



# ***STEMI Networks of the World: Similarities and Dissimilarities***

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**What the guidelines say!**

# ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation

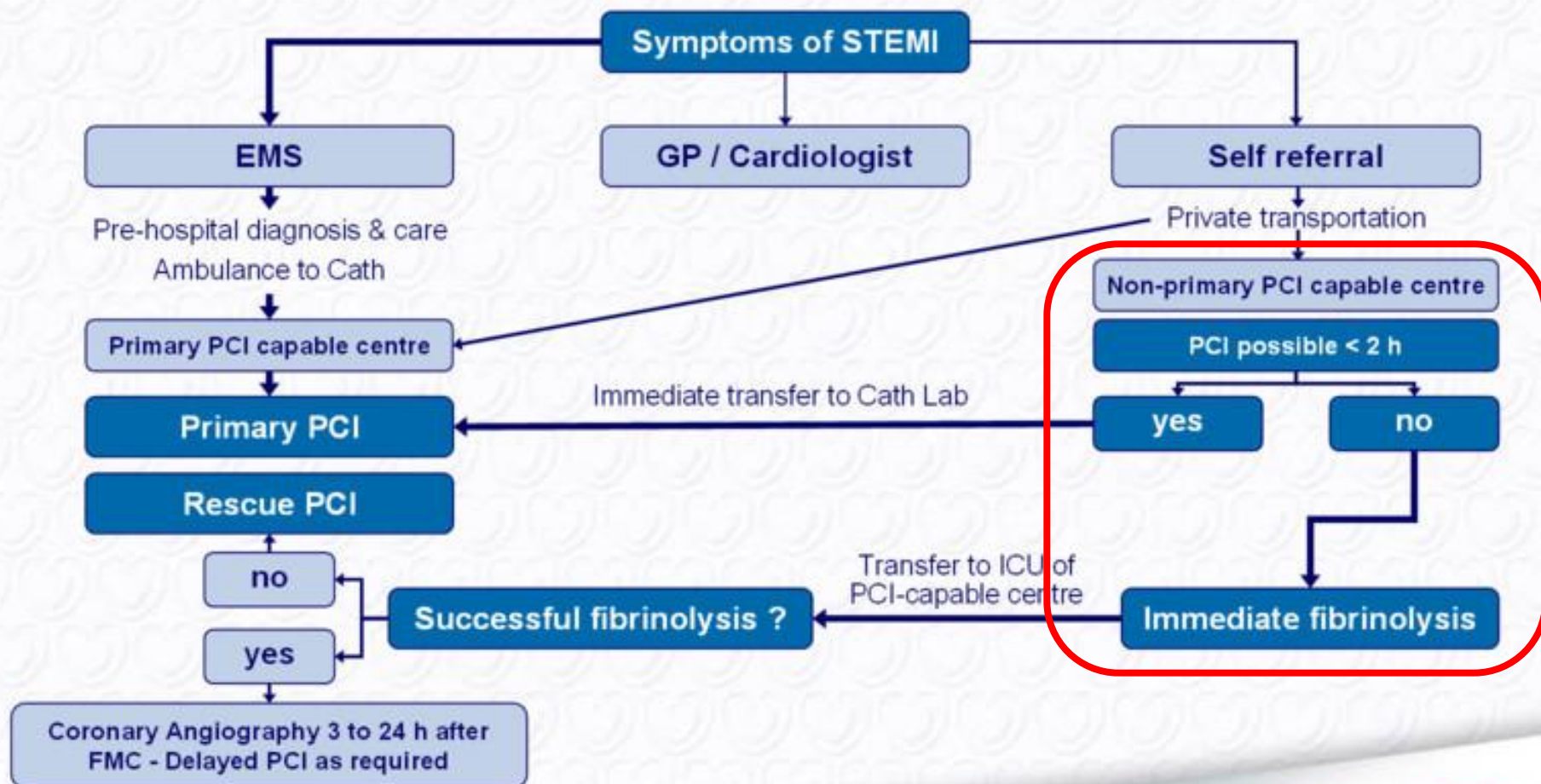
## The Task Force on the management of ST-segment elevation acute myocardial infarction of the European Society of Cardiology

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# Organisation of STEMI patient disposal describing pre- and in-hospital management, and reperfusion strategies within 12 h of First Medical Contact (FMC)





# Recommended Delay Times

**Table 10.** A summary of important delays and treatment goals in the management of acute STEMI

Delay	Target
Preferred for FMC to ECG and diagnosis	≤ 10 min
Preferred for FMC to fibrinolysis ('FMC to needle'):	≤ 30 min
Preferred for FMC to primary PCI ('door to balloon') in primary PCI hospitals	≤ 60 min
Preferred for FMC to primary PCI	≤ 90 min (≤ 60 min if early presenter with large area at risk)
Acceptable for primary PCI rather than fibrinolysis	≤ 120 min (≤ 90 min if early presenter with large area at risk if this target cannot be met, consider fibrinolysis)
Preferred for successful fibrinolysis to angiography	3–24 h

FMC = first medical contact; PCI = percutaneous coronary intervention.

# Logistics for networks

**Table 8. Logistics of prehospital care**

Recommendations	Class <sup>a</sup>	Level <sup>b</sup>	Ref. <sup>c</sup>
Ambulance teams must be trained and equipped to identify STEMI (with use of ECG recorders and telemetry as necessary) and administer initial therapy, including thrombolysis where applicable.	I	B	(43)
The prehospital management of STEMI patients must be based on regional networks designed to deliver reperfusion therapy expeditiously and effectively, with efforts made to make primary PCI available to as many patients as possible.	I	B	(47)
Primary PCI-capable centres must deliver a 24/7 service, be able to start primary PCI as soon as possible and within 60 min from the initial call.	I	B	(6, 52, 55)

# Organization of Networks

- Clear definition of geographical areas of responsibility;
- Shared protocols based on risk stratification and transportation by trained paramedic staff in appropriately equipped ambulances or helicopters;
- Pre-hospital triage of STEMI patients to the appropriate institutions, bypassing non-PCI hospitals whenever primary PCI can be implemented within the recommended time limits
- On arrival at the appropriate hospital, the patient should immediately be taken to the catheterization laboratory, bypassing the emergency department;
- Patients presenting to a non-PCI-capable hospital and awaiting transportation for primary or rescue PCI must be attended in an appropriately monitored and staffed area;
- If the diagnosis of STEMI has not been made by the ambulance crew, and the ambulance arrives at a non-PCI-capable hospital, the ambulance should await the diagnosis and if STEMI is confirmed should continue to a PCI-capable hospital.

