Controversies on Primary angioplasty in STEMI

원주의대
이 승 환

Case (51/M)

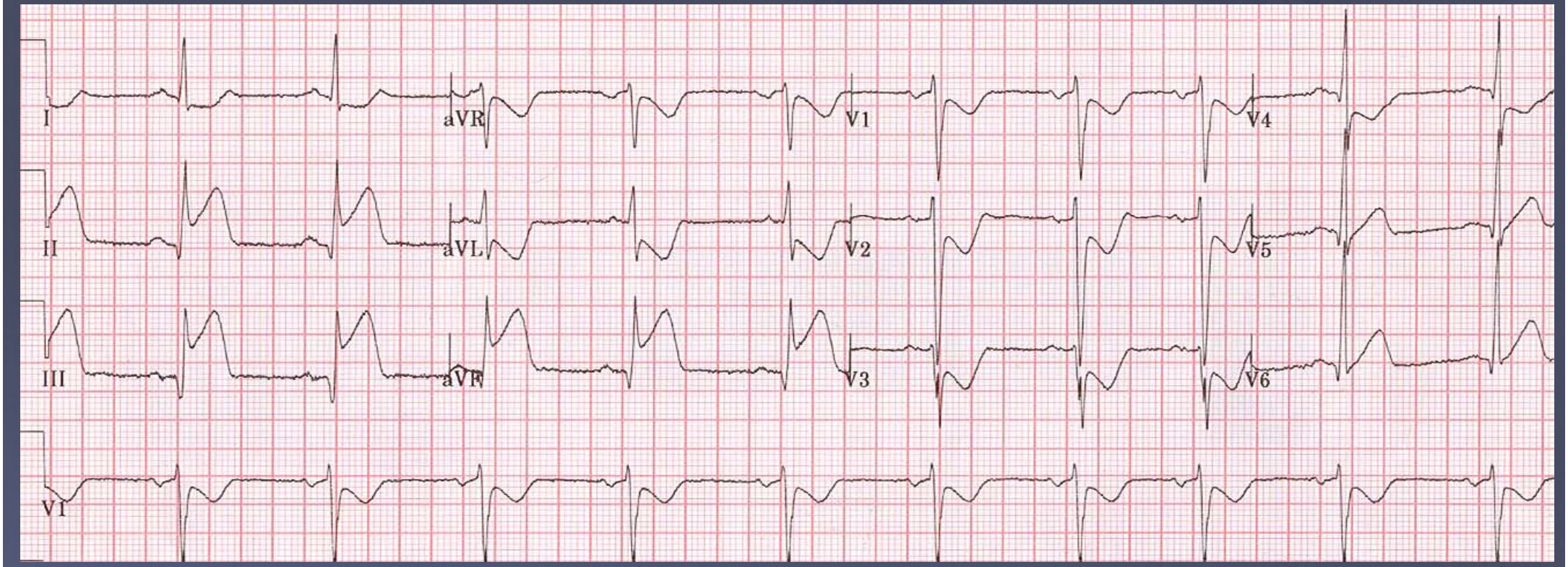
- C.C: ongoing squeezing chest pain
- D : for 2 hours
- Risk factors
  - Current smoker (40 PYs)
  - Hypercholesterolemia (+)

Case (51/M)

- **Physical examination**
  - **BP: 142 / 96 mmHg, Pulse: 68 /min**
  - **Regular heart beat without murmur**

- **Stat lab. data**
  - **Troponin stick negative**
  - **CK-MB : 3.40 ng/ml (upper limit 6.3 ng/ml)**
  - **Troponin-I : 0.13 ng/ml (upper limit 0.2 ng/ml)**

EKG at arrival



Which is the best treatment of STEMI?

The key point of decision is the feasibility of primary PCI

In hospital with Cath. Lab.

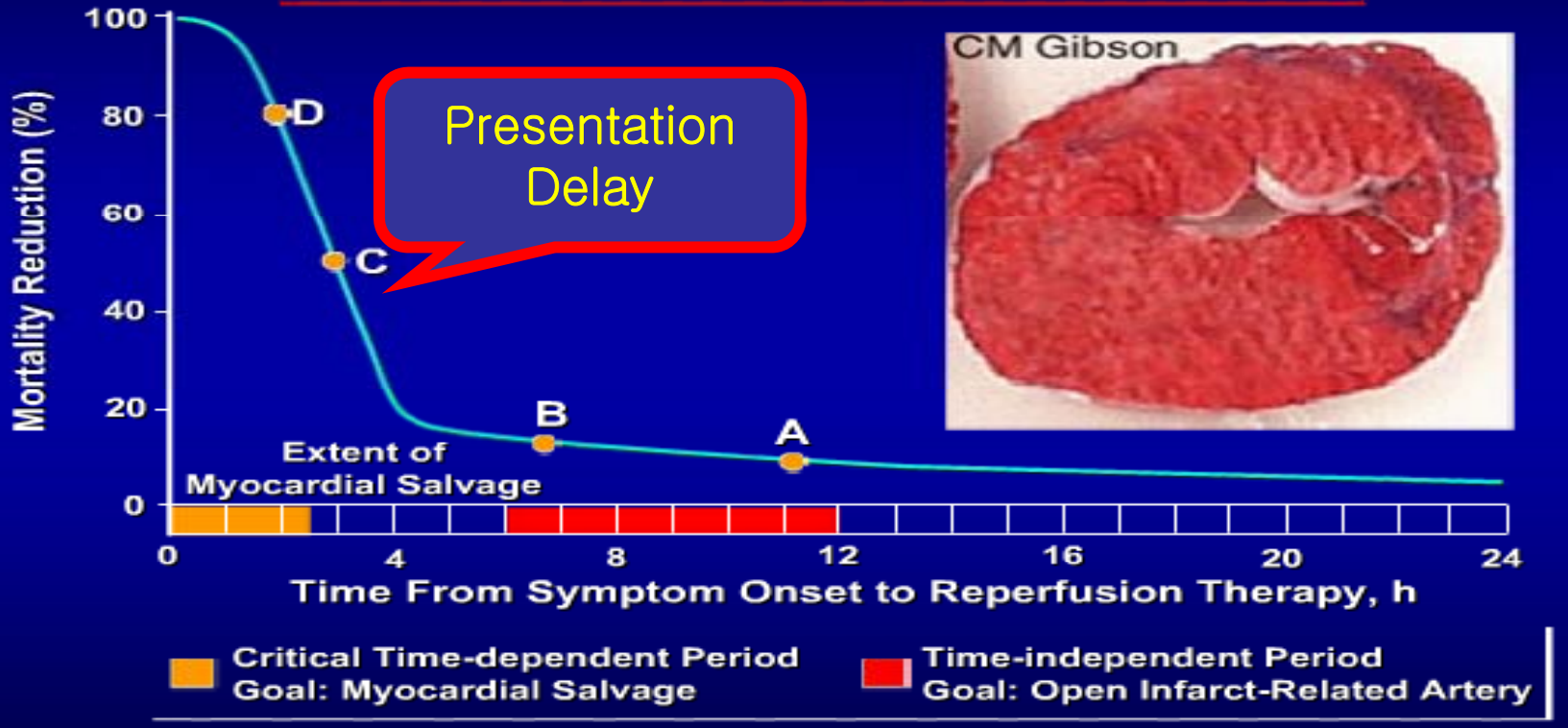
Thrombolysis vs Primary angioplasty

In hospital without Cath. Lab.

Thrombolysis vs transfer for Primary angioplasty

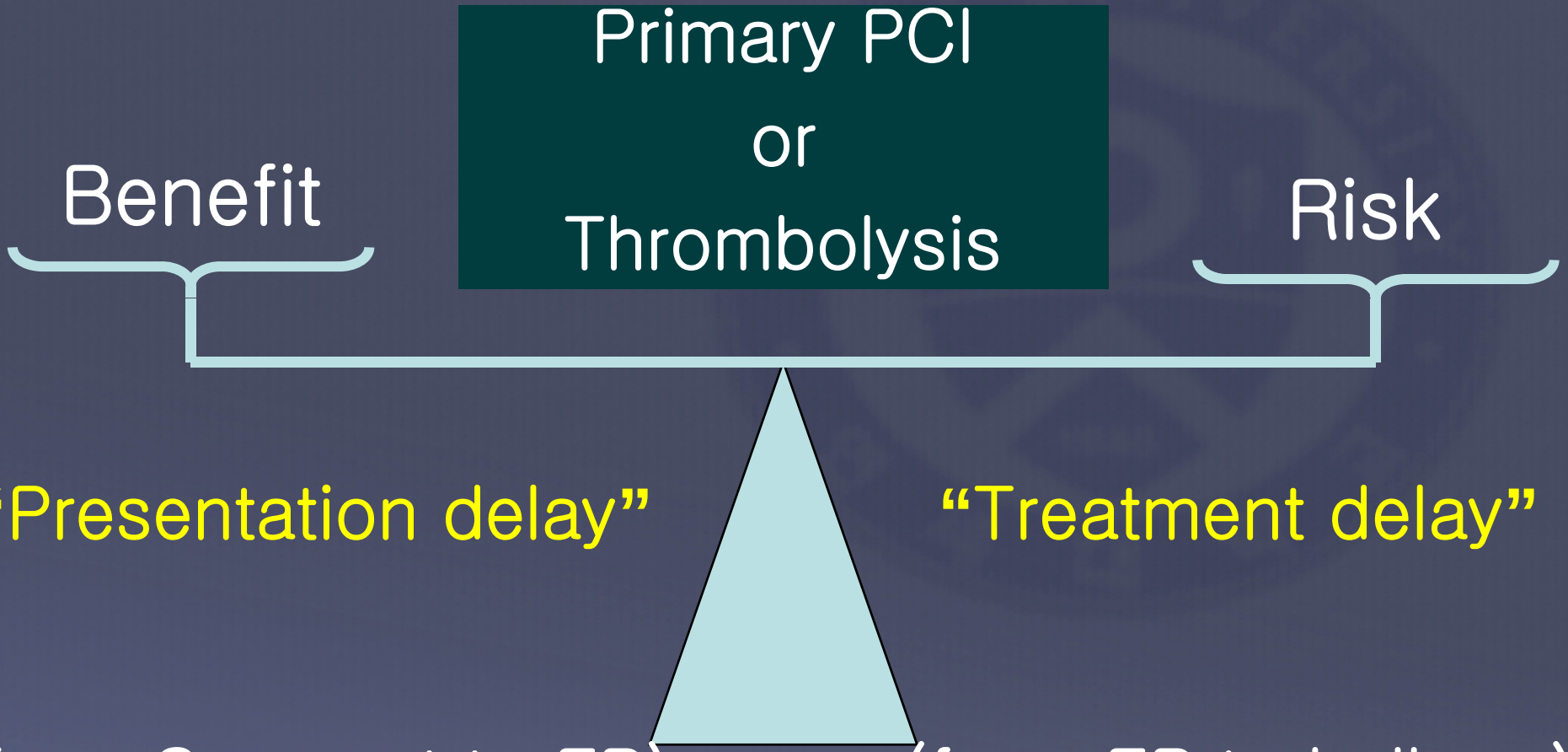
Myocardial salvage
First 2 hours from pain onset is critical

1. Time is Myocardium
2. Infarct Size is Outcome



Gersh BJ, et al. *JAMA*. 2005;293:979.

