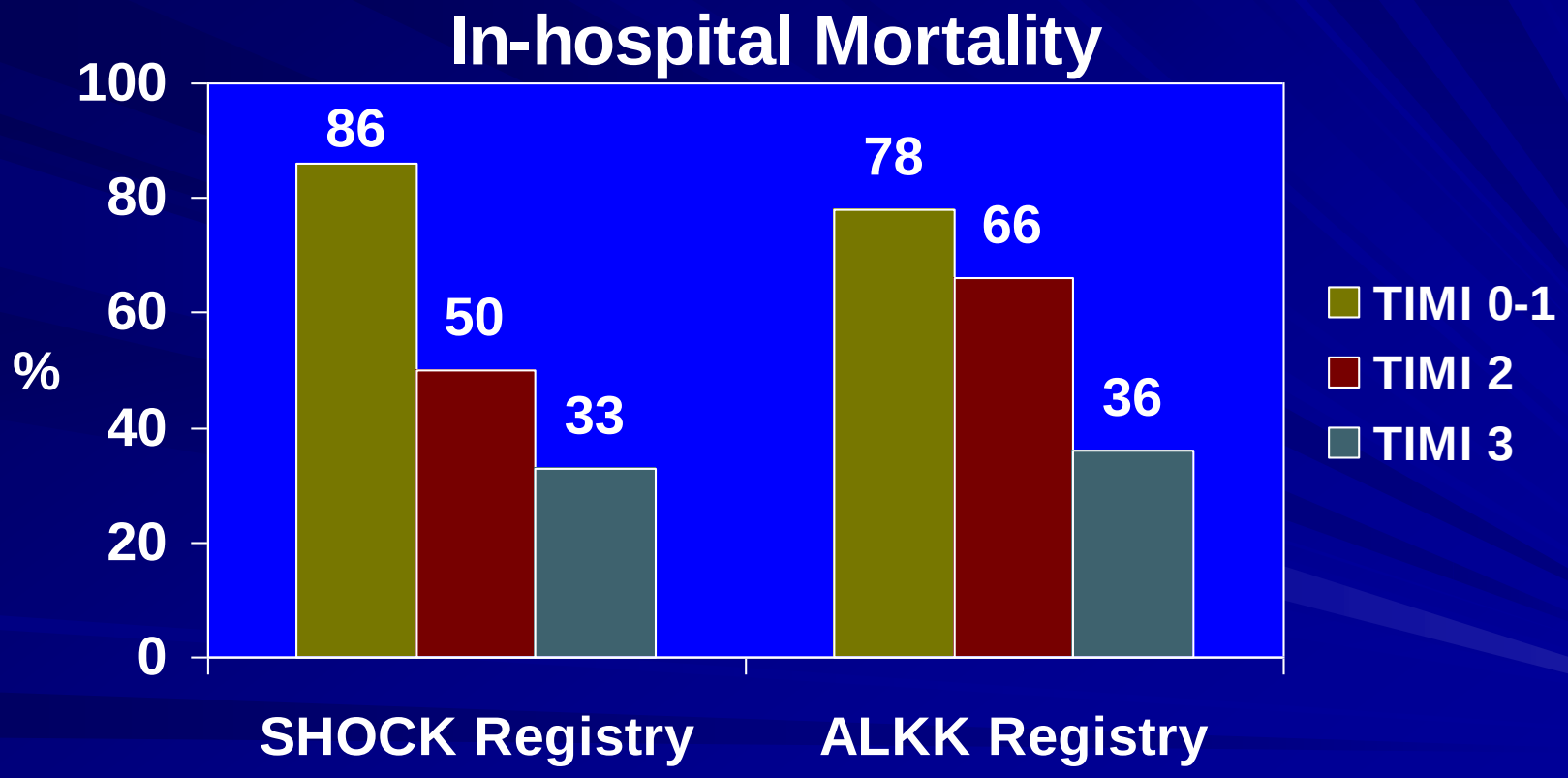
- CA with early CABG or PCI
  - *ACC/AHA class I (LOE = A)*
- Intra-aortic balloon support
  - *ACC/AHA class I (LOE = B)*
- Swan-Ganz catheter
  - *ACC/AHA class IIa (LOE = C)*