Figure 1

First wire passage of the IRA

**FMC to mechanical reperfusion (<120 min)**

If 120 min is not guaranteed switch to fibrinolytic therapy

**FMC to mechanical reperfusion (<90 min)**

Recommended maximal time delay in patients referred for PPCI

**FMC to mechanical reperfusion (<60 min)**

Recommended time delay in patients with STEMI of <2 hrs duration

FMC to pharmacological reperfusion (<30 min)

Injection of the lytic agent





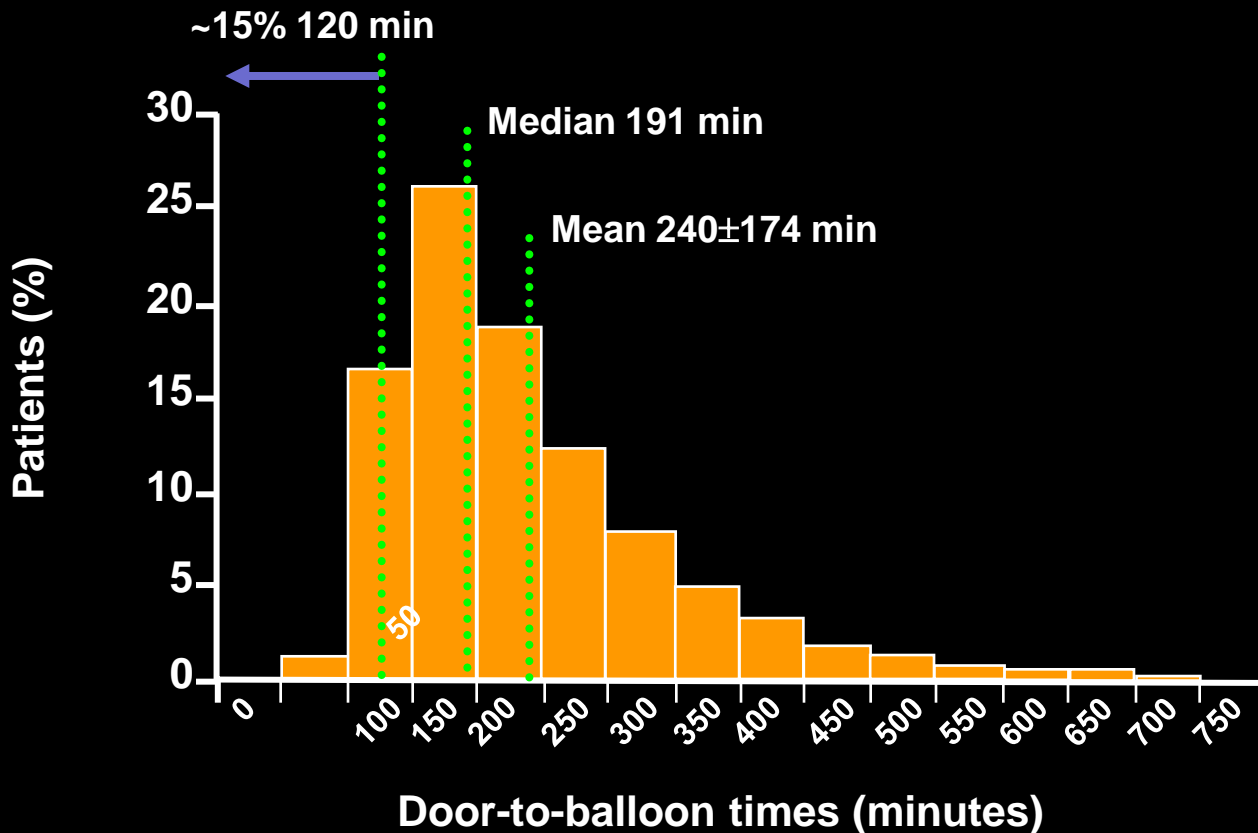
**What the reality is!**



# Proportion of primary PCI patients treated within 2 hours (door-to-balloon=FMC-to-balloon)

Data from NRM1 2-4

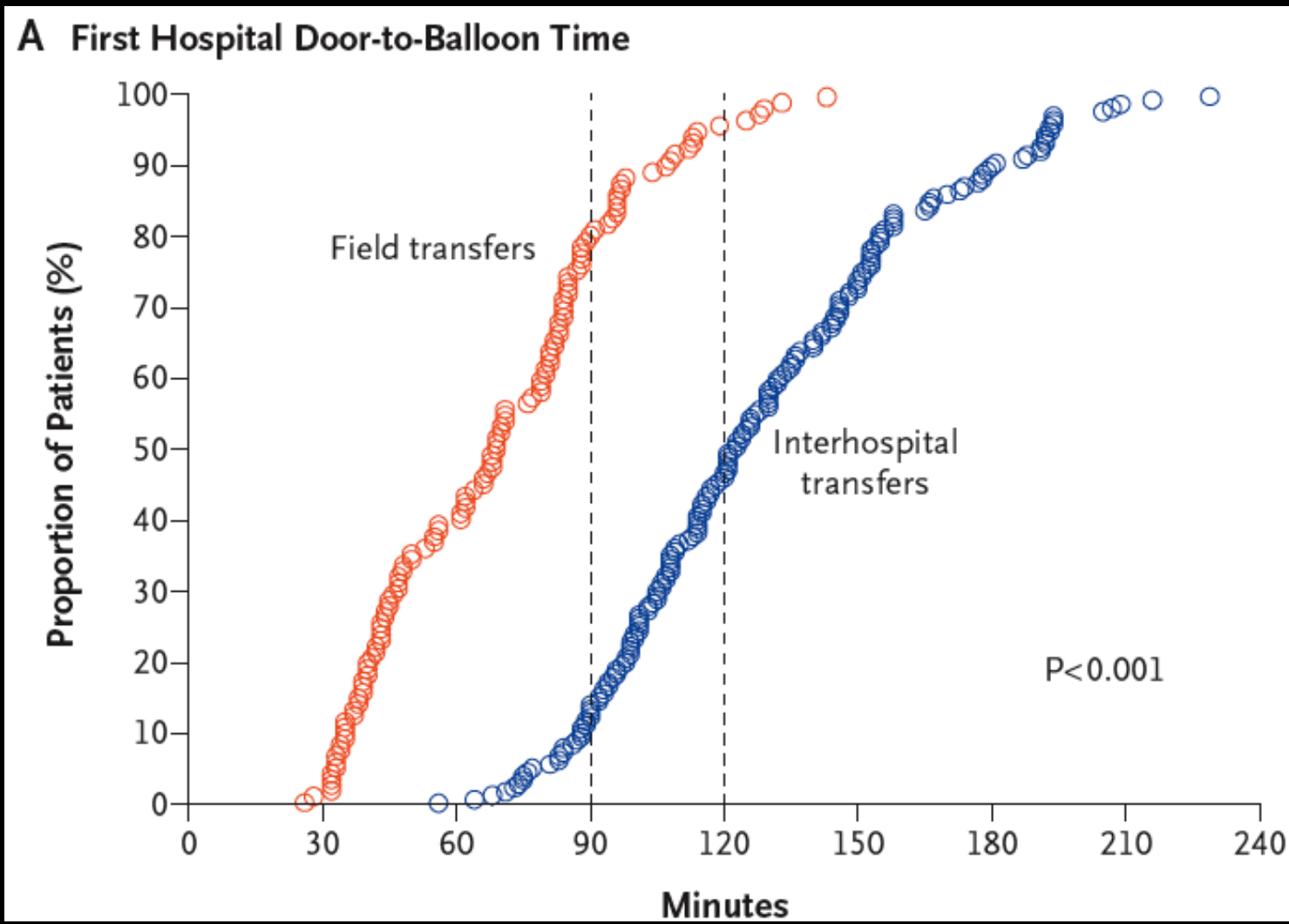
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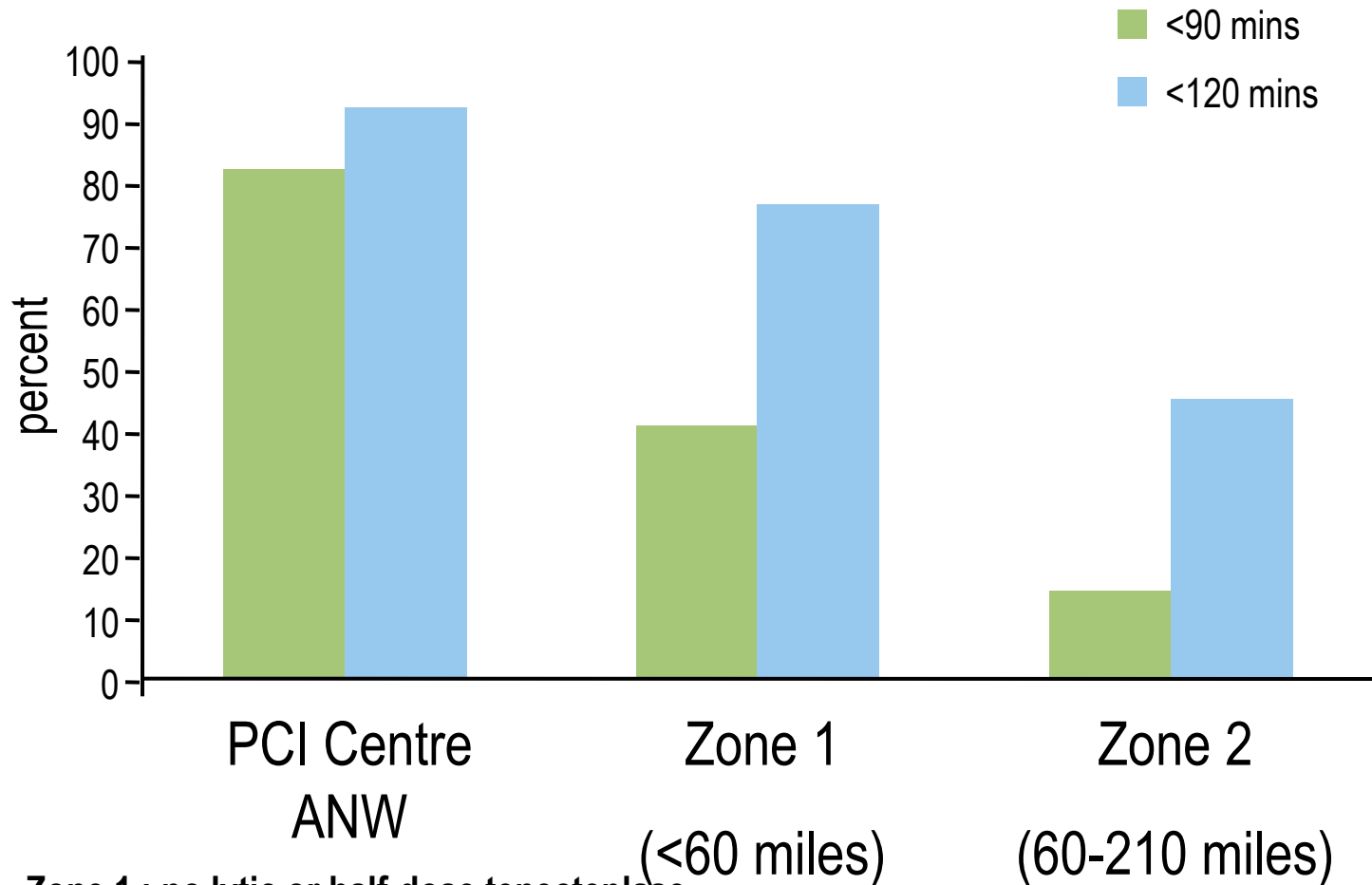