Primary PCI vs. Thrombolysis Therapy



The best treatment is tailored to patient
Reperfusion Option for STEMI

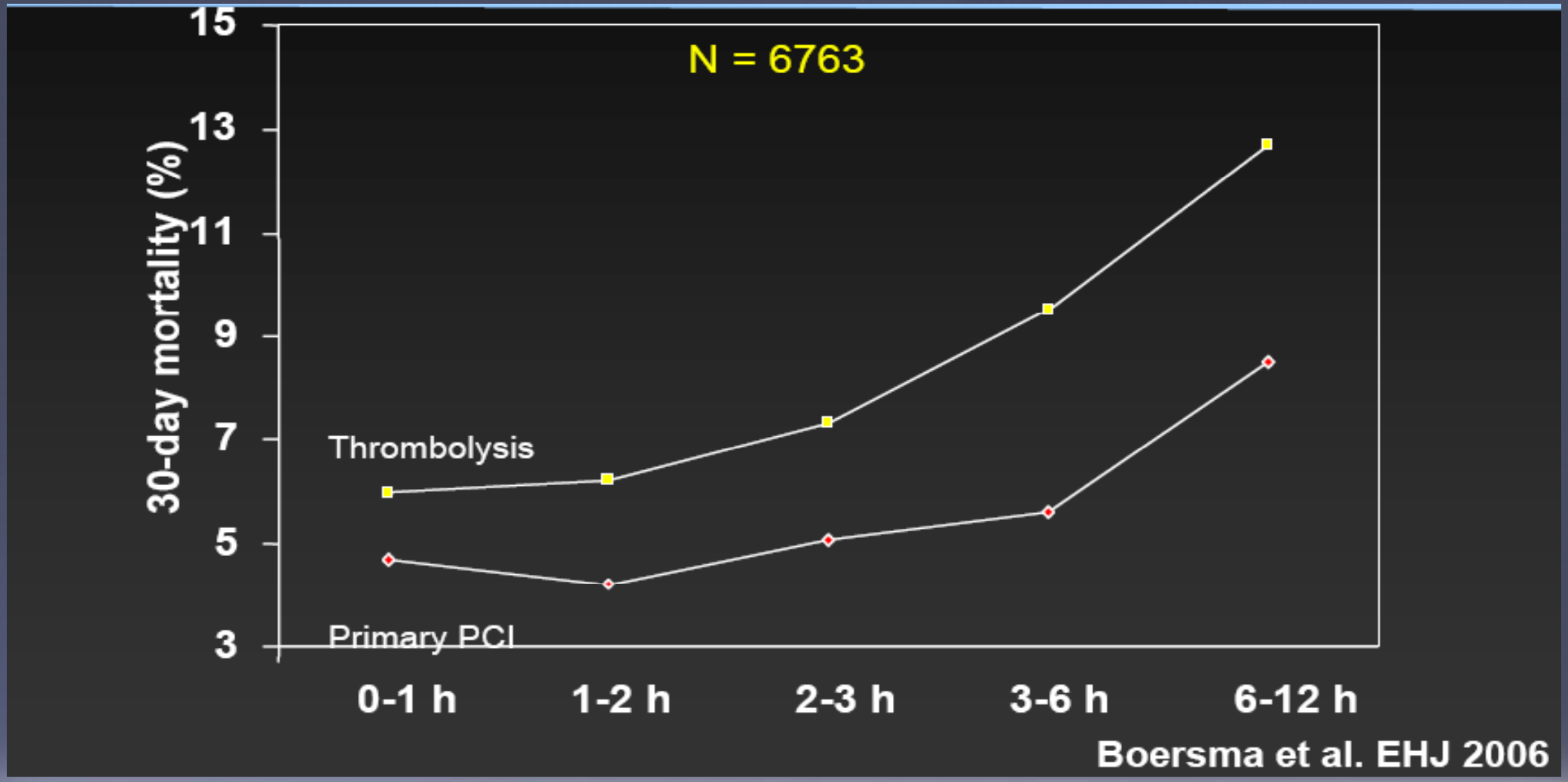
Time since symptom onset

Risk of STEMI

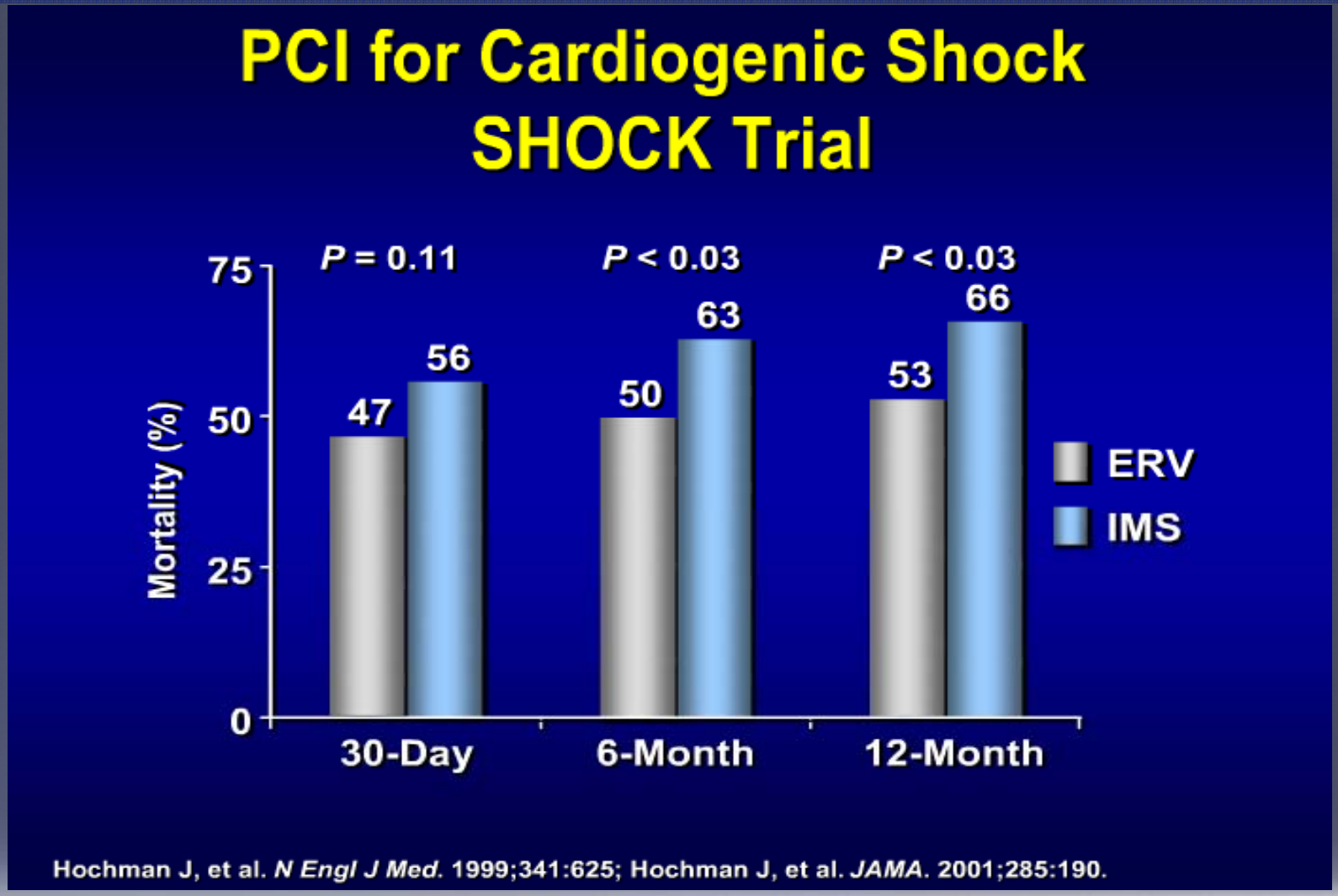
Risk of fibrinolysis

Time required for transport to a skilled PCI lab

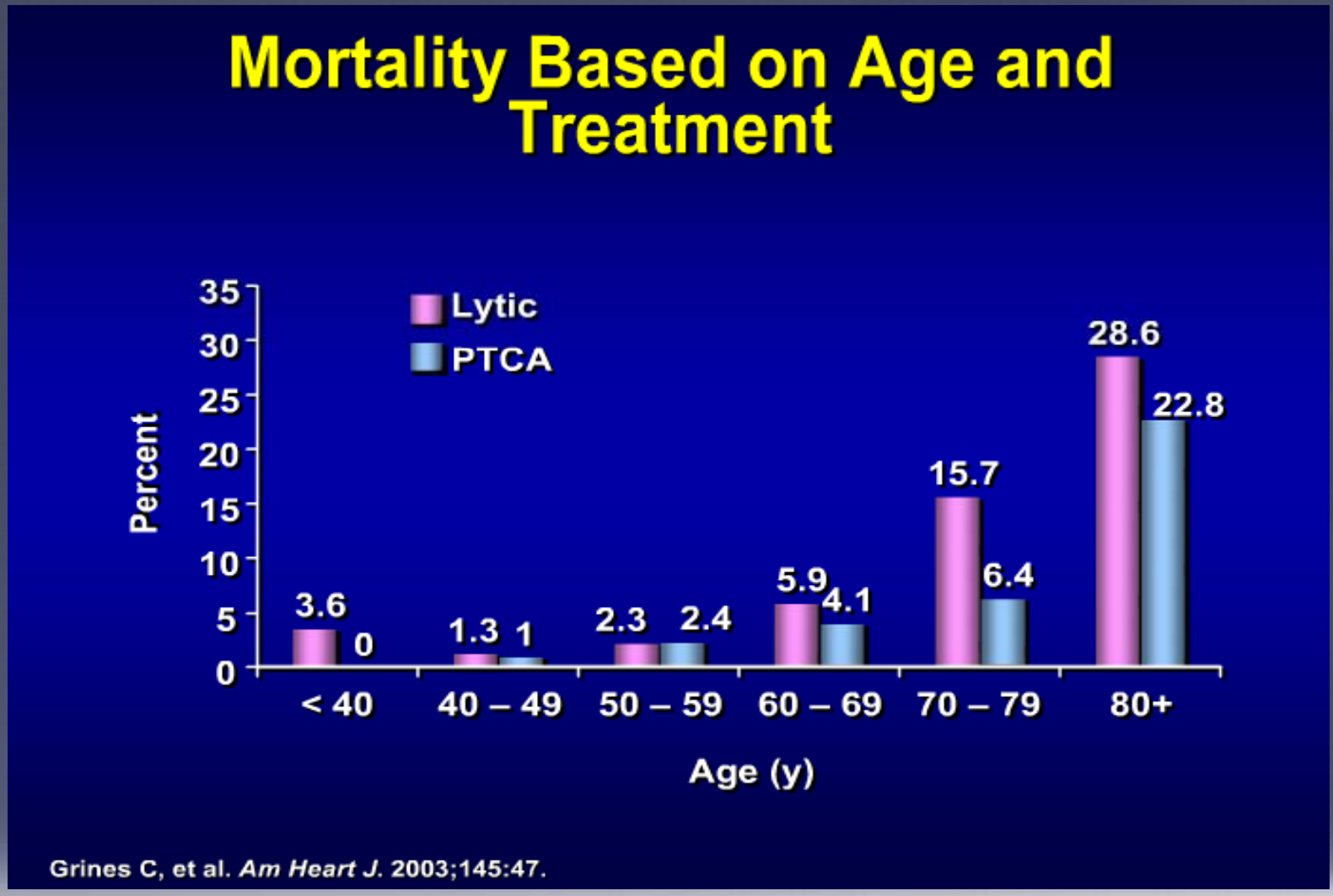
Presentation delay and 30-day mortality (Pooled Analysis)



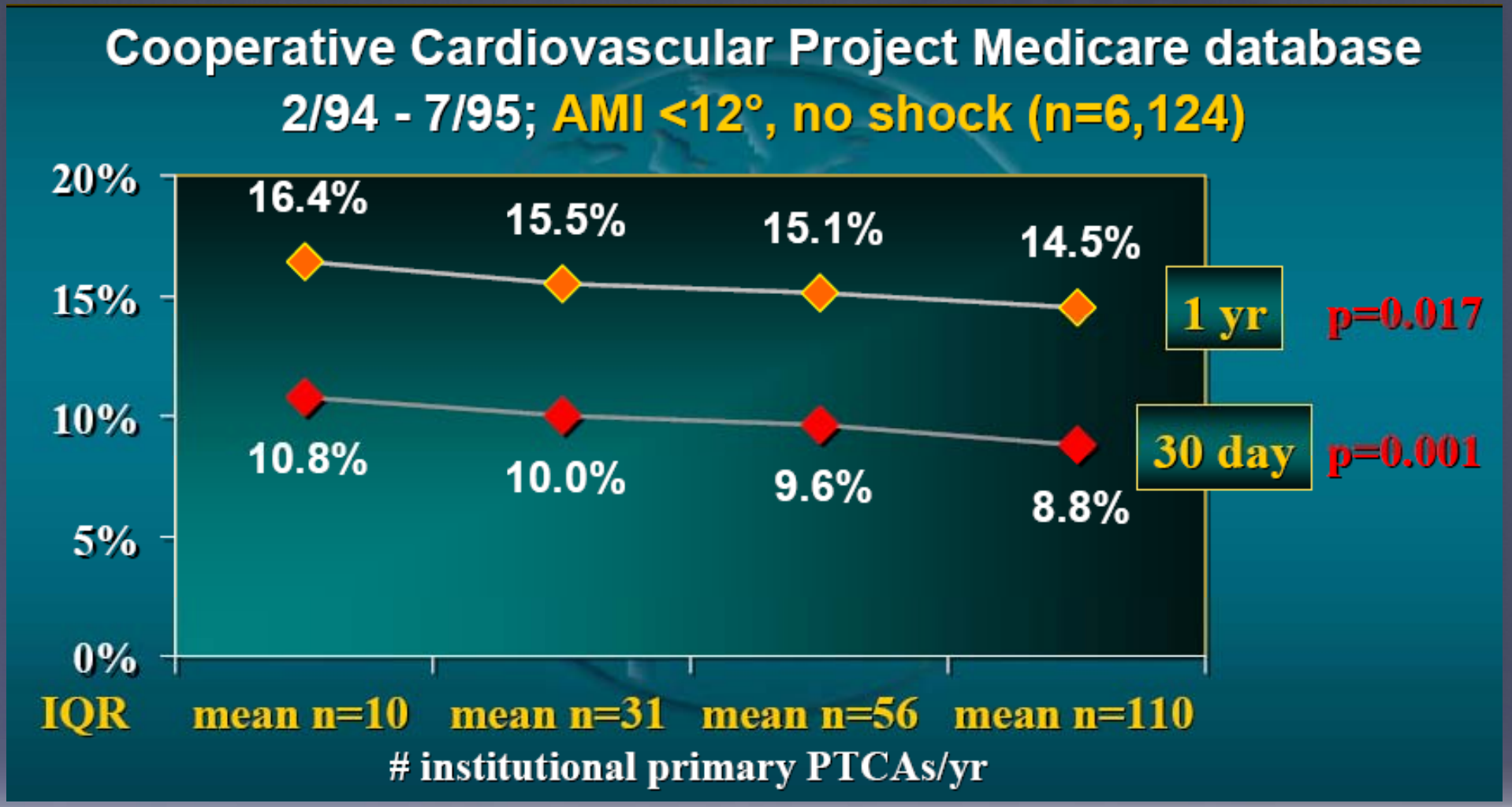
Consider contraindication of thrombolysis