JACC 2004

Treatment of Shock
Main goals

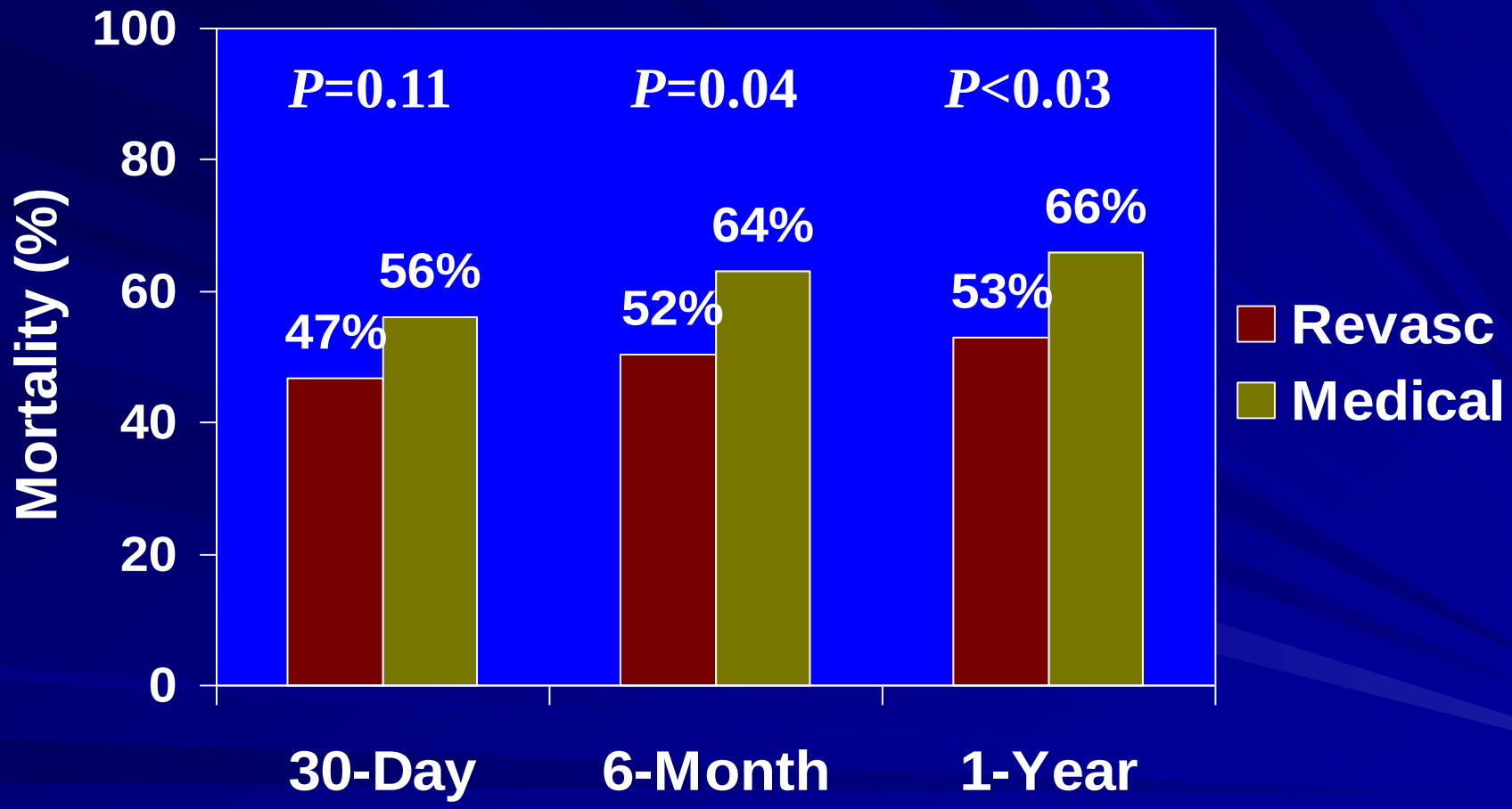
- Restore and optimize coronary blood flow
- Restore and optimize coronary blood flow
- Restore and optimize coronary blood flow
- Restore and optimize coronary blood flow
- Restore and optimize coronary blood flow
- Restore and optimize coronary blood flow