# Ottawa Experience

## field vs. interhospital transfer



# MINNESOTA study: median FMC-to-balloon times



Zone 1 : no lytic or half-dose tenecteplase

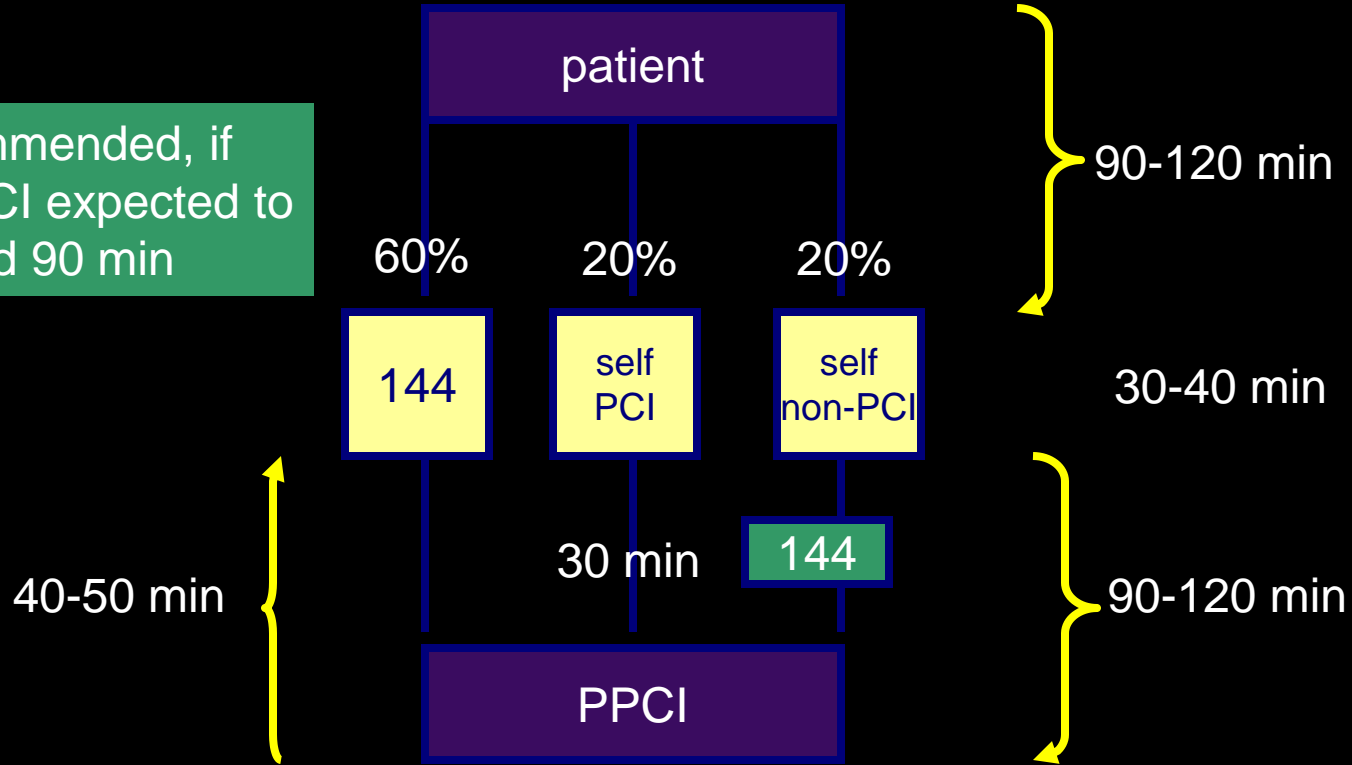
Zone 2 : half-dose or full-dose tenecteplase



# Vienna STEMI network (2003-2006)

## FMC-to-PPCI time intervals

TT recommended, if FMC-to-PPCI expected to exceed 90 min



FMC-to-PPCI: 80-90 min

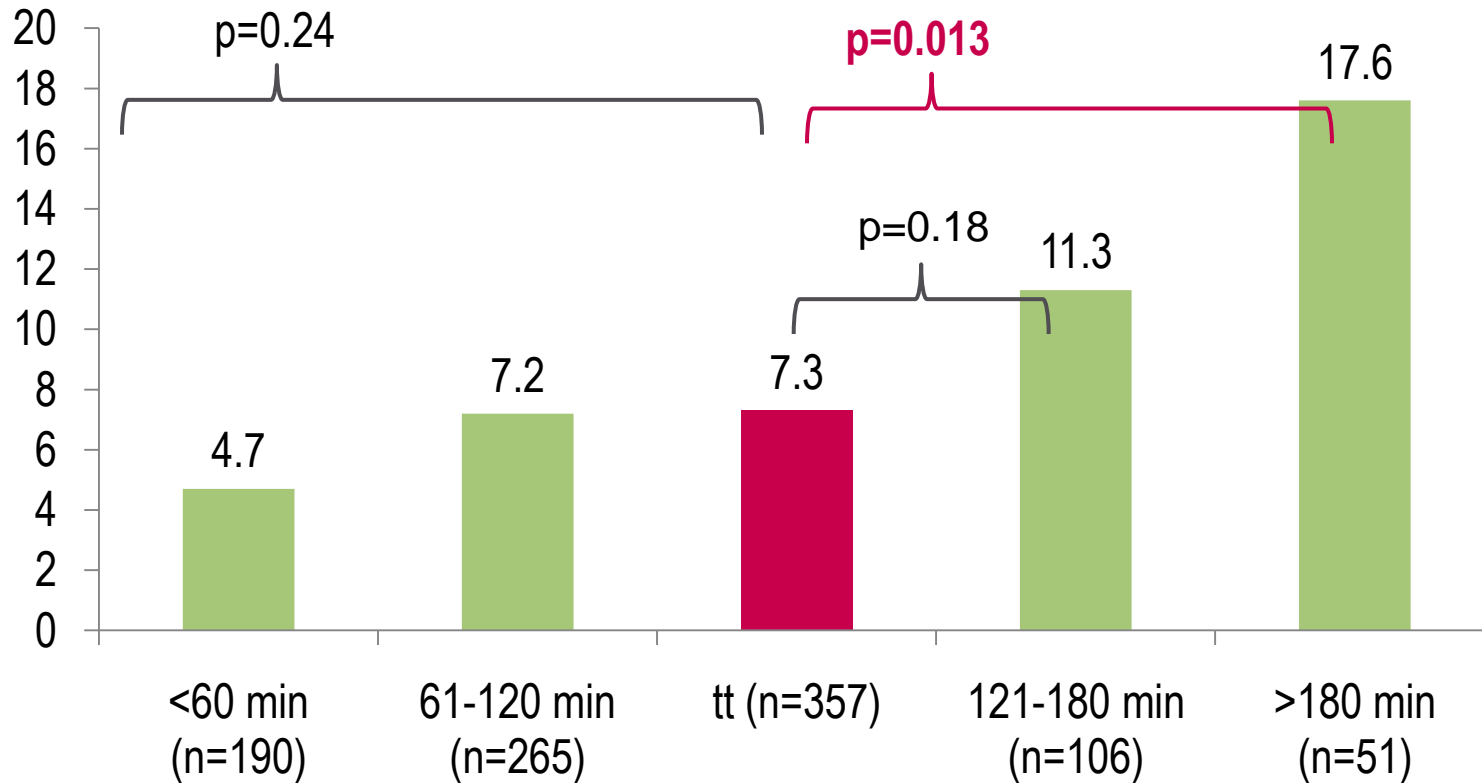
FMC-to-PPCI in self comers to a non-PCI center: 120-160 min