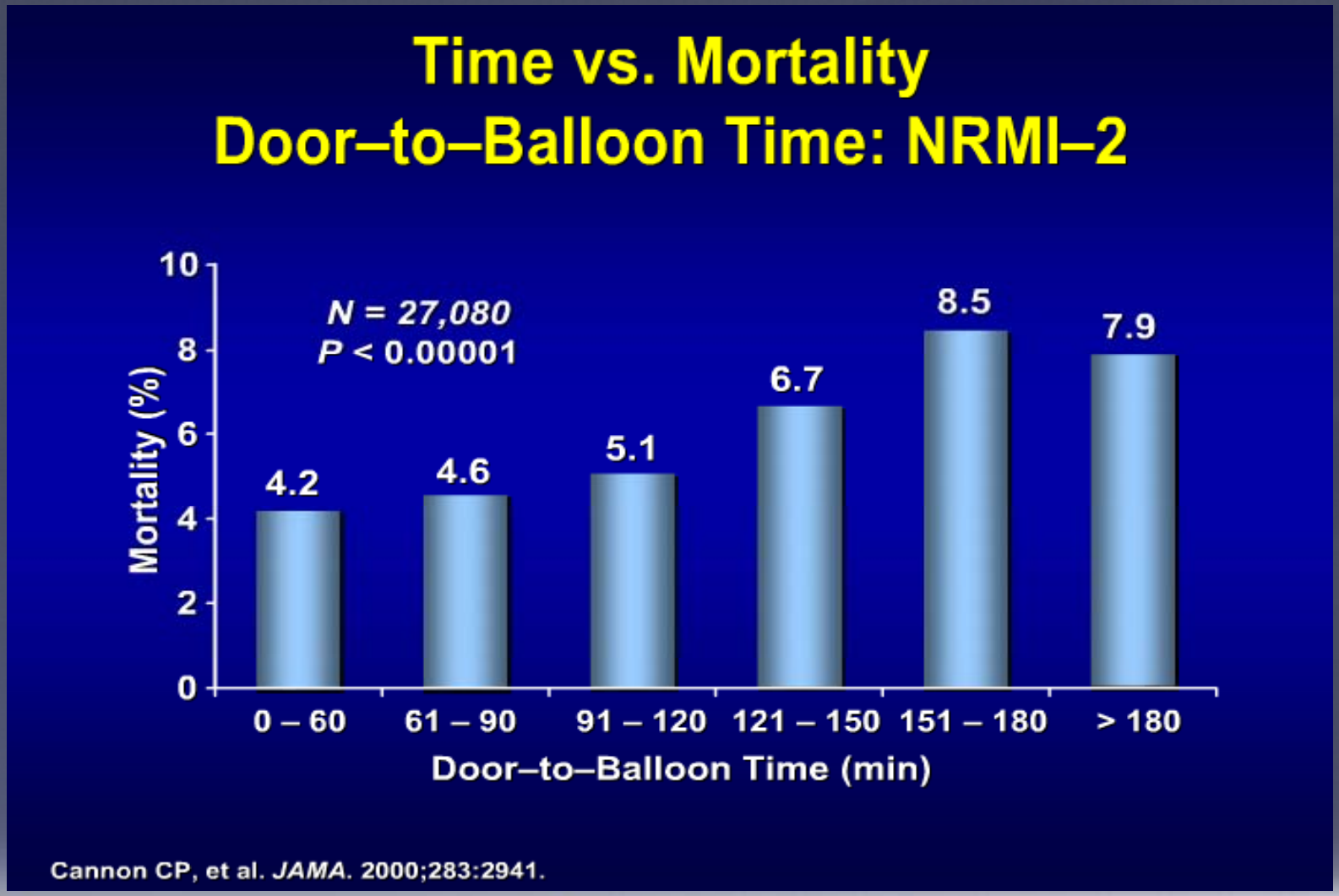
Consider age factor



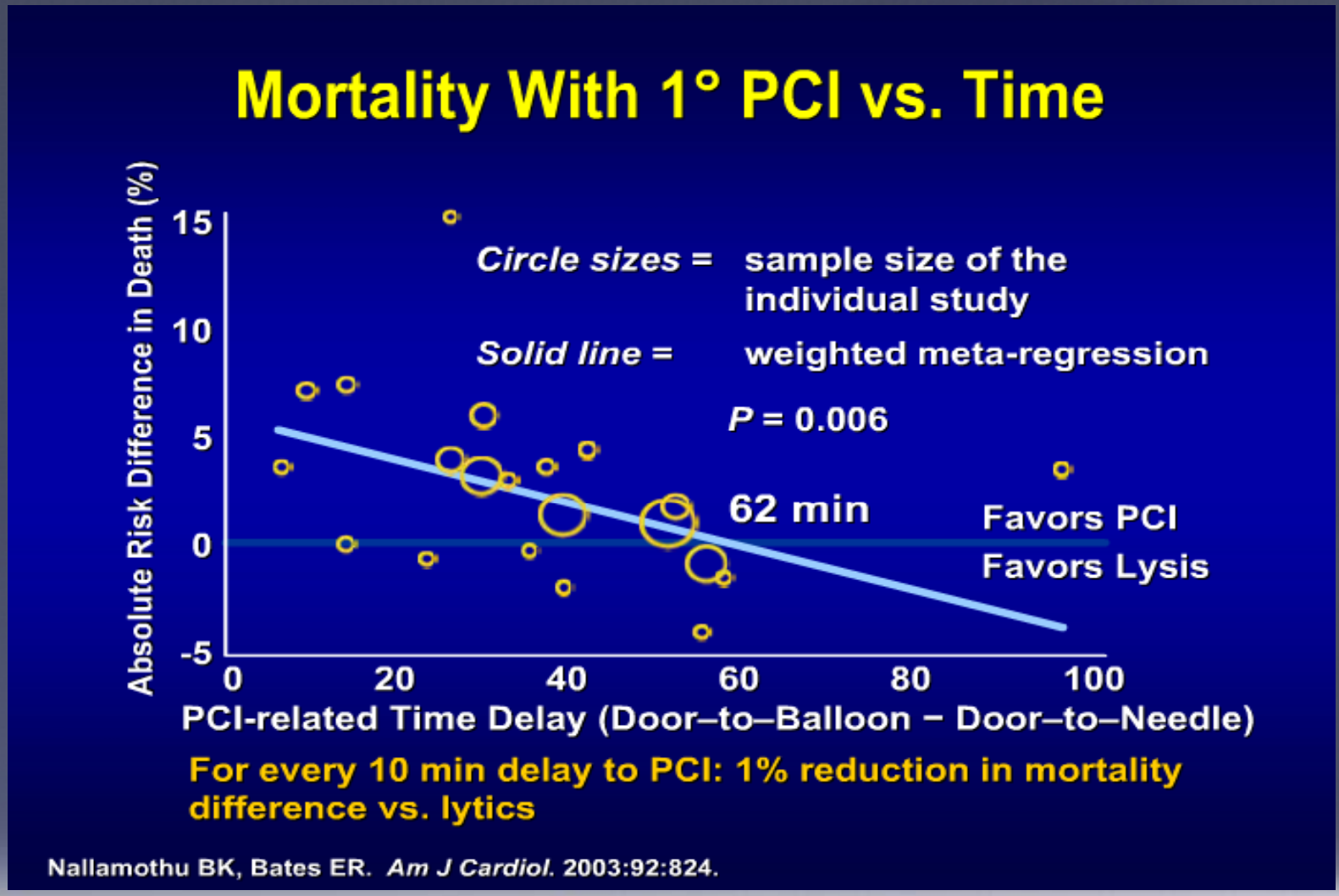
Relationship between institutional primary PCI volume and mortality



Reducing PCI-related treatment delay



Limit of PCI related delay is 60 min



Reperfusion guidelines - ACC/AHA 2007

STEMI patients presenting to a hospital with PCI capability should be treated with primary PCI within 90 minutes of first medical contact.

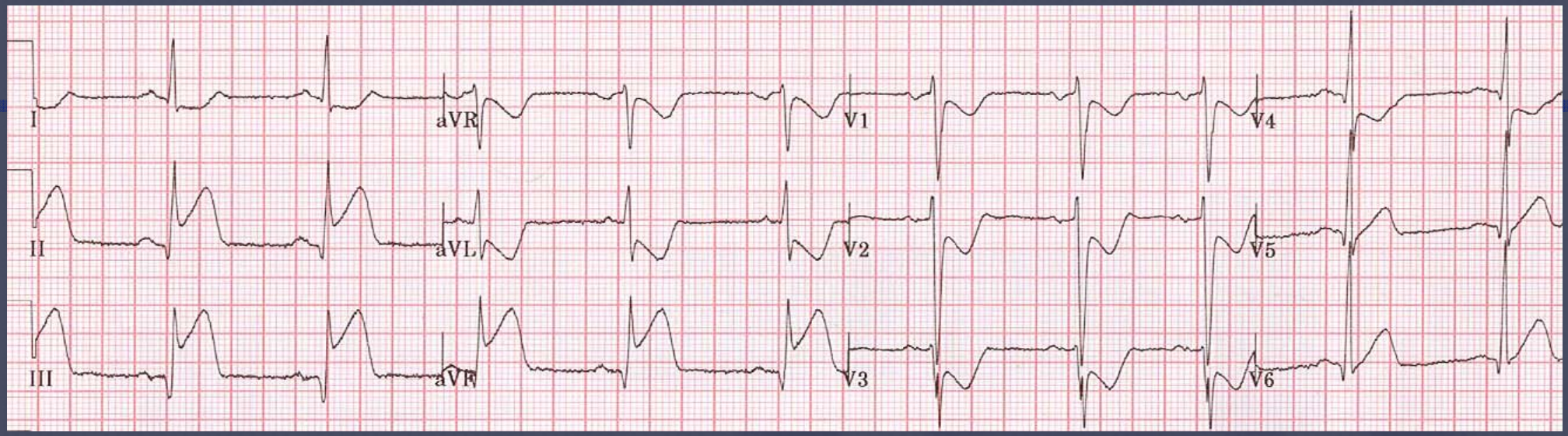
Modified recommendation

Which is your choice of treatment?

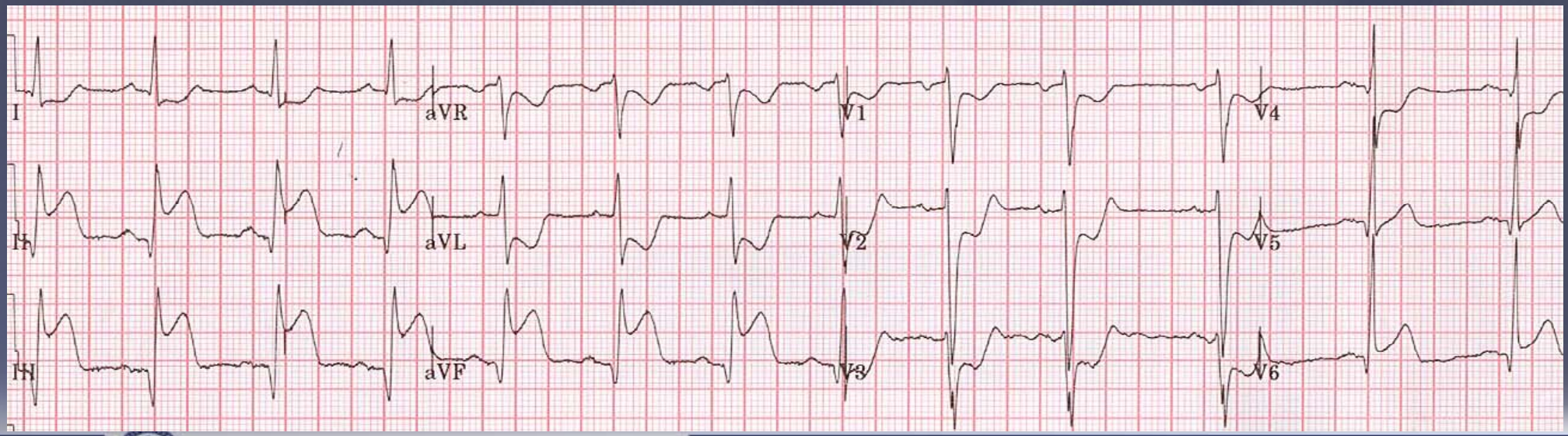
- 51 old man with STEMI within 2 hrs of symptom onset at hospital without cath. lab.

    1) Thrombolysis
    2) Transfer for Primary angioplasty.