Influence of PCI Success on Shock Mortality



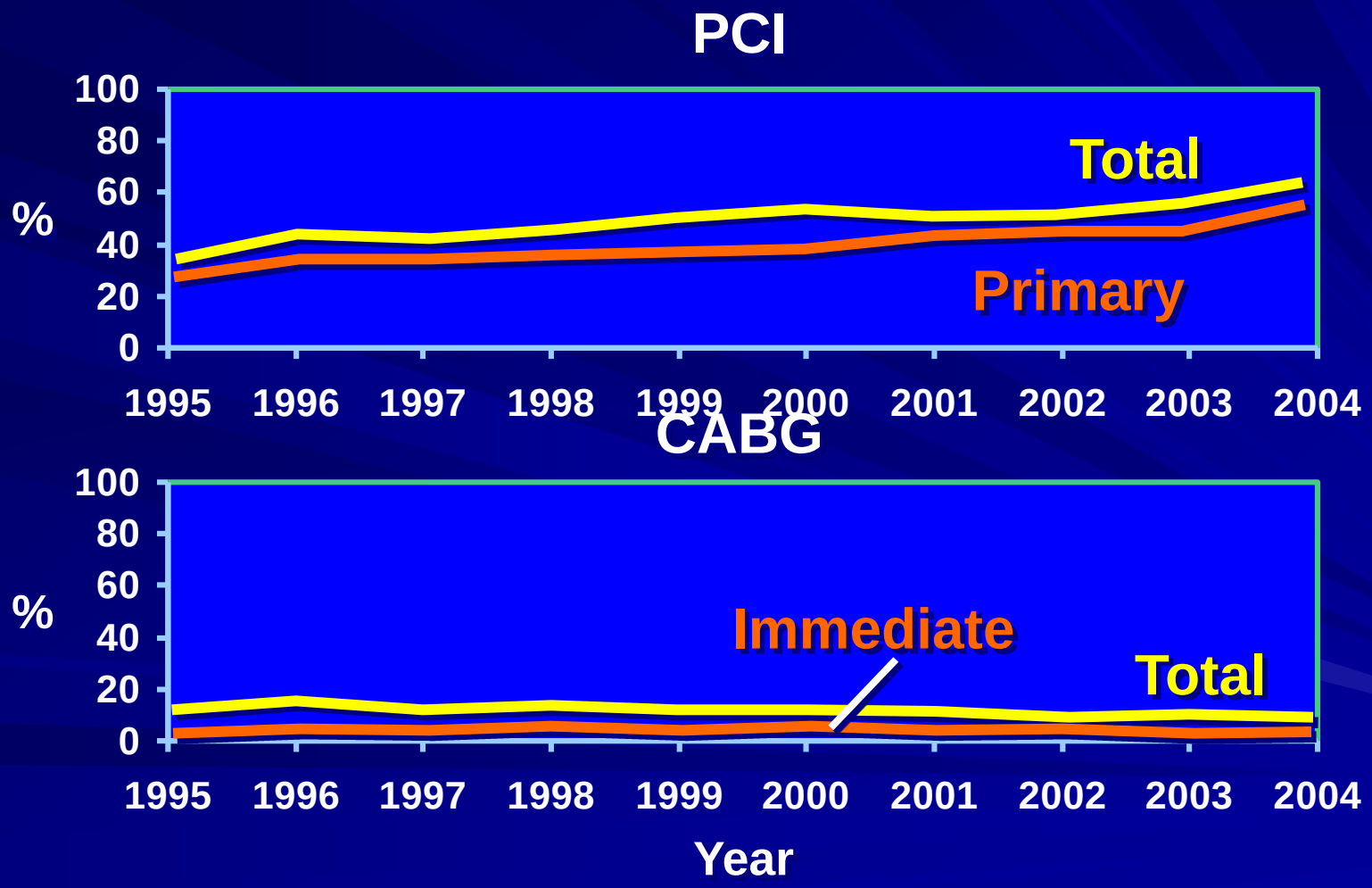
Webb J: AHJ 2001; Zeymer: EHJ 2004

Mortality in the SHOCK Trial



Hochman J: NEJM 1999

Revascularization Use in 7,356 NRMI Patients with Shock

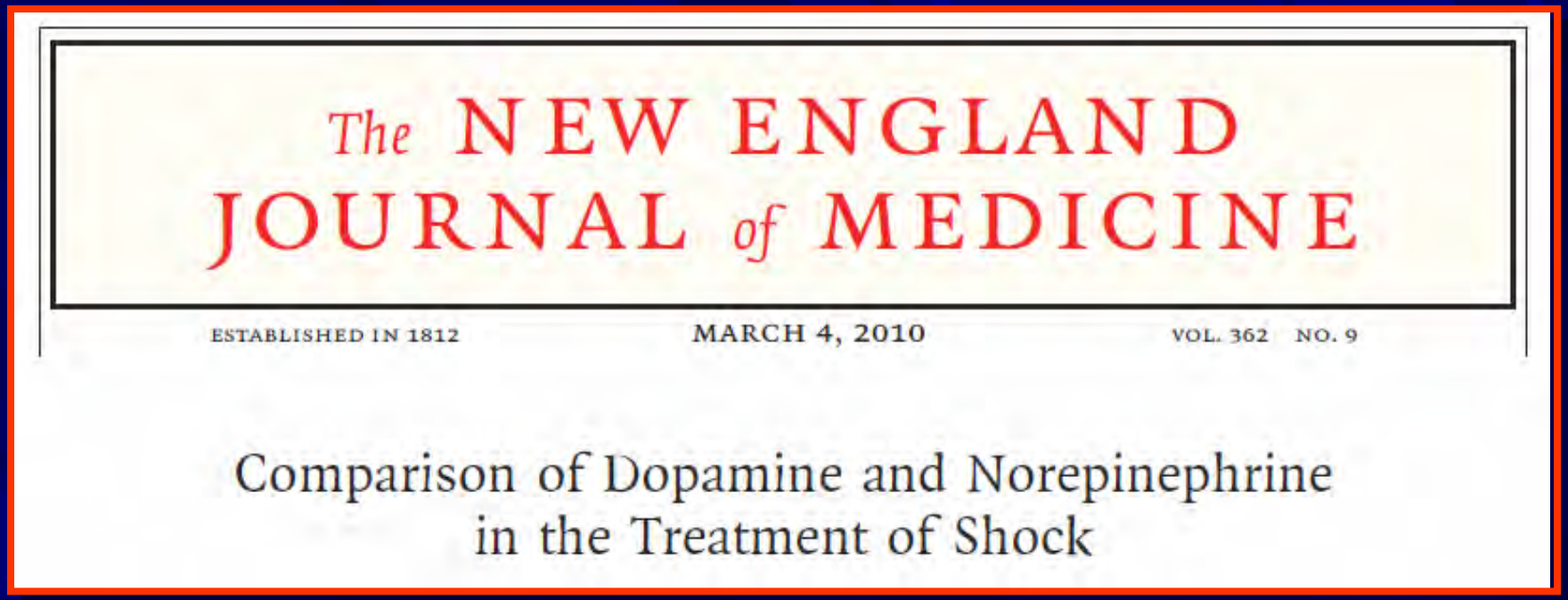


Babaev A: JAMA, 2005

Inotropes and Vasopressors for Cardiogenic Shock

Temporizing measures only:

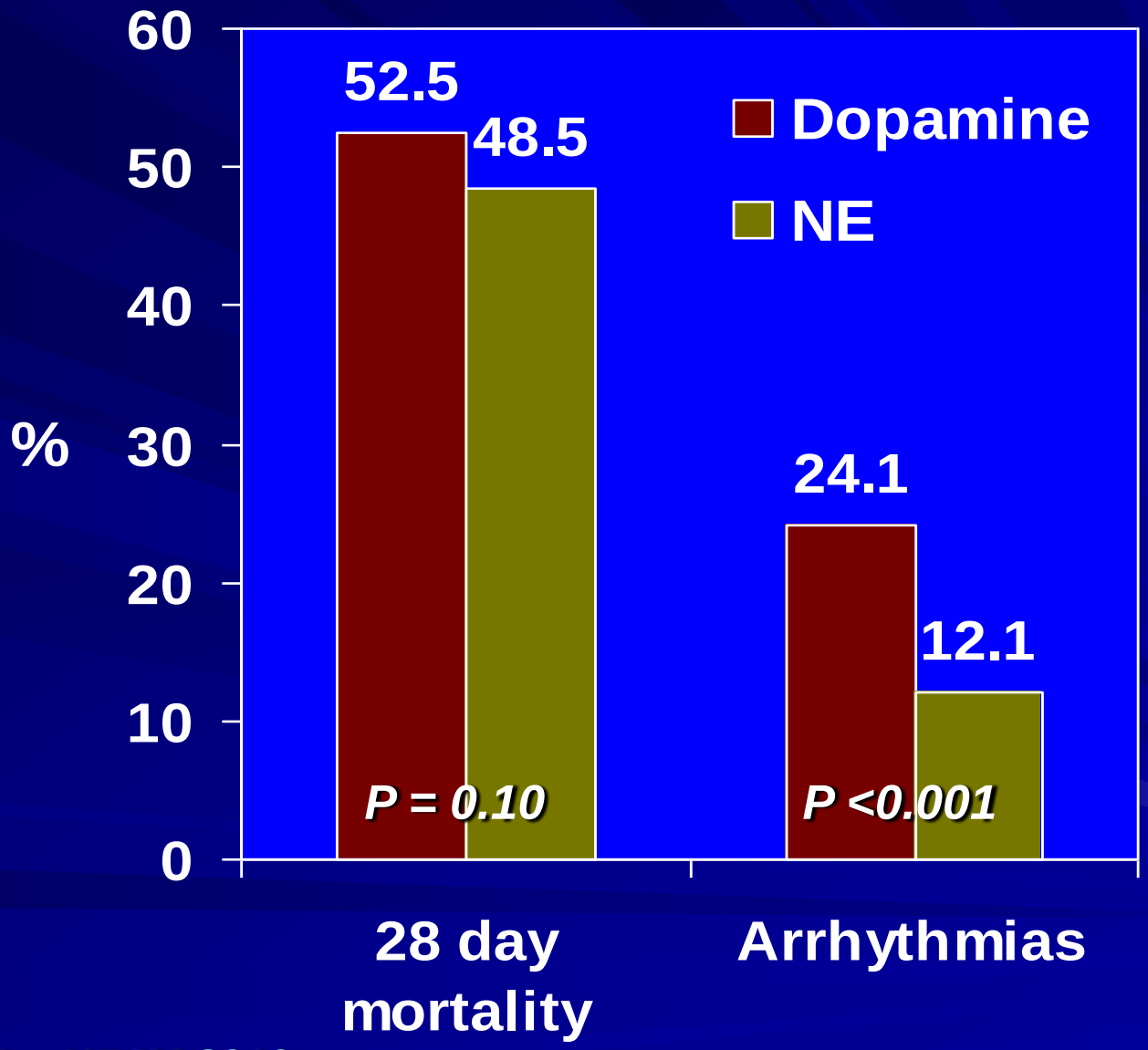
- Use for short as time as possible
  - limited by their toxicity
- Lowest dose and/or in combination
- None shown to improve survival
- Dopamine per ACC/AHA…….
  - But increases mortality?