FMC = DG by 12-lead ECG

# Vienna STEMI registry

## Reperfusion strategies, time delay and mortality

### Pain-to-first contact <120 min



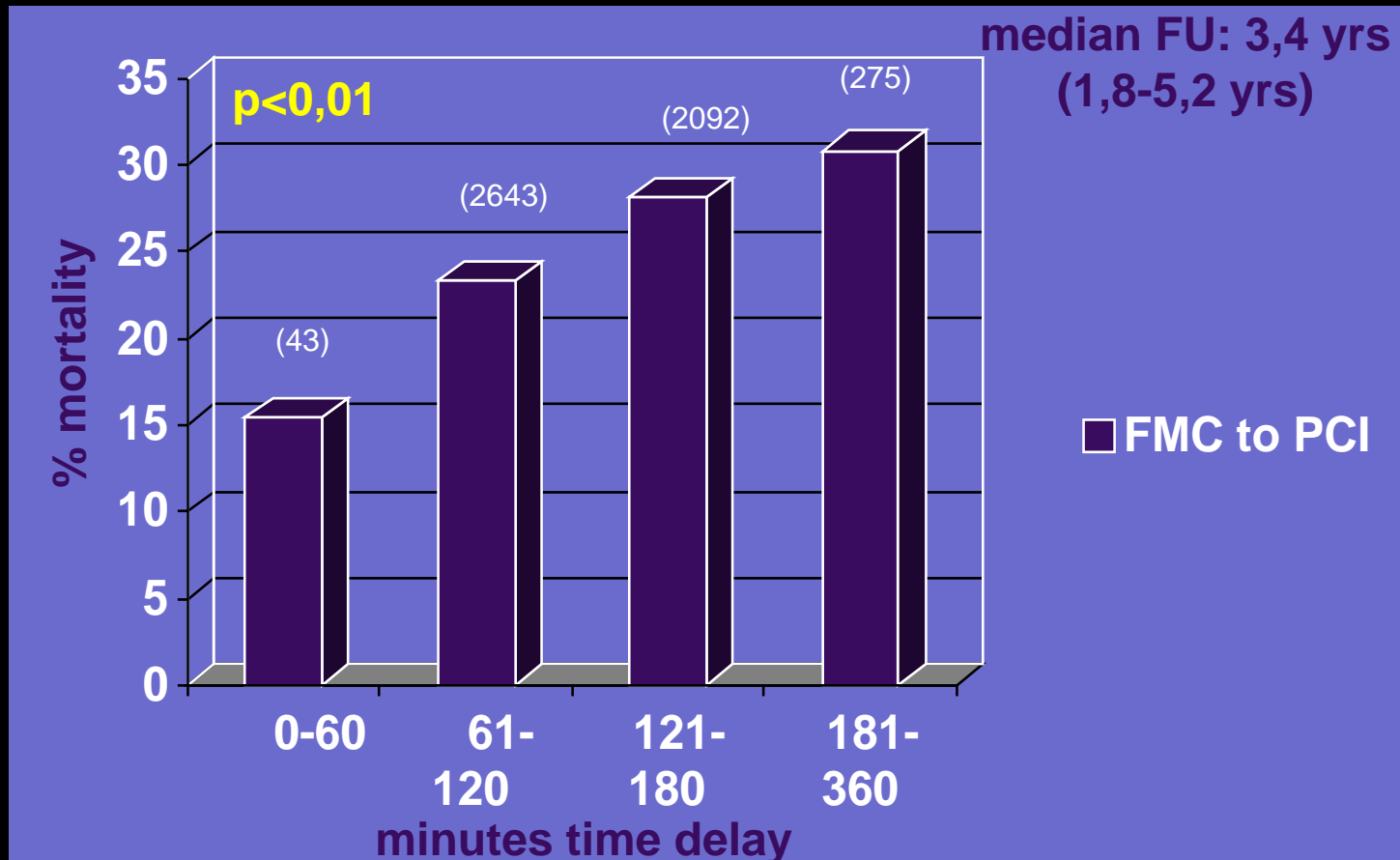
74.3% of STEMI patients referred for PPCI were treated < 120 min

However 8.3% of STEMI patients referred for PPCI received first balloon inflation >3 h later