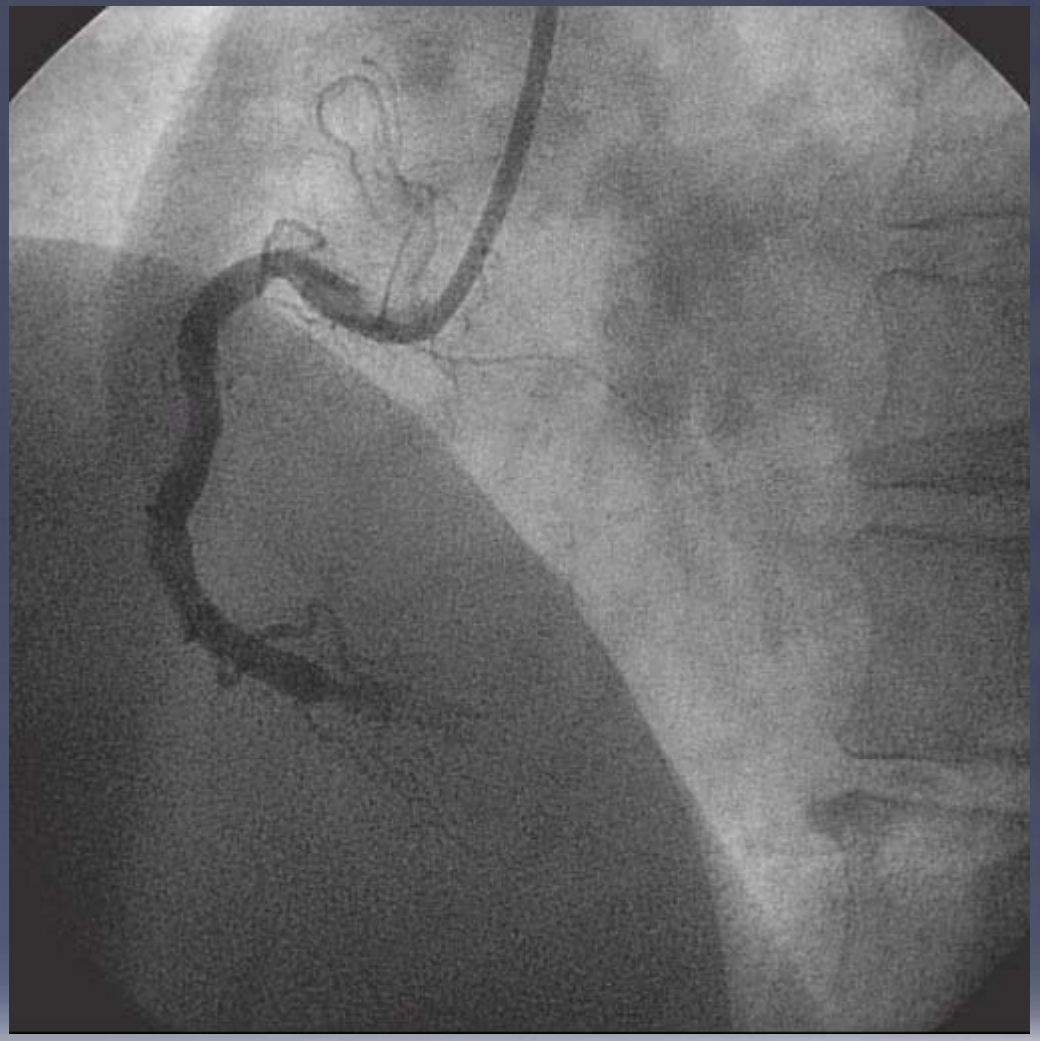
Initial ECG



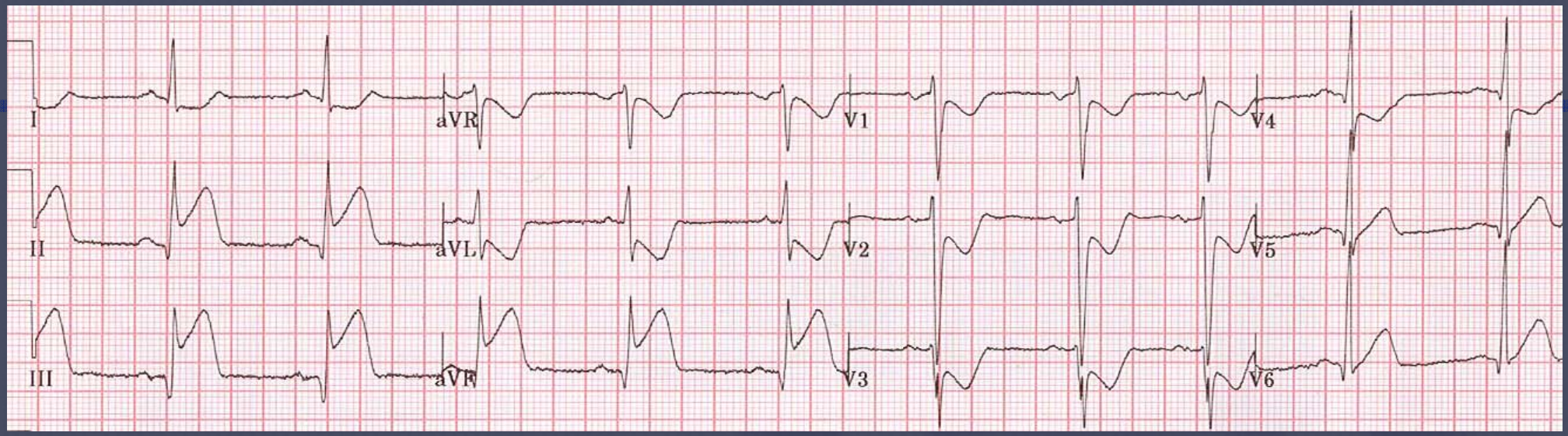
ECG (1 hours after thrombolytic therapy)



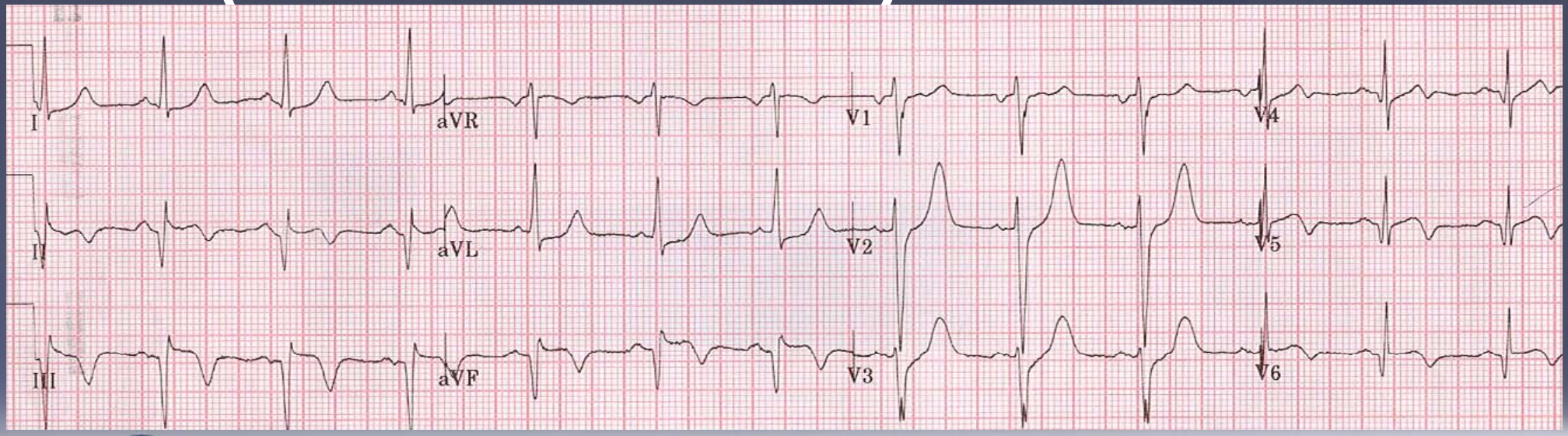
33% of patients received TT need rescue PCI



Initial ECG



ECG (Immediate after PCI)



Transfer for PPCI vs Thrombolysis
DANAMI- 2

DENMARK

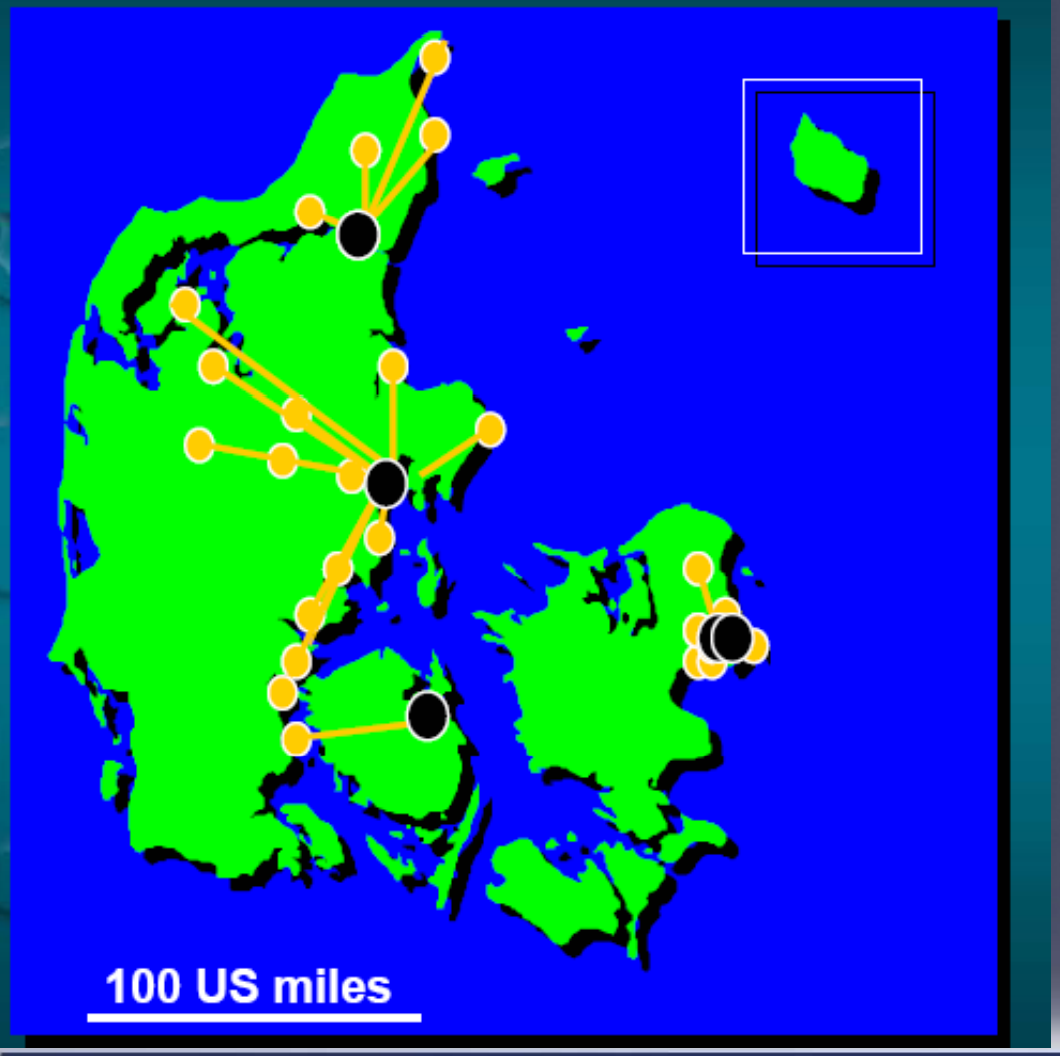
5.4 mill. inhabitants

62% of the Danish Population

5 PCI centers

24 referral hospitals

Transport distance up to 95 US miles (mean 35 miles)



DANAMI - 2 Trial

Referral hospitals

Planned: 1,100 pts.

No transfer → **Fibrinolysis** (front loaded tPA)

Ambulance Transfer <3hr → **PCI**

1,129 pts.

Angioplasty centers

Planned: 800 pts.

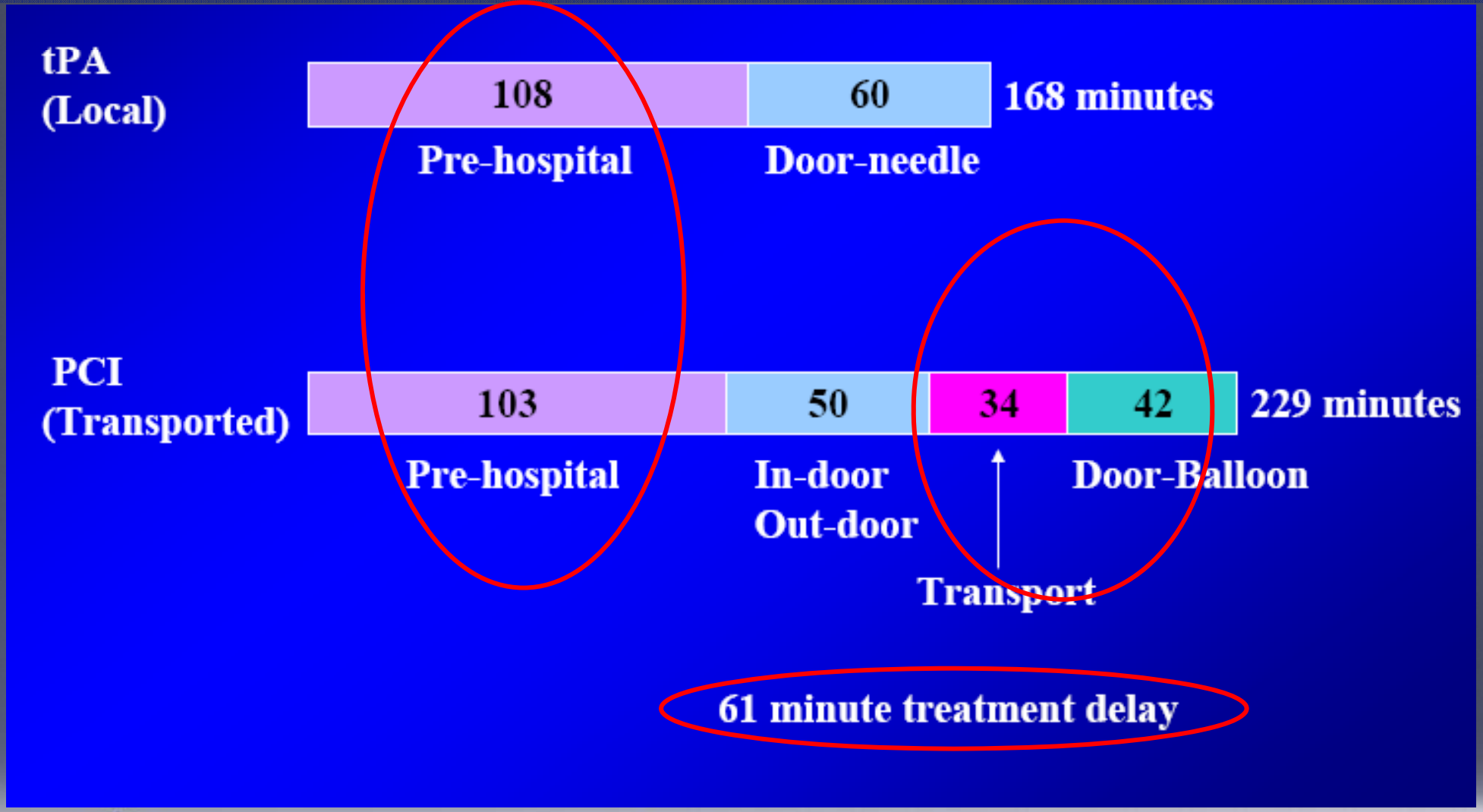
Fibrinolysis (front loaded tPA)

PCI

443 pts.