SOAP II Trial

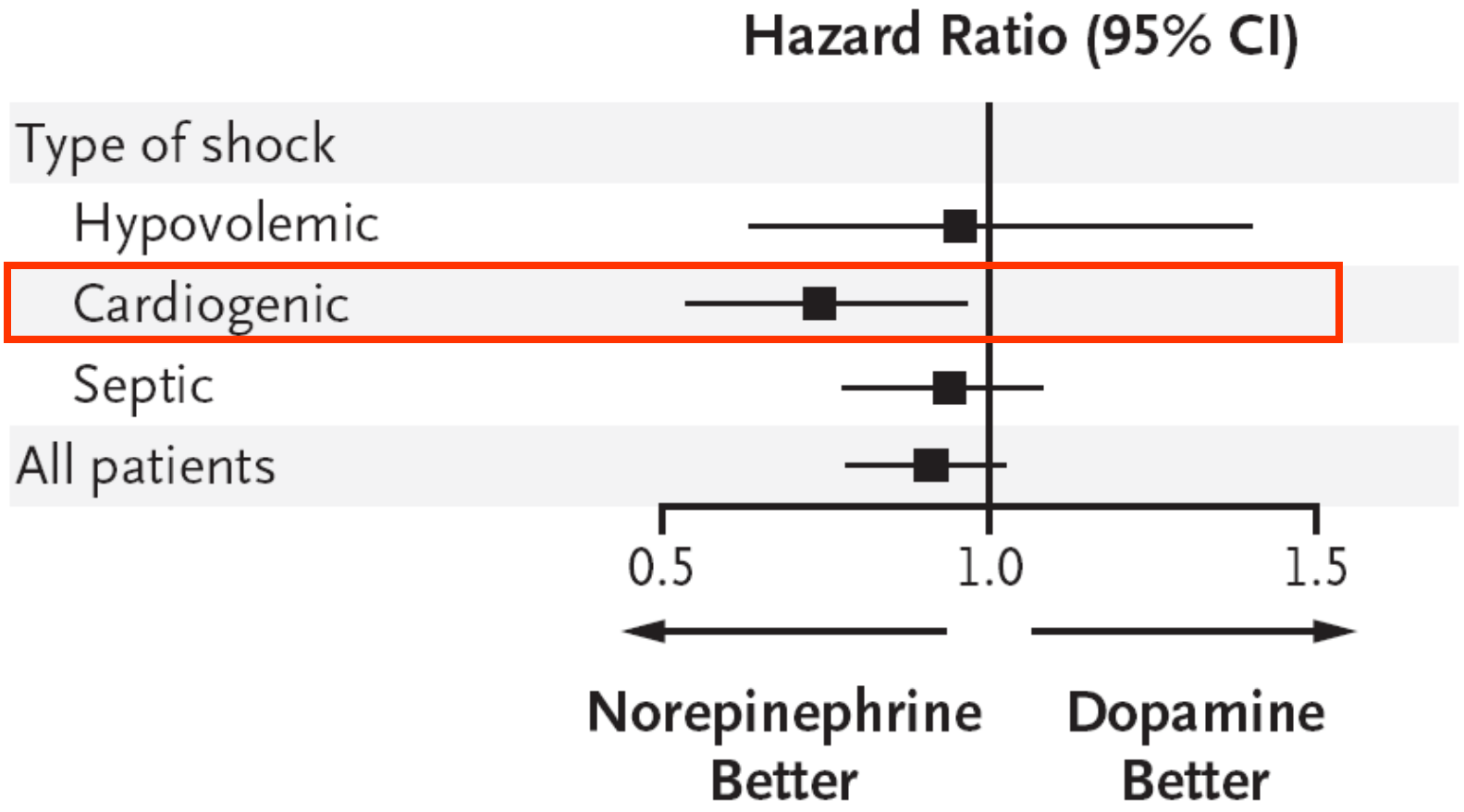
- 1679 shock patients
- Randomized and blinded
- Dopamine *vs.* norepinephrine

SOAP II Results



De Backer D: NEJM 2010

SOAP II Trial
Predefined Subgroups



De Backer D: NEJM 2010

General Care of the Shock Patient

- Transfer to cardiac intensive care
  - Skilled and experienced team
  - Availability of multi specialists
- Ensure adequate oxygenation
  - Prompt treatment of pulmonary edema
  - Intubation and mechanical ventilation
- Monitor for multi organ failure
- Prevent infection and prompt Rx of sepsis

What is new?

TRIUMPH Trial

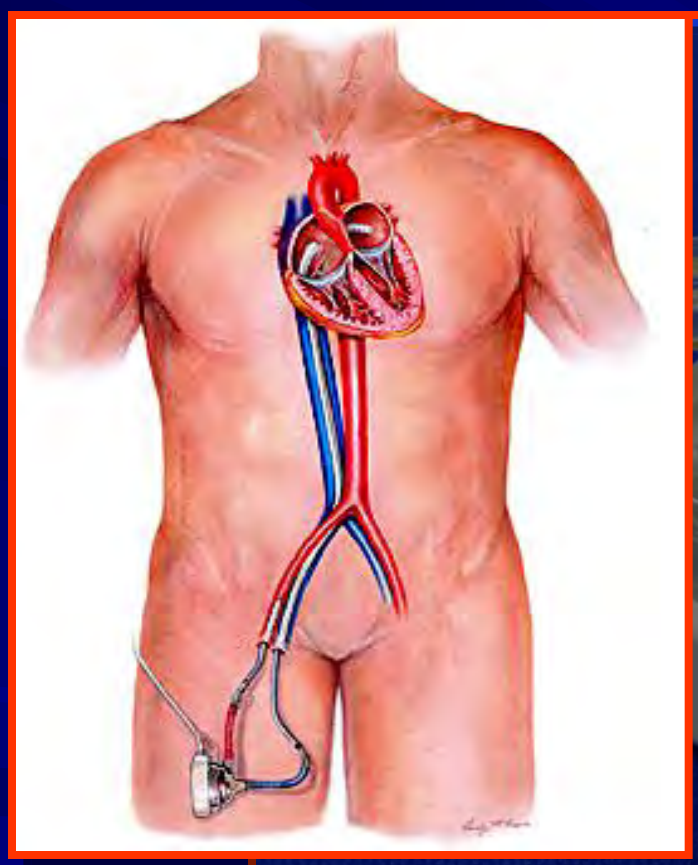
Hypothesis: excess NO release leads to SIRS and worsening shock