# Danish Registry

## Impact of time delay FMC-to-PCI on long-term mortality

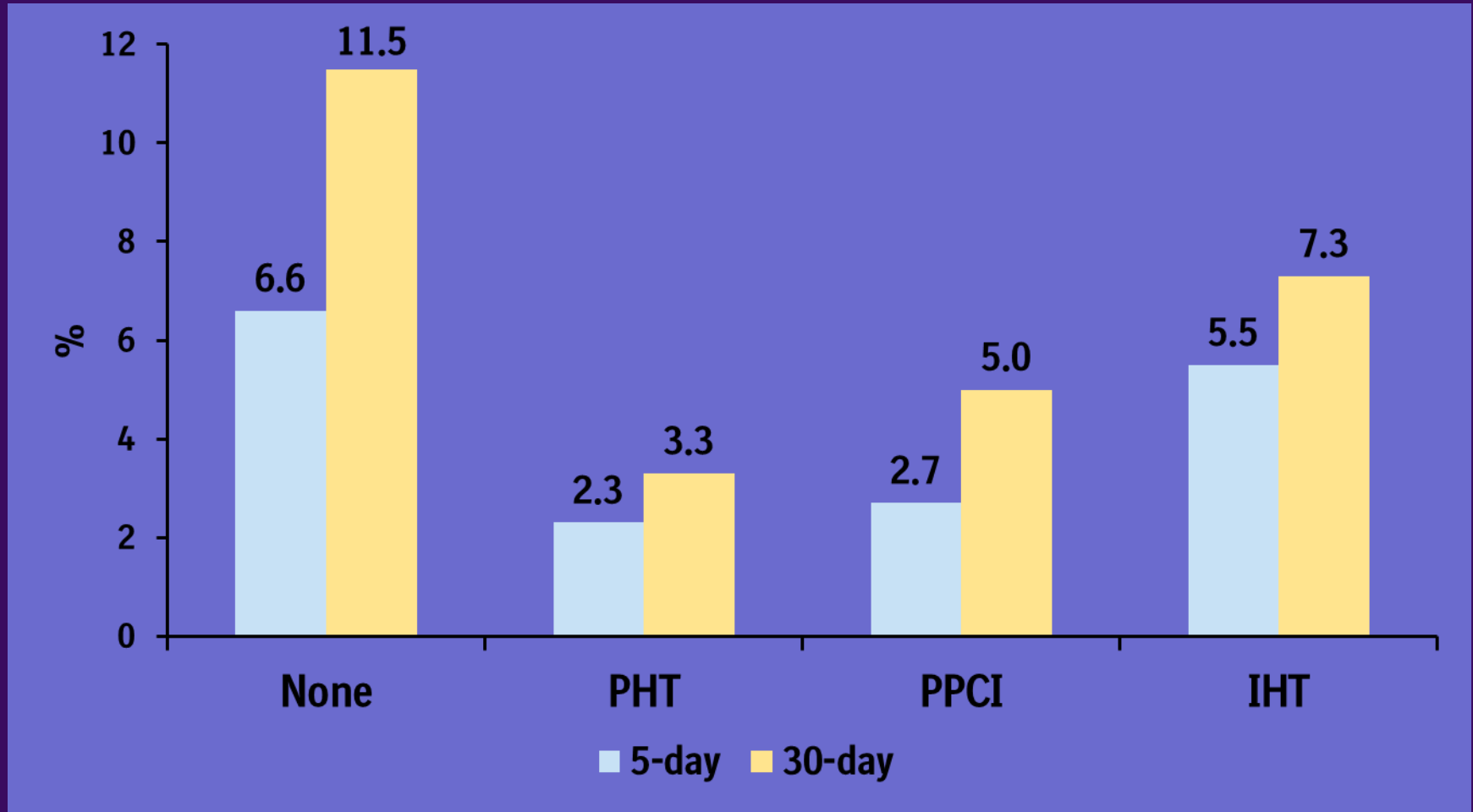




**Outcome data!**

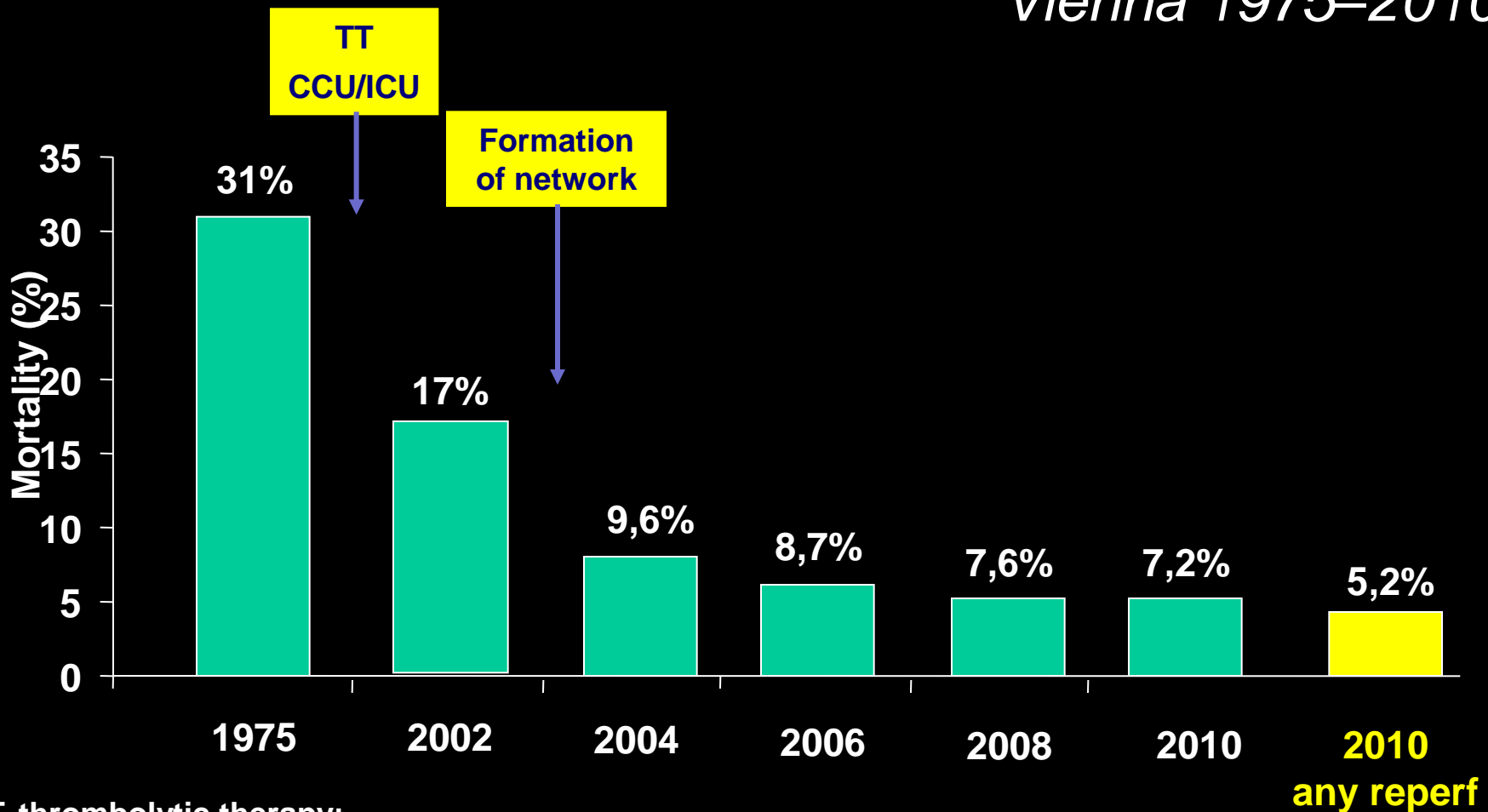


# *FAST-MI 2005: early mortality according to reperfusion therapy*





# STEMI (all comers, all