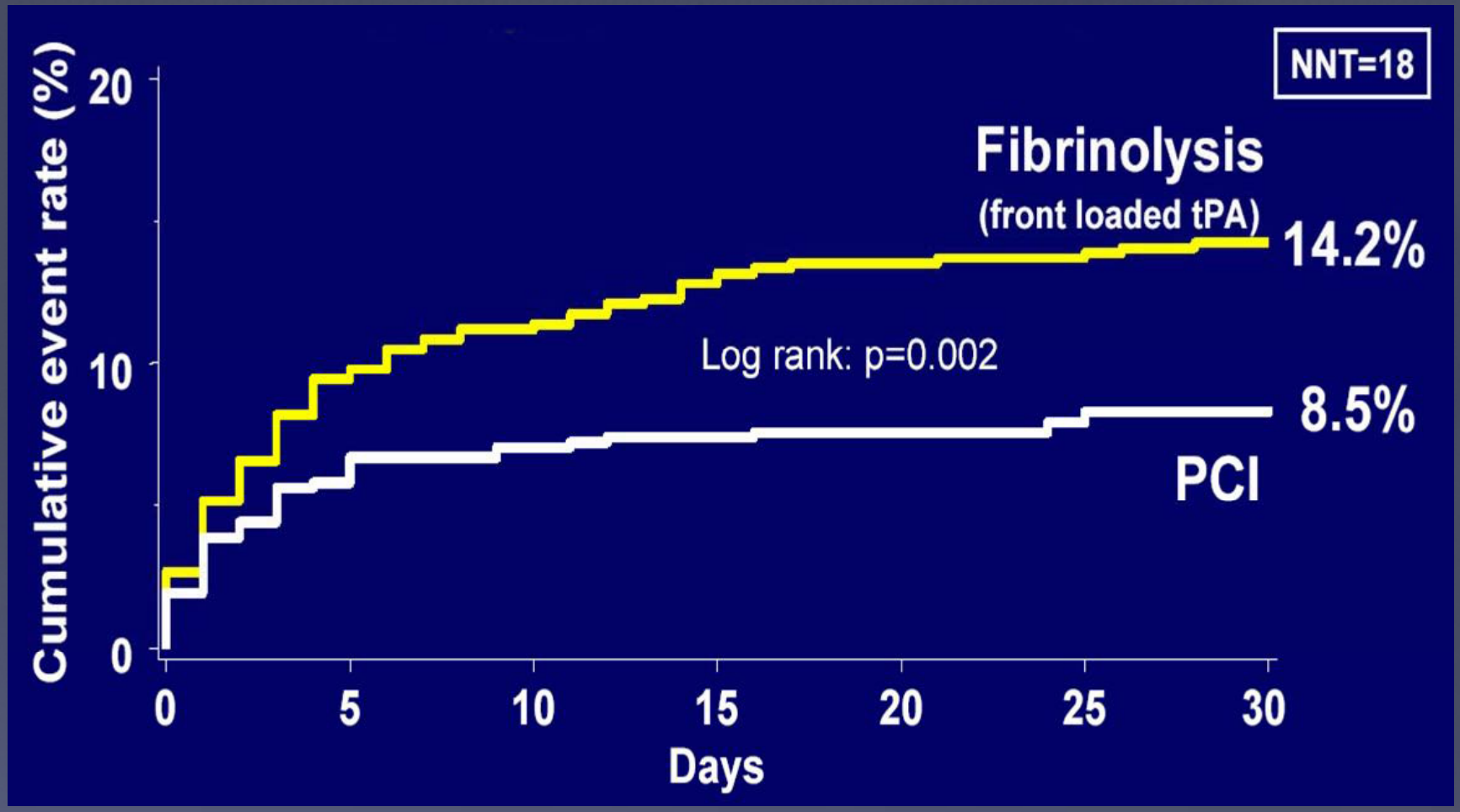
Moon JC, Int J Cardiol. 2002;85:199-201

DANAMI 2: Median Treatment Time (min)



Moon JC, Int J Cardiol. 2002;85:199-201

Primary end point within 30 Days
Referral hospitals: 1,129 patients



Primary end point: Death or reinfarction or stroke

Thrombolysis vs transfer to primary PCI within 90 min (Maximum transport distance was 120 km)

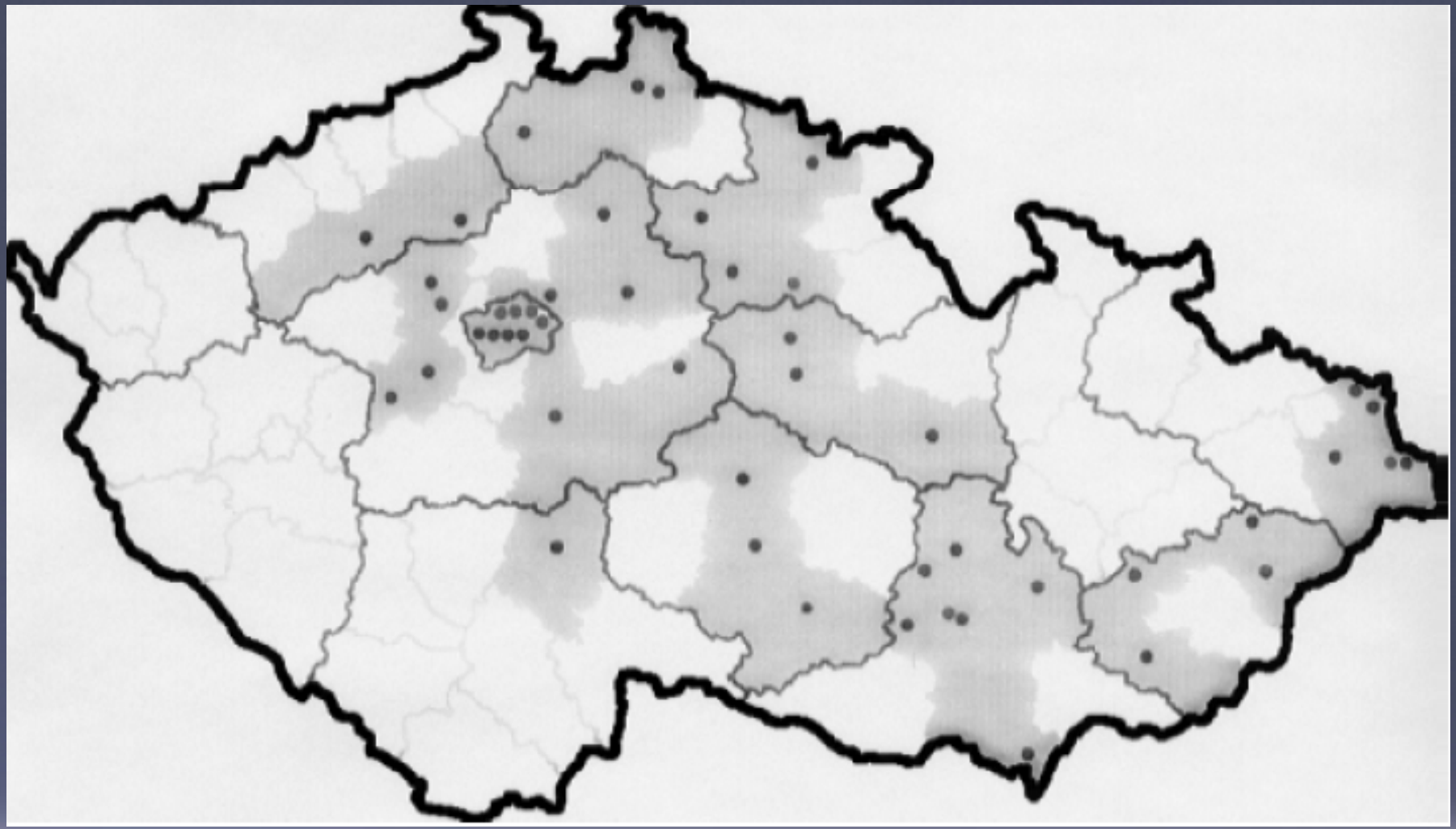
Randomized national multicentre trial--PRAGUE-2

850 patients with acute STEMI presenting within <12 h to the nearest community hospital without a catheter laboratory

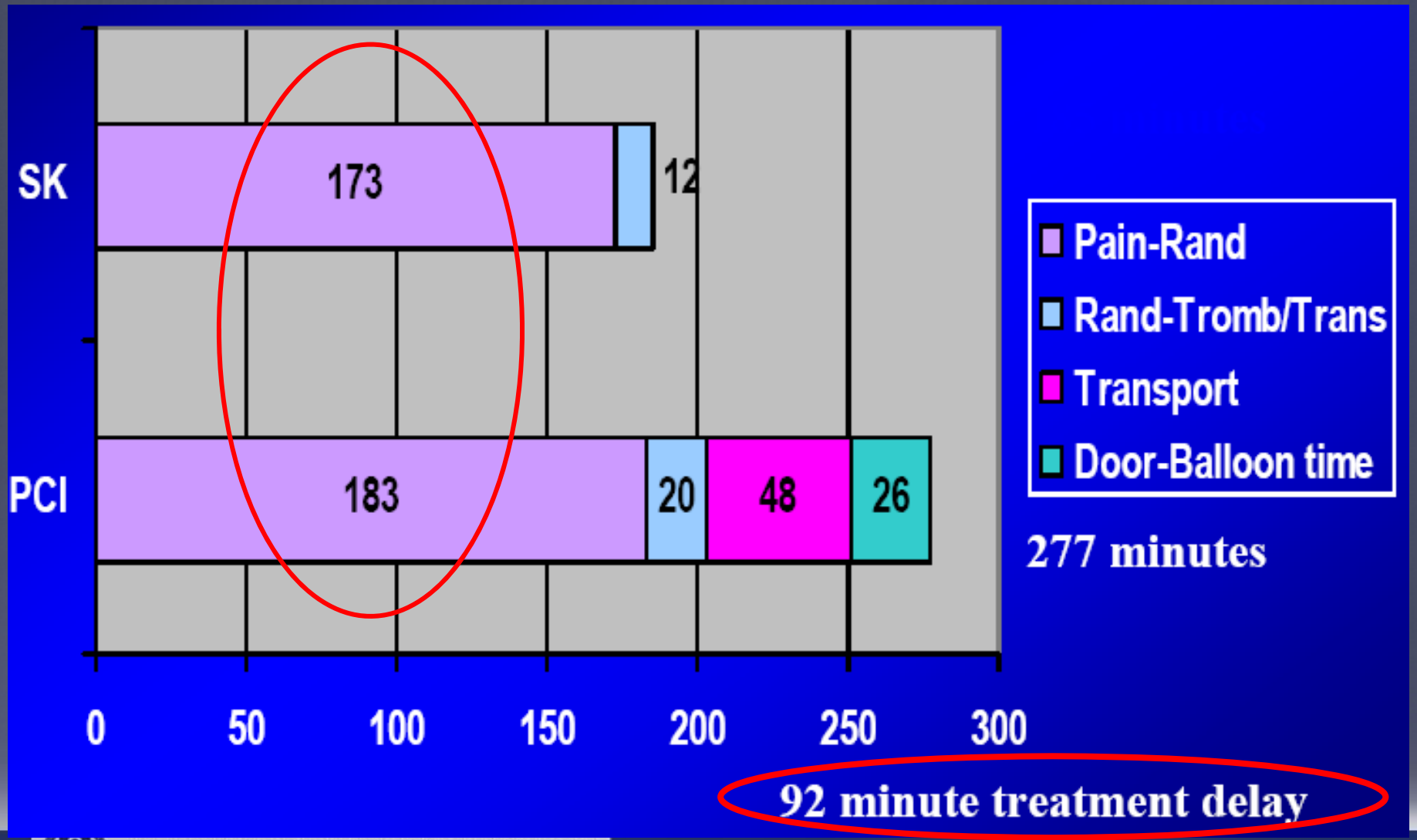
- Thrombolysis in this hospital (TL group, n = 421)
- Immediate transport for primary angioplasty (PCI group, n = 429).