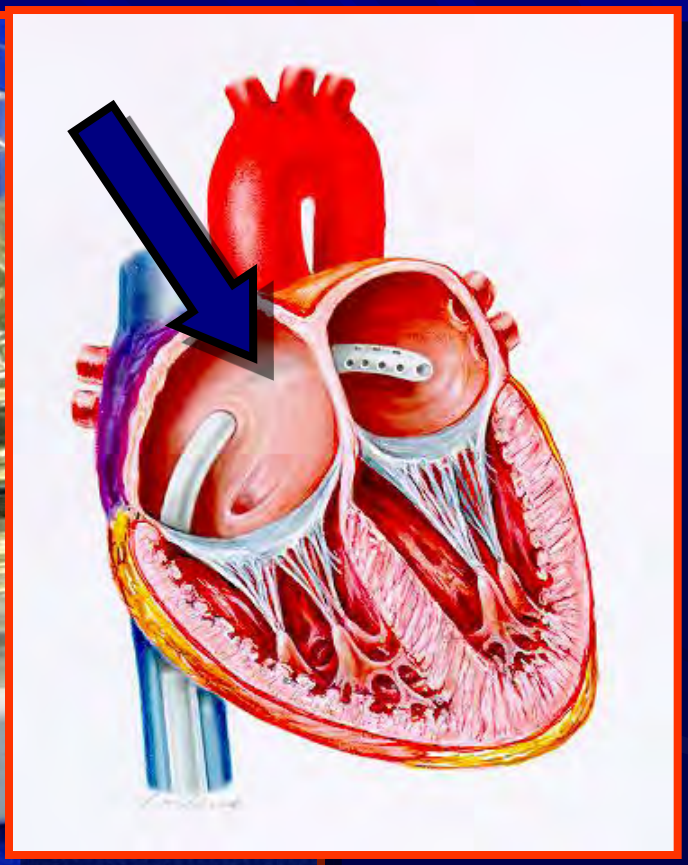
- Tilarginine (NOS inhibitor) *vs* placebo
- Primary endpoint: 30-day mortality
  - Negative