treatment): In-hospital mortality Vienna 1975–2010



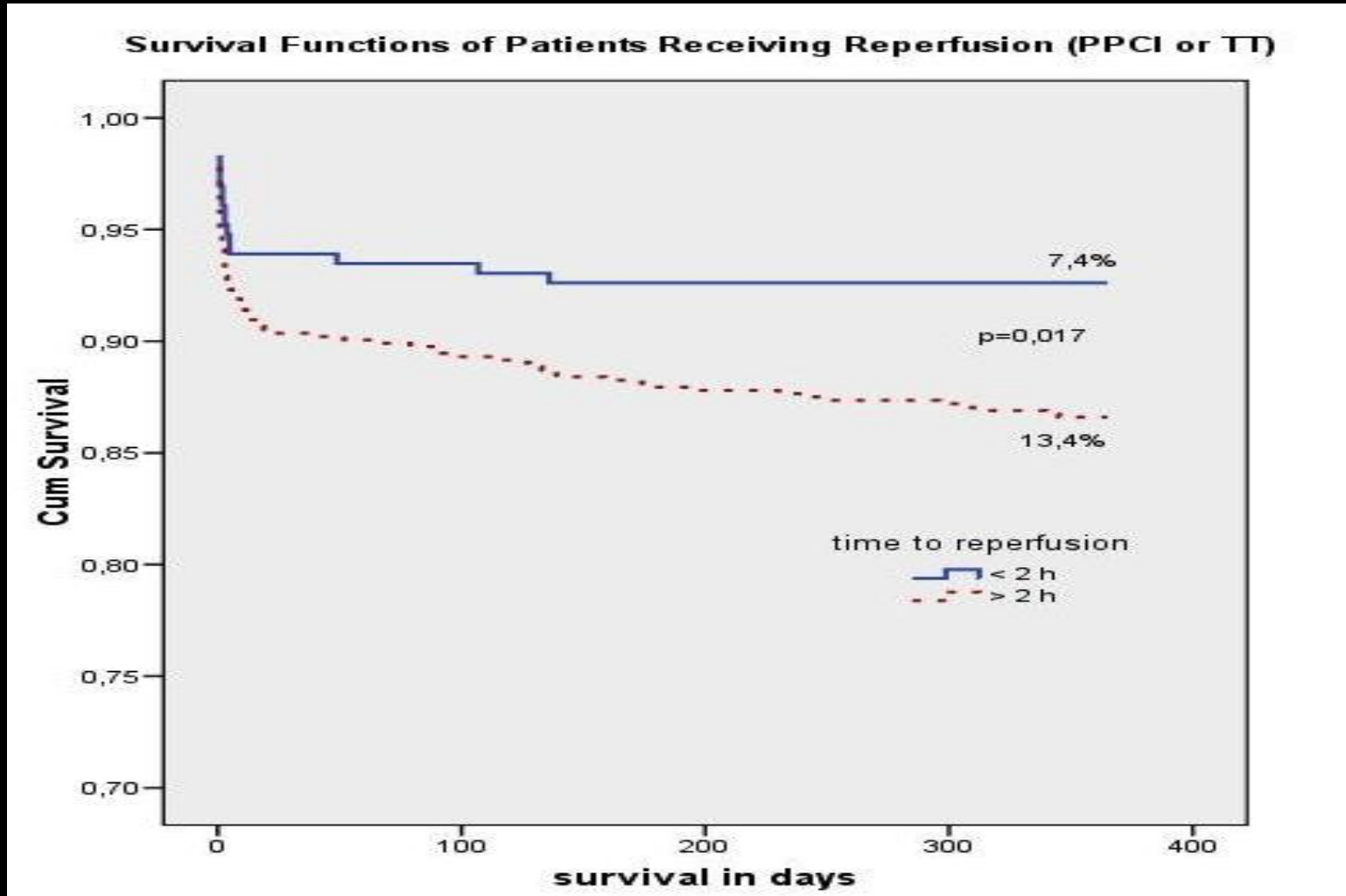
TT, thrombolytic therapy;  
CCU, coronary care unit; ICU, intensive care unit

data partially based on Kalla K et al. *Circulation* 2006;113:2398–2405 & Lanschuetzer et al. unpublished