PRAGUE Study Group Investigators Eur Heart J. 2003;24:94-104

PRAGUE-2 study
Tertiary centers are located within 100Km from home

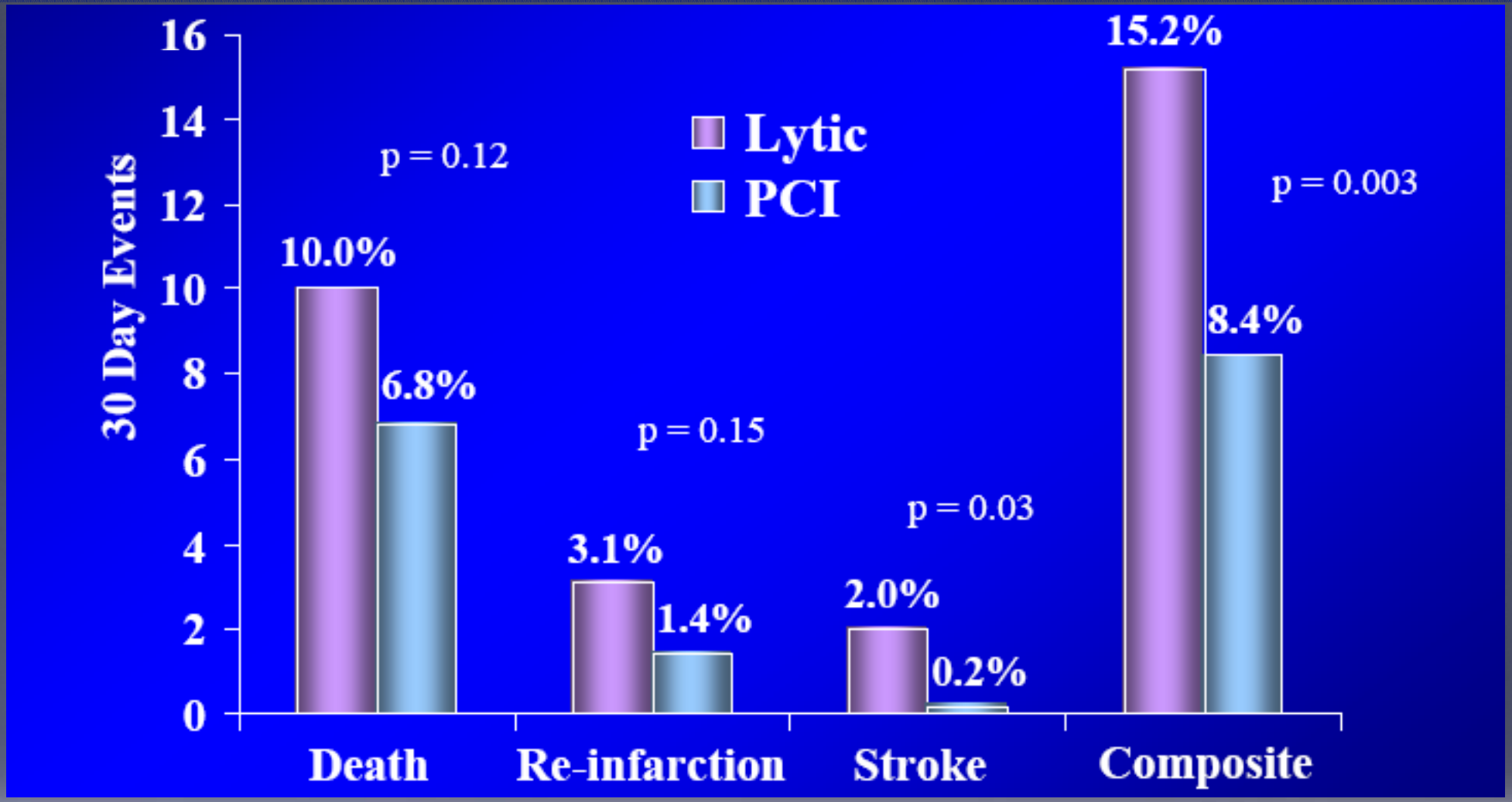


Time intervals from pain onset to reperfusion



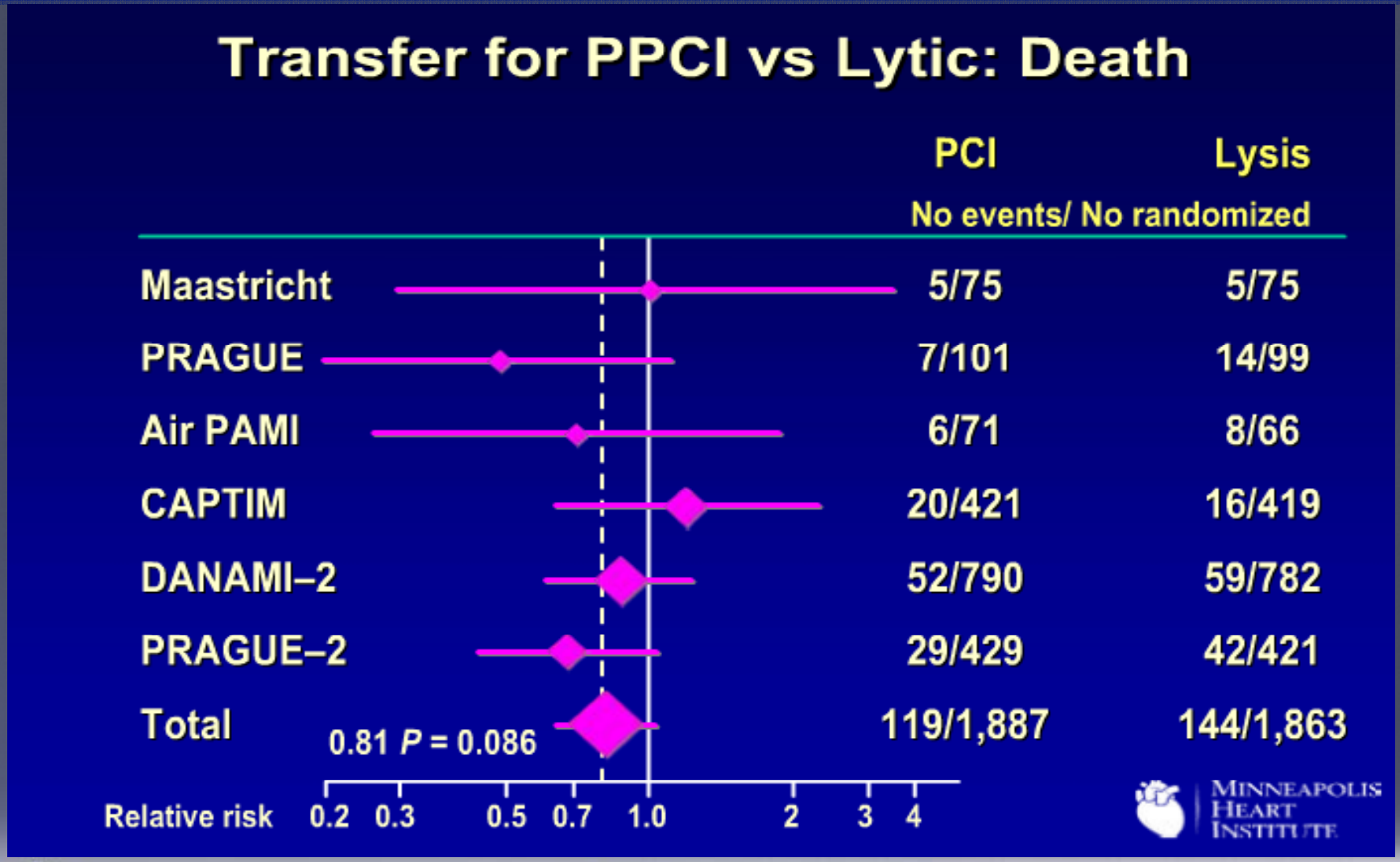
PRAGUE Study Group Investigators Eur Heart J. 2003;24:94-104

Outcomes in AMI Treated with Local Lytic Therapy vs Transfer for Primary PCI

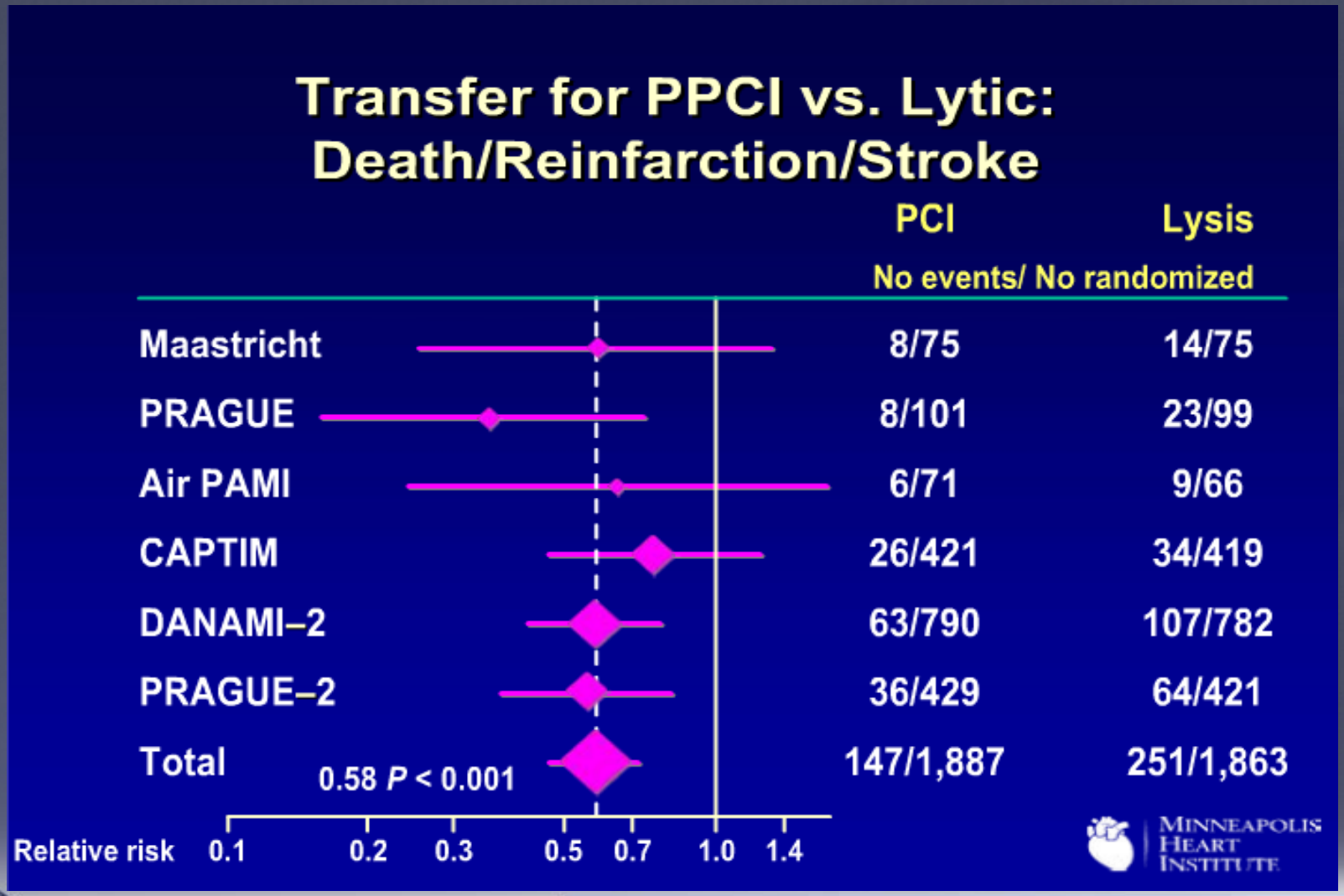


PRAGUE Study Group Investigators Eur Heart J. 2003;24:94-104

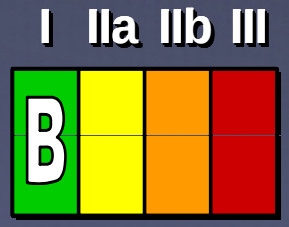
Transfer for PPCI vs Lytics
Mortality only



Transfer for PPCI vs Lytics
Composite end point

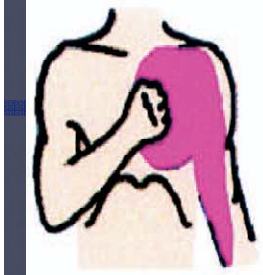


Reperfusion guidelines - ACC/AHA 2007



STEMI patients presenting to a hospital without PCI capability and who cannot be transferred to a PCI center for intervention within 90 minutes of first medical contact should be treated with fibrinolytic therapy within 30 minutes of hospital presentation, unless contraindicated.

Modified recommendation



Call 9-1-1
Call fast

Onset of symptoms of STEMI

9-1-1 EMS Dispatch

EMS on-scene
- Encourage 12-lead ECGs
- Consider prehospital fibrinolytic if capable and EMS-to-needle within 30 min

EMS Triage Plan

Hospital fibrinolysis:
Door-to-Needle within 30 min

Not PCI capable

Inter-Hospital Transfer

PCI capable

Goals†

Patient	*Dispatch*	*EMS on scene*	*EMS transport*	
5 min after symptom onset	1 min	Within 8 min	Prehospital fibrinolysis: EMS-to-Needle within 30 min	*EMS transport:* EMS-to-Balloon within 90 min *Patient self-transport:* Hospital Door-to-Balloon within 90 min

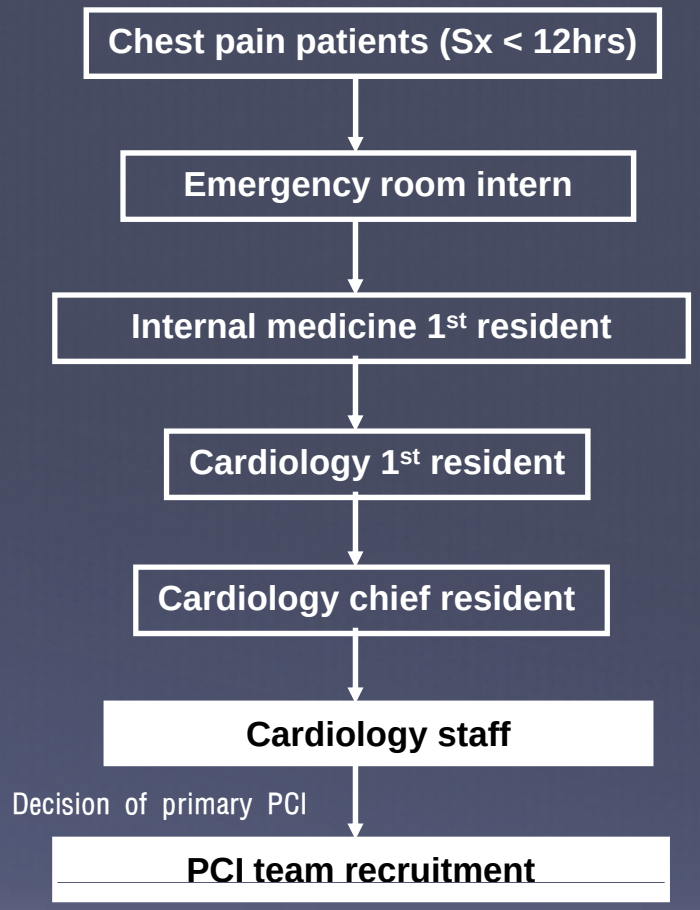
Total ischemic time: Within 120 min*

*Golden Hour = First 60 minutes

반경 25 mile(40.25 km) 이내 (30분 이내)