  ……*Stopped for futility*
- Largest drug trial in cardiogenic shock
  - 398 pts

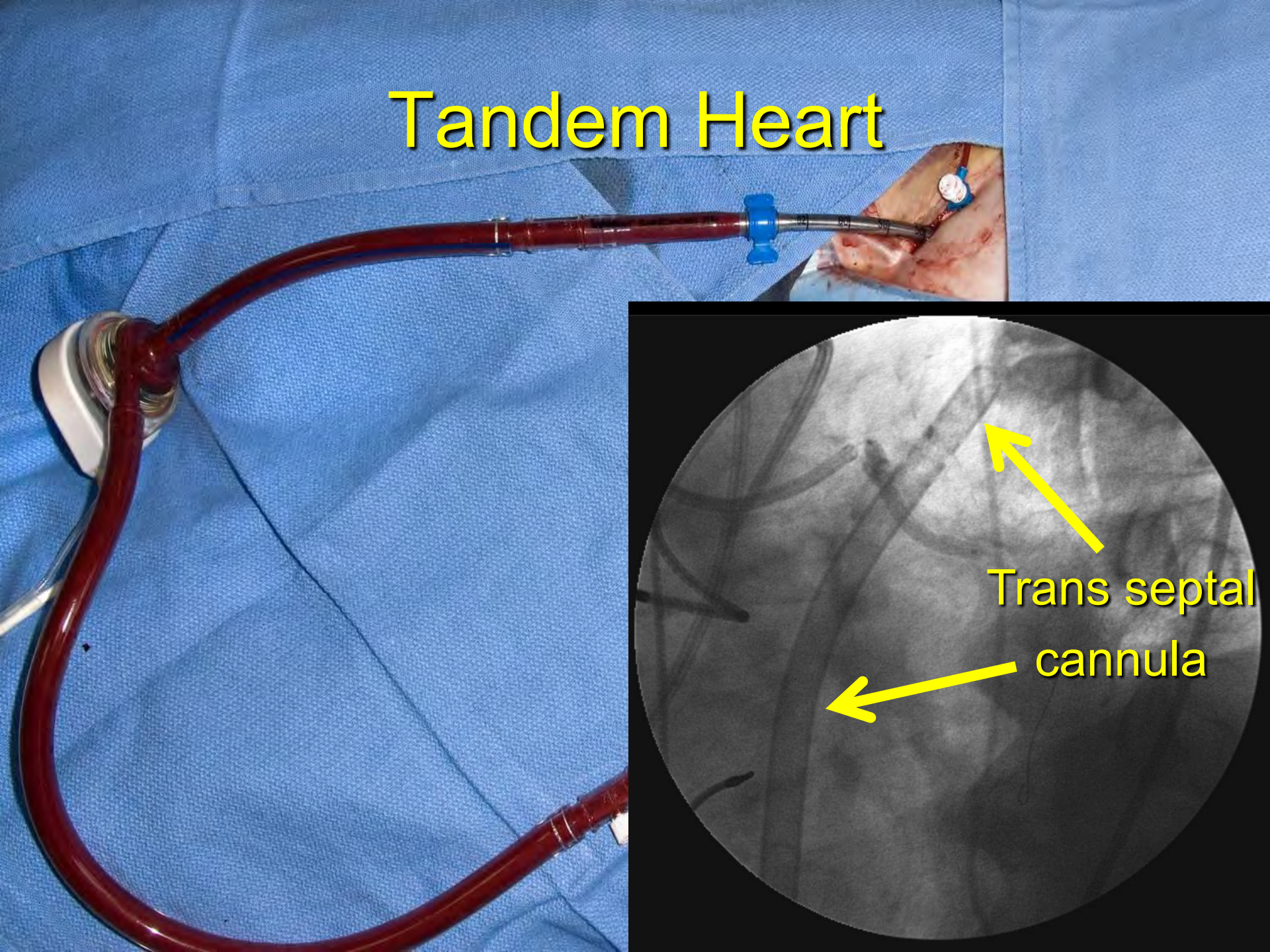
JAMA 2007

TandemHeart™ Percutaneous LVAD





Tandem Heart



Leipzig Shock Trial

IABP vs pLVAD

Cardiogenic Shock post AMI

Randomized to

20 (IABP) vs 21 (pVAD)

pLVAD more effective:

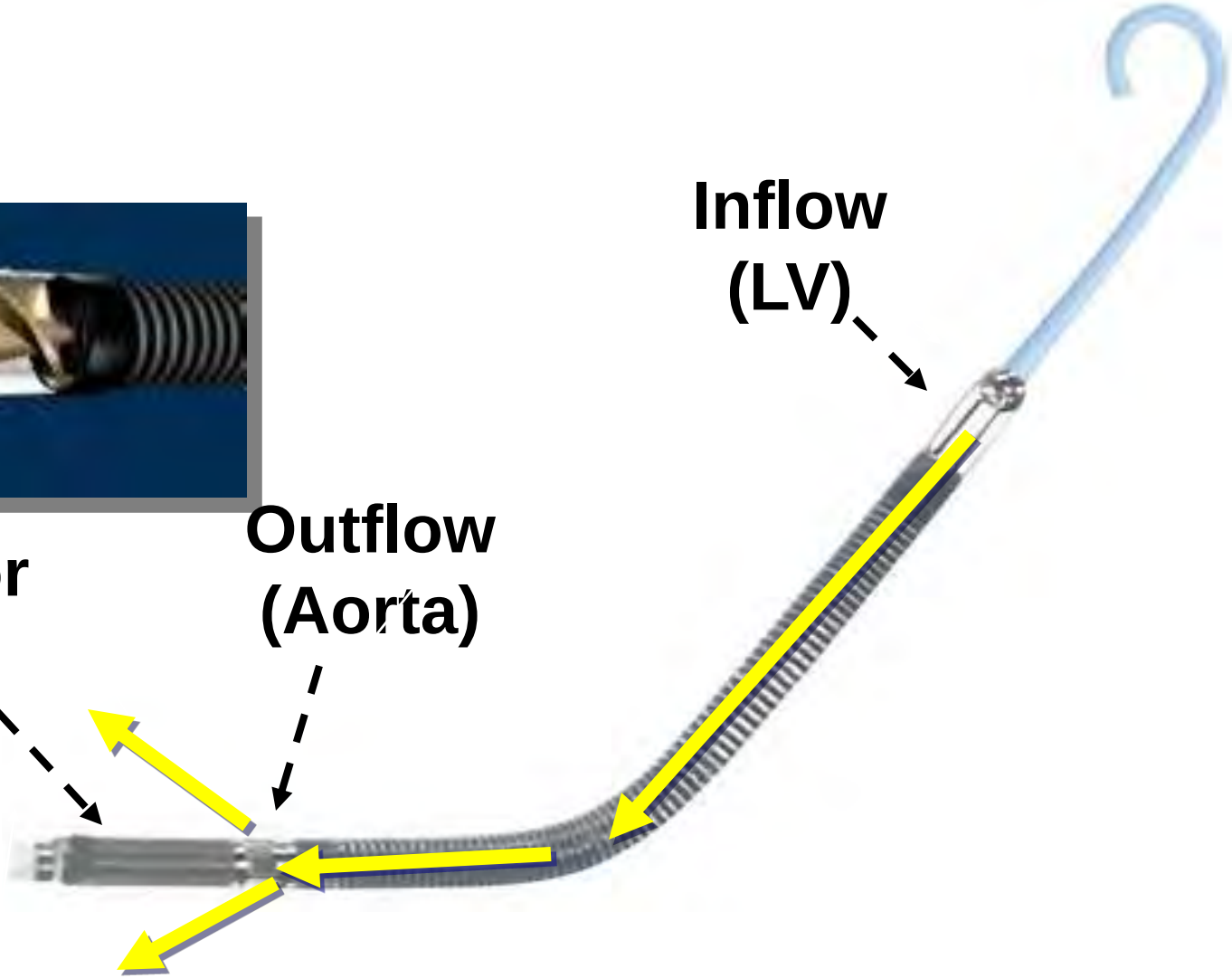
- Cardiac power
- Cardiac output, PCWP
- Lactate