To reduce Door to Balloon time

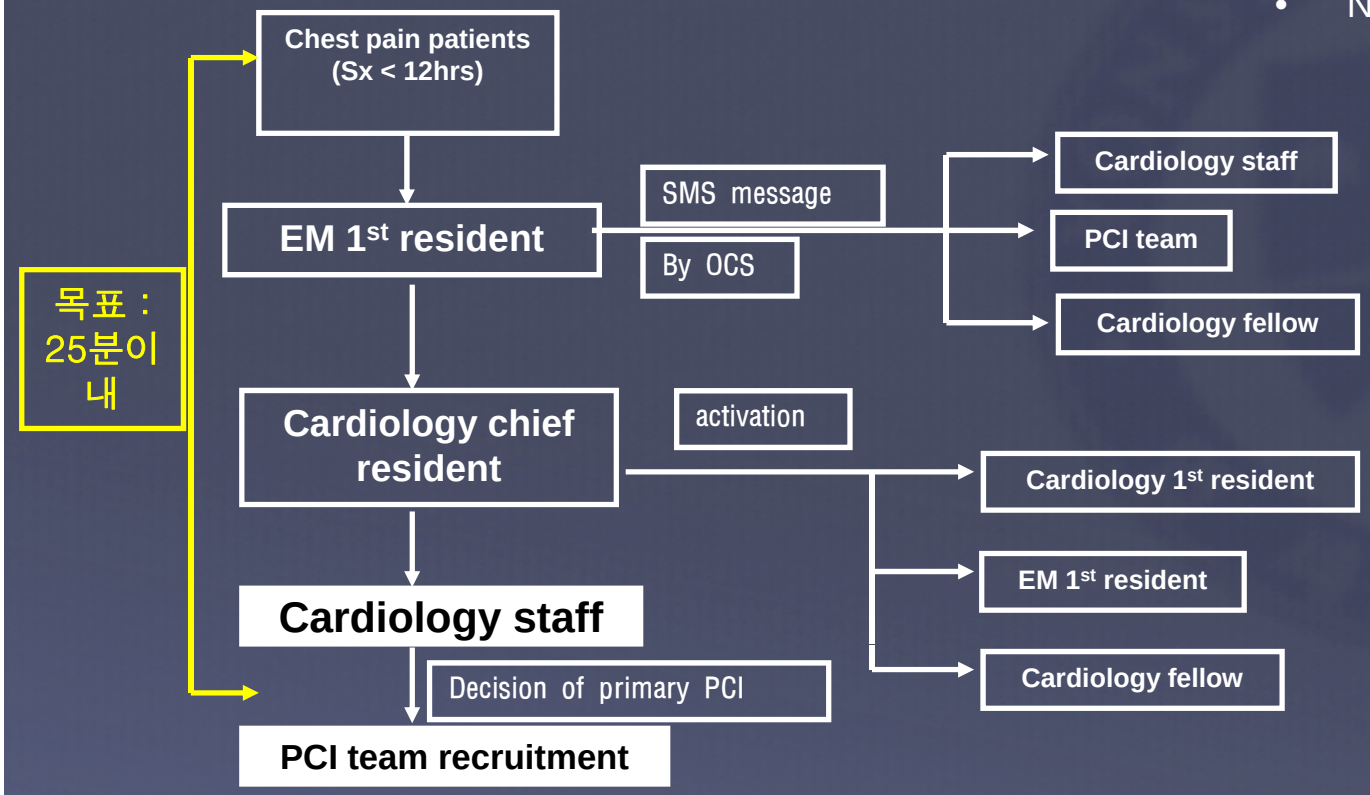
<원주기독병원에서 2006년 12월까지 notify system>



- 현 notify 체계의 문제점
  - 각 단계별로 time delay의 가능성 많음. (특히 내과 1년차나 cardio 1년차의 병동 job이 있는 경우 각각 윗 단계로의 notify delay)
  - 너무 많은 단계로 인해 각 단계마다의 시간이 걸림.
- 2007년 1월과 2월
  - 응급의학과와 conference를 통해 단계를 줄이기 위한 algorithm 개발을 위해 노력하여 2007년 3월부터 시행함.

To reduce Door to Balloon time

<원주기독병원에서 2007년 3월부터 바뀐 notify system>



- Notify algorithm
  - Cardiology staff에 이르는 단계를 4단계에서 2단계로 줄임.
  - 환자 도착후 25분까지 thrombolysis or primary PCI에 대한 cardiology의 결정
  - 환자 도착시 OCS로 cardiology staff, PCI team, fellow에게로 환자도착 SMS message를 보내 미리 준비를 할수 있게 함. (현재 전산개발과와 system 구축중.)

Result

<2007년 3월부터의 notification cascade 변화후 time change>

Procedure time (in primary PCI)	Phase I 2006년 3월-6월 (n=28)	Phase II 2007년 3월-6월 (n=35)	P value
hospital arrival time (min)	360.8±259.3	252.1±230.2	0.083
Door to cath. Room (min)	76.4±32.5	51.5±38.8	0.020
cath. Room to balloon (min)	21.3±9.6	22.3±10.8	0.699
Door to balloon (min)	98.6±34.9	73.3±41.3	0.027
Total fluoro time (min)	10.6±6.9	13.3±6.2	0.117

Regional Systems of Care to Optimize Timeliness of Reperfusion Therapy for STEMI: *The Mayo Clinic Protocol*

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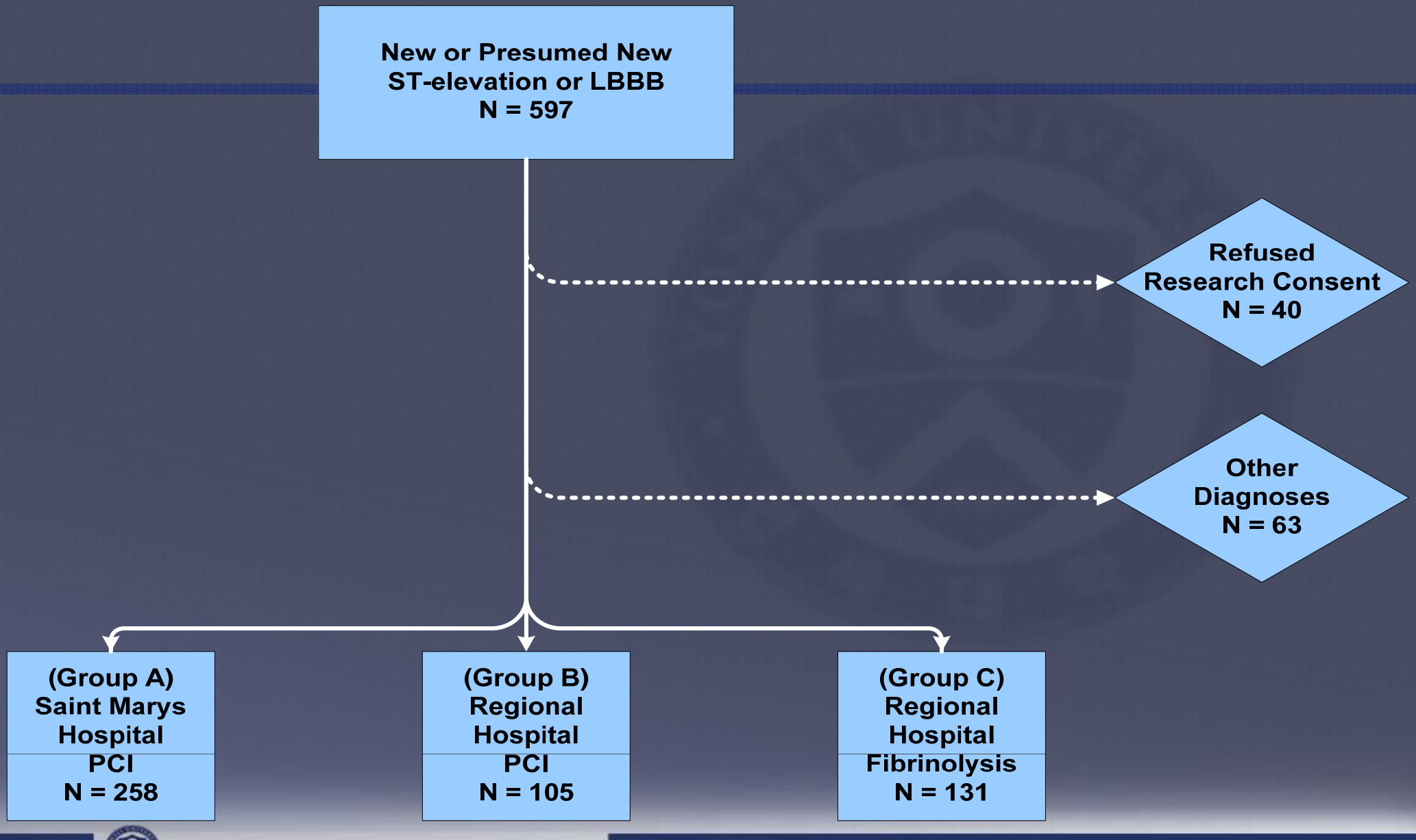
Associate Professor of Medicine
Mayo Clinic College of Medicine
Division of Cardiovascular Diseases
Mayo Clinic, Rochester
August 14, 2007

Mayo Clinic STEMI Experience May 2004 to December 2006



Ting HH, et al. Circulation 2007;116:729-736

The NEW ENGLAND JOURNAL of MEDICINE

N Engl J Med 2006;355:2308-2320

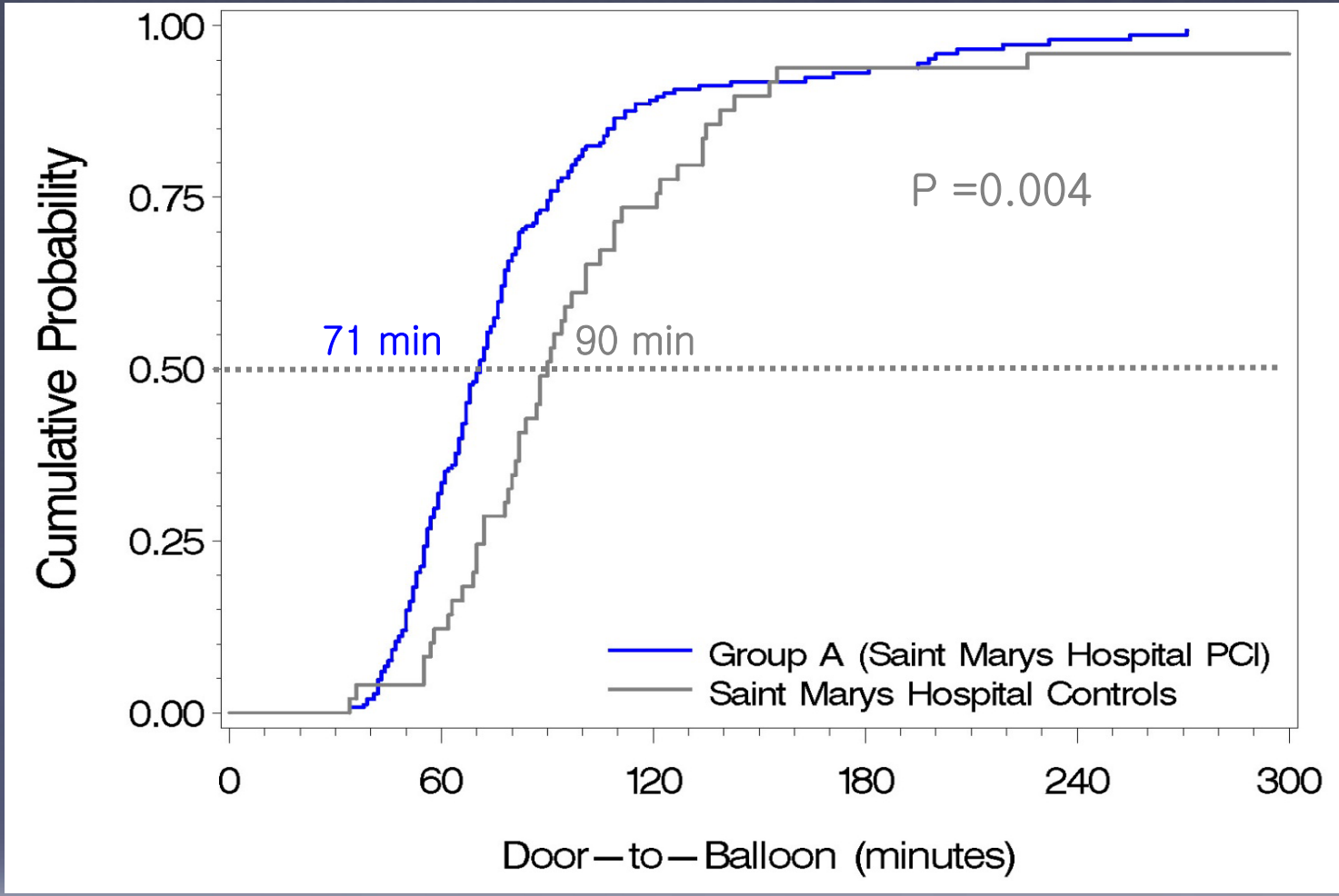
SPECIAL ARTICLE

Strategies for Reducing the Door-to-Balloon Time in Acute Myocardial Infarction

Elizabeth H. Bradley, Ph.D., Jeph Herrin, Ph.D., Yongfei Wang, M.S., Barbara A. Barton, R.N., Tashonna R. Webster, M.P.H., Jennifer A. Mattera, M.P.H., Sarah A. Roumanis, R.N., Jeptha P. Curtis, M.D., Brahmajee K. Nallamothu, M.D., David J. Magid, M.D., M.P.H., Robert L. McNamara, M.D., M.H.S., Janet Parkosewich, R.N., M.S.N., Jerod M. Loeb, Ph.D., and Harlan M. Krumholz, M.D.

- ✓ ED physician activates the Cath Lab
- ✓ Single call to activate the Cath Lab
- ✓ Cath Lab operational within 20 minutes of activation
- ✓ Real time data feedback for case review
- χ Having attending cardiologist always on site
- χ Prehospital ECG to activate Cath Lab while patient is en route

Saint Marys Hospital Emergency Department STEMI Patients Treated with Primary PCI (2004-2006) Compared with Historical Controls (2003)



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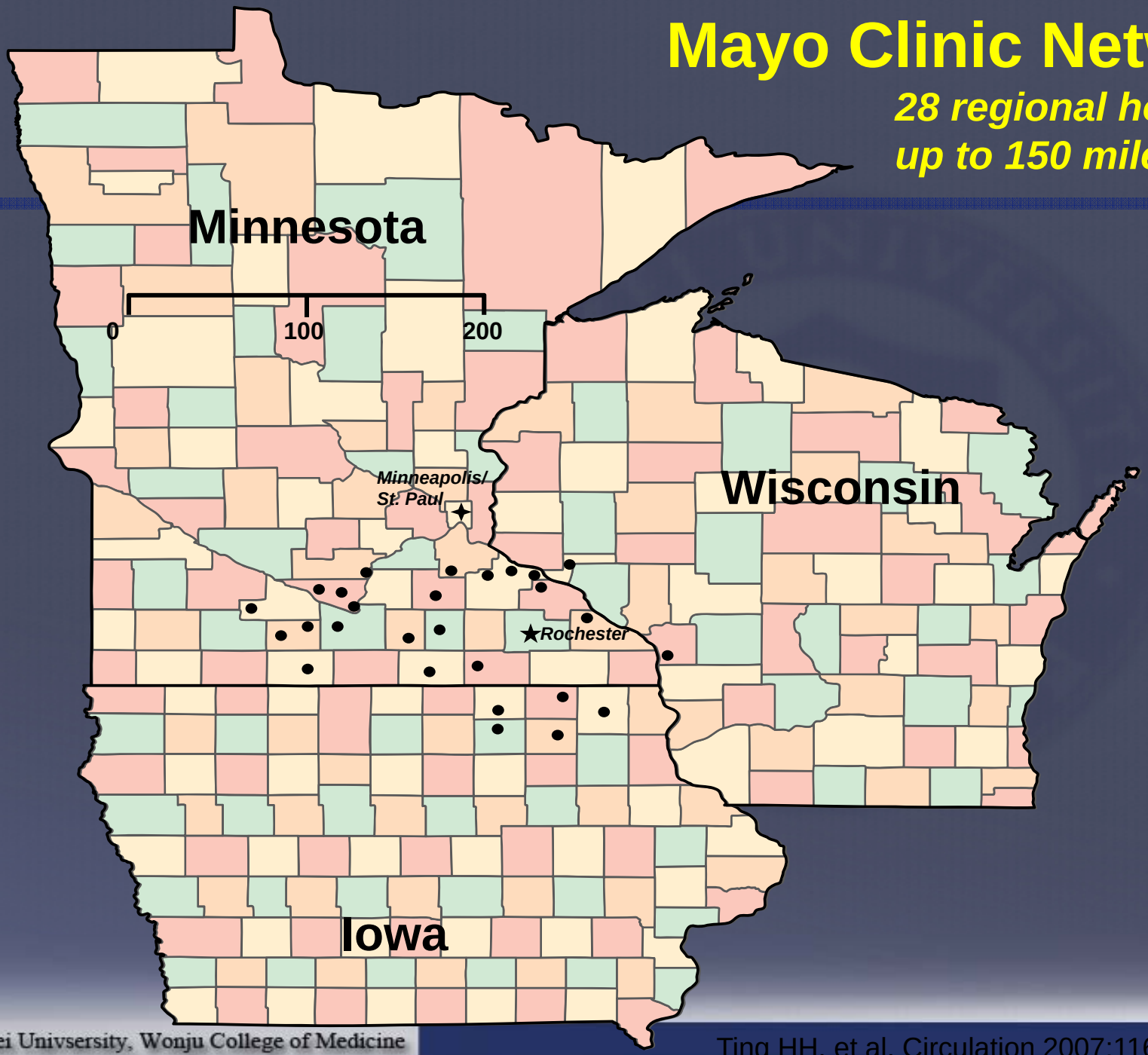
Mayo Clinic Network

28 regional hospitals
up to 150 miles away



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Mayo Clinic *FAST TRACK* Protocol for Regional STEMI Patients

updated April 28, 2006

Criteria: New ST Elevation Myocardial Infarction or New LBBB

Step 1: **STAT 12-lead electrocardiogram** and brief history & physical examination

Step 2: Call St. Mary's Emergency Dept. Referral Nurse **(507-255-2910)** and they will arrange transport and connect to Cardiologist

Step 3: Fax ECG to St. Mary's Coronary Care Unit **(507-255-5745)**

Aspirin 325 mg (four 81mg non-enteric coated chewable tablets)
Nitroglycerin SL or IV PRN chest pain
Cardiac Monitor
Minimum of (2) peripheral IV's TKO/saline lock

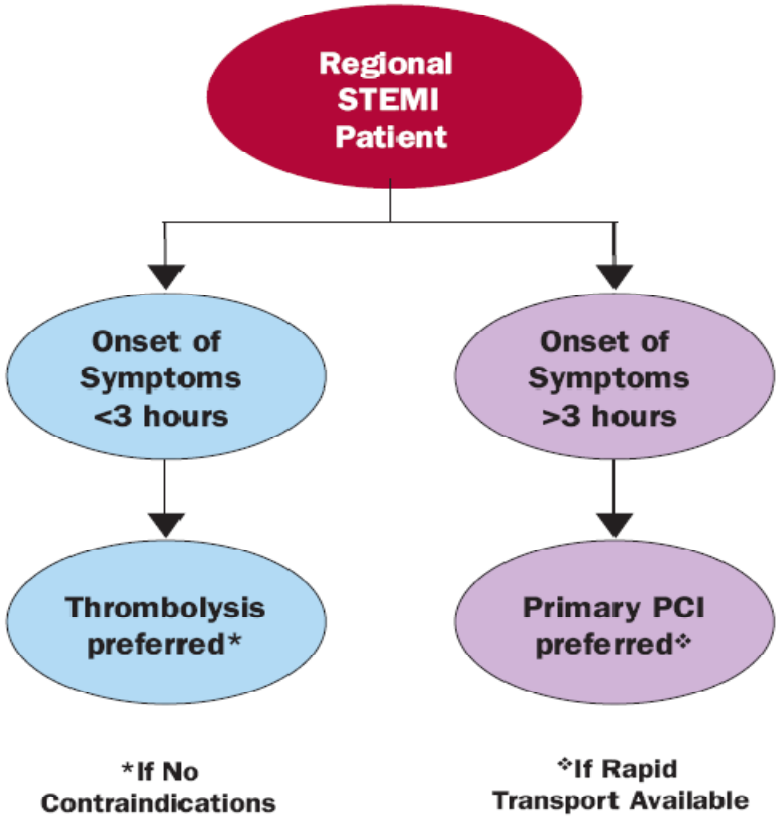
Please Document Times:

1._____ Chest Pain Onset
2._____ Arrival to Hospital
3._____ First 12 Lead ECG
4._____ 12 Lead ECG showing ST Elevation (may be same as #3)
5._____ Call to Activate Fast Track
6._____ Thrombolysis given (If Indicated)

Choose One Pathway

If Onset of Symptoms <3 Hours, **Thrombolysis**	If Onset of Symptoms >3 Hours, **Percutaneous Coronary Intervention**
Give full dose **TNK or rPA**	Do not give **TNK or rPA**
Unfractionated Heparin loading dose, 60 Units/kg IV (maximum 4,000 Units) **Heparin infusion,** 12 Units/kg/hour IV (maximum 1000 Units/hour)	**Unfractionated Heparin loading dose,** 60 Units/kg IV (maximum 4,000 Units) **Heparin infusion,** 12 Units/kg/hour IV (maximum 1000 Units/hour)
Metoprolol (Lopressor) 5mg IV every 5 minutes, hold if BP<100, HR<60	**Metoprolol (Lopressor)** 5mg IV every 5 minutes, hold if BP<100, HR<60
Give **Clopidogrel (Plavix)** 75mg x 1	Do not give **Clopidogrel (Plavix)**
Patient transferred to St. Mary's CCU. Cath Lab is not activated, unless patient arrives at CCU and failed to reperfuse with thrombolytic. Do not give **Eptifibatide (Integrilin)**	Patient will be transferred to St. Mary's Cath Lab directly. Cath Lab is activated. Consider giving **Eptifibatide (Integrilin)** en route by Mayo One Transport Team.

Labs to be drawn and faxed to St. Mary's Coronary Care Unit **(507-255-5745)**
CK-MB, Troponin, CBC, Electrolytes, BUN, Cr, Glucose, INR, PTT, Portable CXR



Key Questions:
1. Is this a STEMI and are we activating Fast Track protocol?
2. Is the patient receiving Thrombolysis or Primary PCI?
3. For primary PCI, should we give Eptifibatide (Integrilin)?

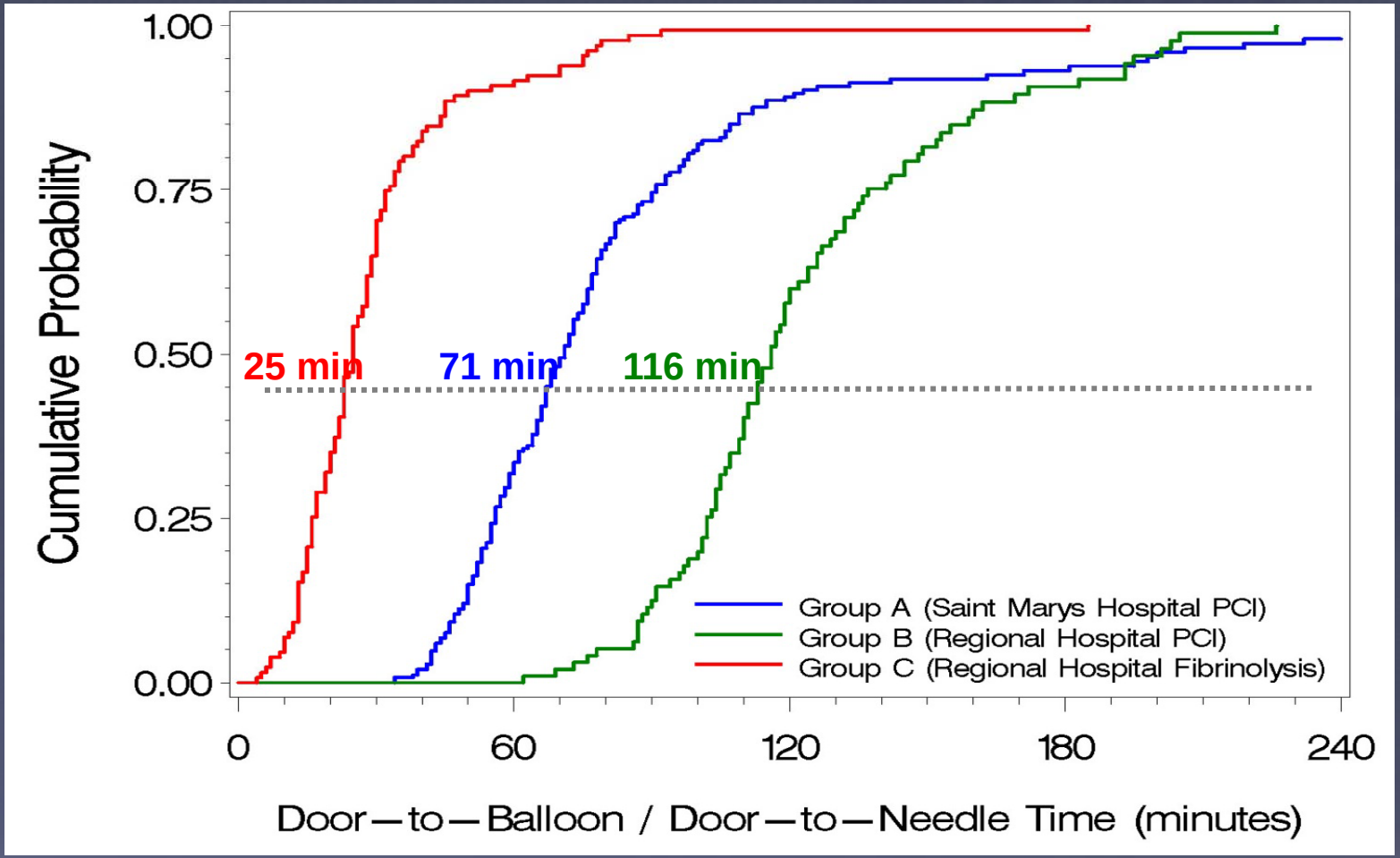
Target Time Metrics: Regional Door – to – Balloon: Total Time < 120 min

Regional Door – to – ECG	< 5 min
ECG – to – Mayo One Activation	< 15 min
Mayo One Activation – to – Door 2	< 60 min
Door 2 – to – Balloon	< 30 min

Ting HH, et al. Circulation 2007;116:729-736

Regional STEMI Patients Treated with Primary PCI or Fibrinolysis

May 2004 to December 2006 (n=236)



Ting HH, et al. Circulation 2007;116:729-736

To improve myocardial salvage

- To reduce presentation delay
  - Continuous education for population
  - Improving emergent transport system
  - Even distribution of clinics depending on territories
  - Presentation delay is within 2hr from ongoing pain onset

- To reduce treatment delay
  - Application of fast pathway approach on each hospital

경청해 주셔서 감사합니다.