But:

- Severe bleeding (19 v 8)
- Limb ischemia (7 v 0)
- Mortality same

Thiele H: EHJ 2005

Impella 2.5



ISAR-SHOCK Trial

Impella vs. IABP (randomized)

Primary endpoint =

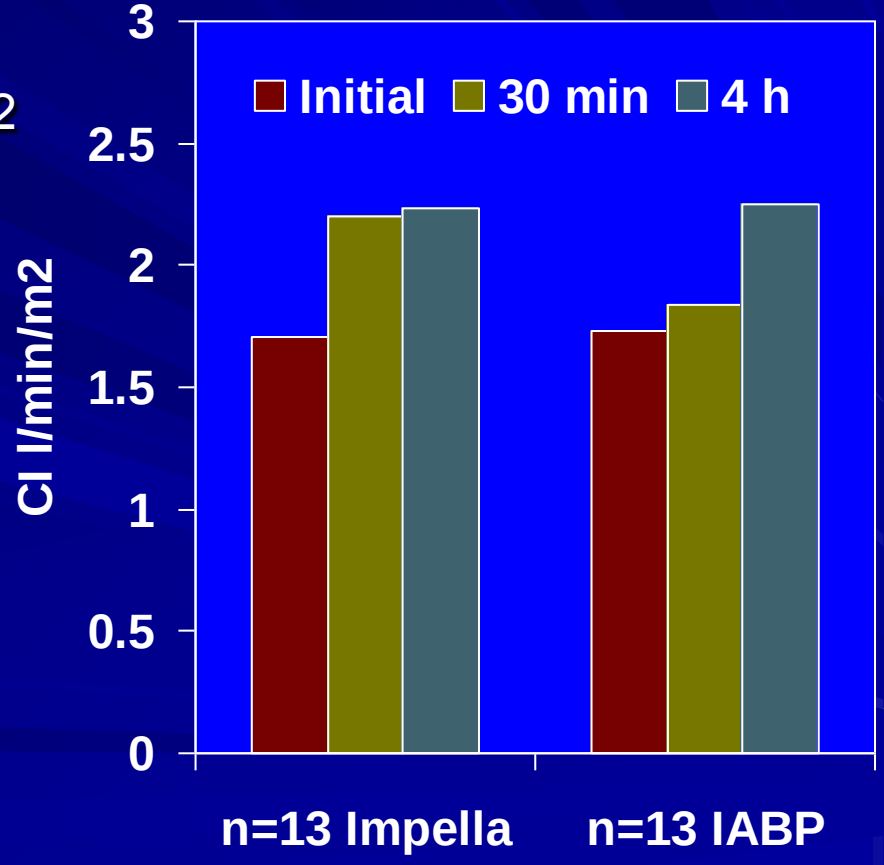
ΔCI 0.49 vs 0.11 l/min/m^2

No difference in clinical events

<u>Impella:</u>

Leg ischemia (1)

More transfusions



Seyfarth M: JACC 2008

Summary of New Devices

- Produce superior hemodynamics
- Technically more difficult than IABP
- ↑Bleeding and vascular complications
- No survival benefit demonstrated, so far
- Expensive
- Current use – limited; not first-line

Circulatory Support Devices

	IABP	Impella 2.5	TandemHeart
Max flow or aug	<1 L/min	2.5 L/min	5 L/min
Ease of use	✓ ✓ ✓ ✓	✓ ✓	✓
Cannula/sheath	7-8F	13F	$17F_a$ $22F_v$
Set up time	1-2 min	15-25 min	30 min
Duration of use	Days	6 hours	Hours
Cost - console	$59,000	$50,000	$52,000
- pump	$850-1,200	$26,000	$22,000

IABP – where is the evidence?

The use of intra-aortic balloon counterpulsation in

European Heart Journal (2010) **31**, 502–504

EDITORIAL

LETTERS TO THE EDITOR

Cardiog ... **pump?**

Holger Thiel

Department of Internal Me

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Krisch
Jan Ba
and Jc

doi:10.1093/eurheartj/ehp522
Online publish-ahead-of-print 1 December 2009

Percutaneous assist devices vs. intra-aortic balloon pump for cardiogenic shock: evidence under construction vs. expert opinion

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Trials of Shock Treatments

- Large randomized trials:
  - Challenging
  - Can be done (TRIUMPH and SHOCK)
  - Must be done (new devices)
- Improvement in hemodynamics is not a surrogate for survival
  - via mechanical or pharmacologic means

Need Aggressive Approach in 2010

- IABP and angiography or pLVAD *no* delay
- PCI culprit vessel
  - complete revascularization - selected cases
- CABG in selected cases
- LVAD or ECMO – very selected cases as bridge to transplant

Mortality remains high