# Vienna STEMI Registry

## 1-year survival rate (2003-2004)

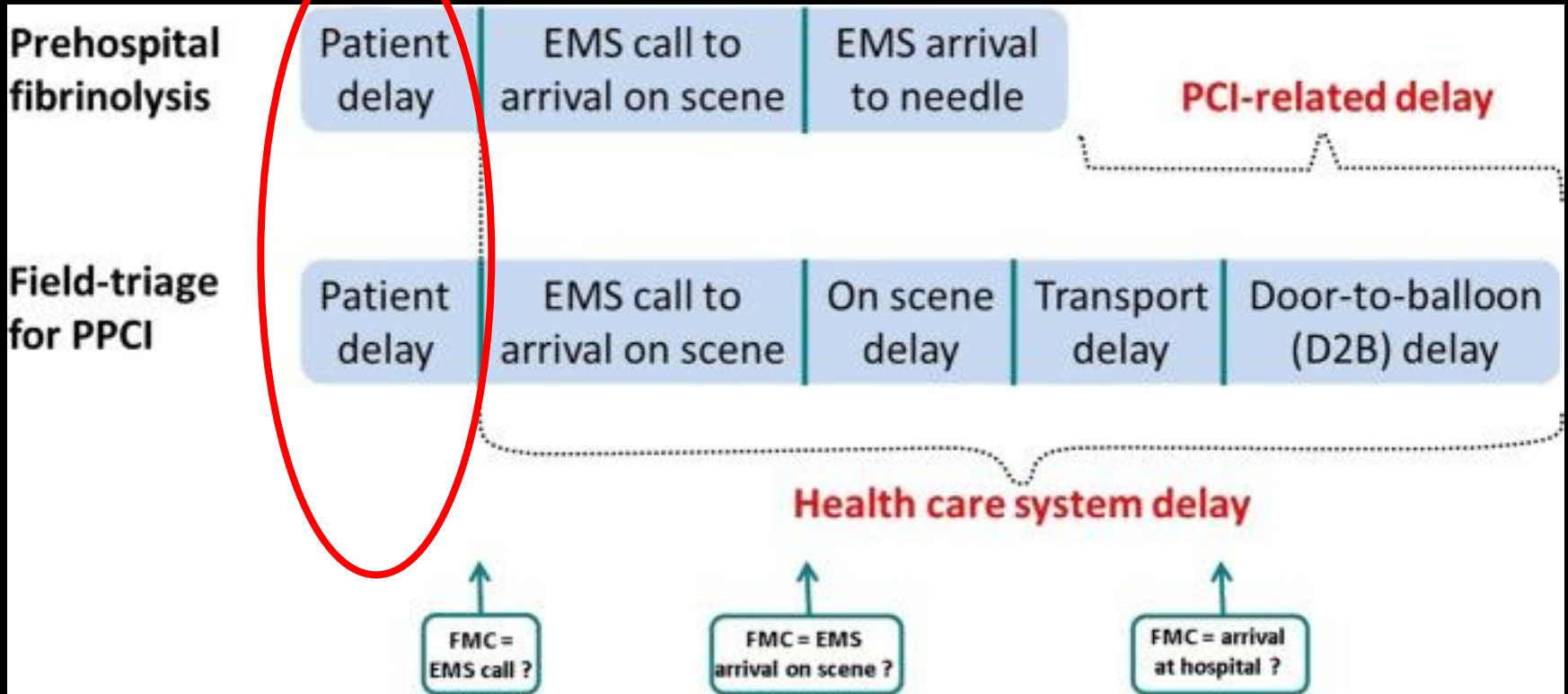




**Further improvement!**

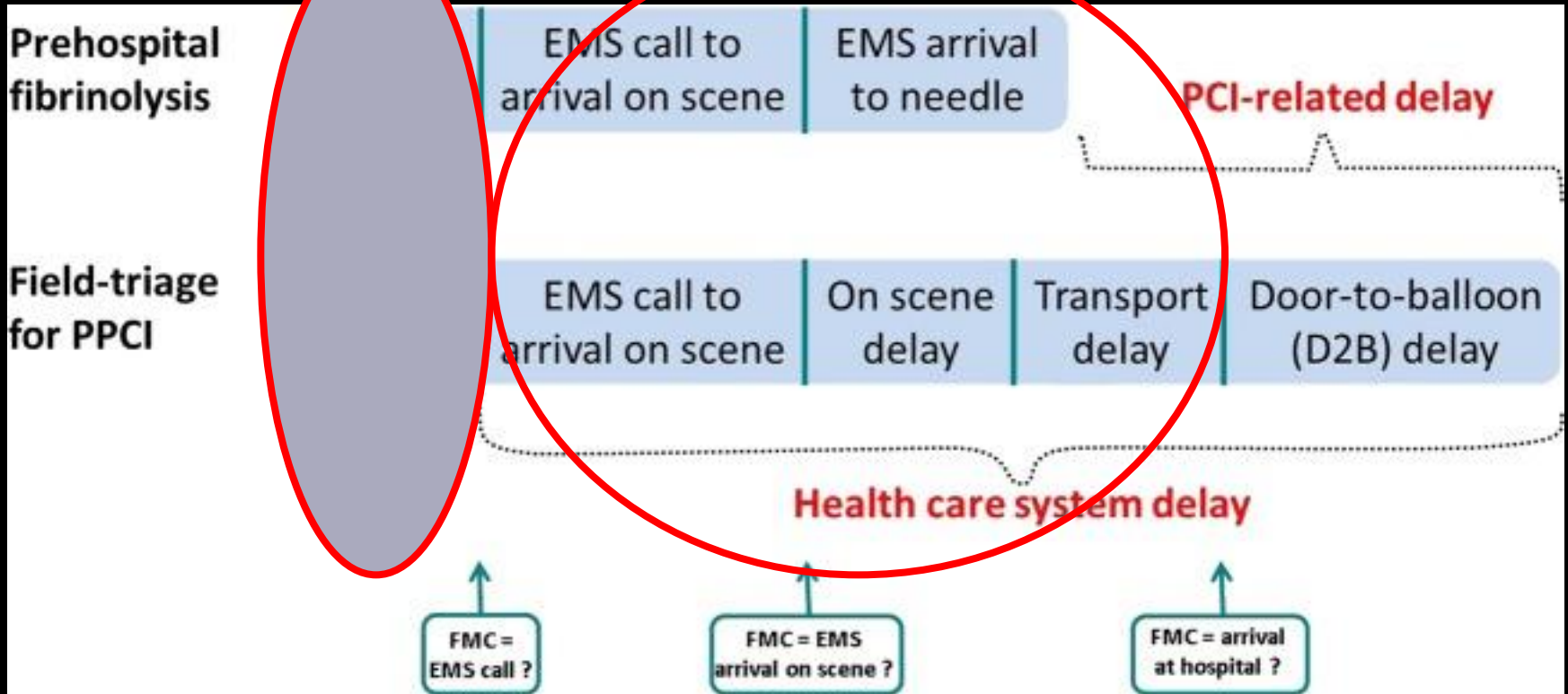


# Delay Times in STEMI Networks



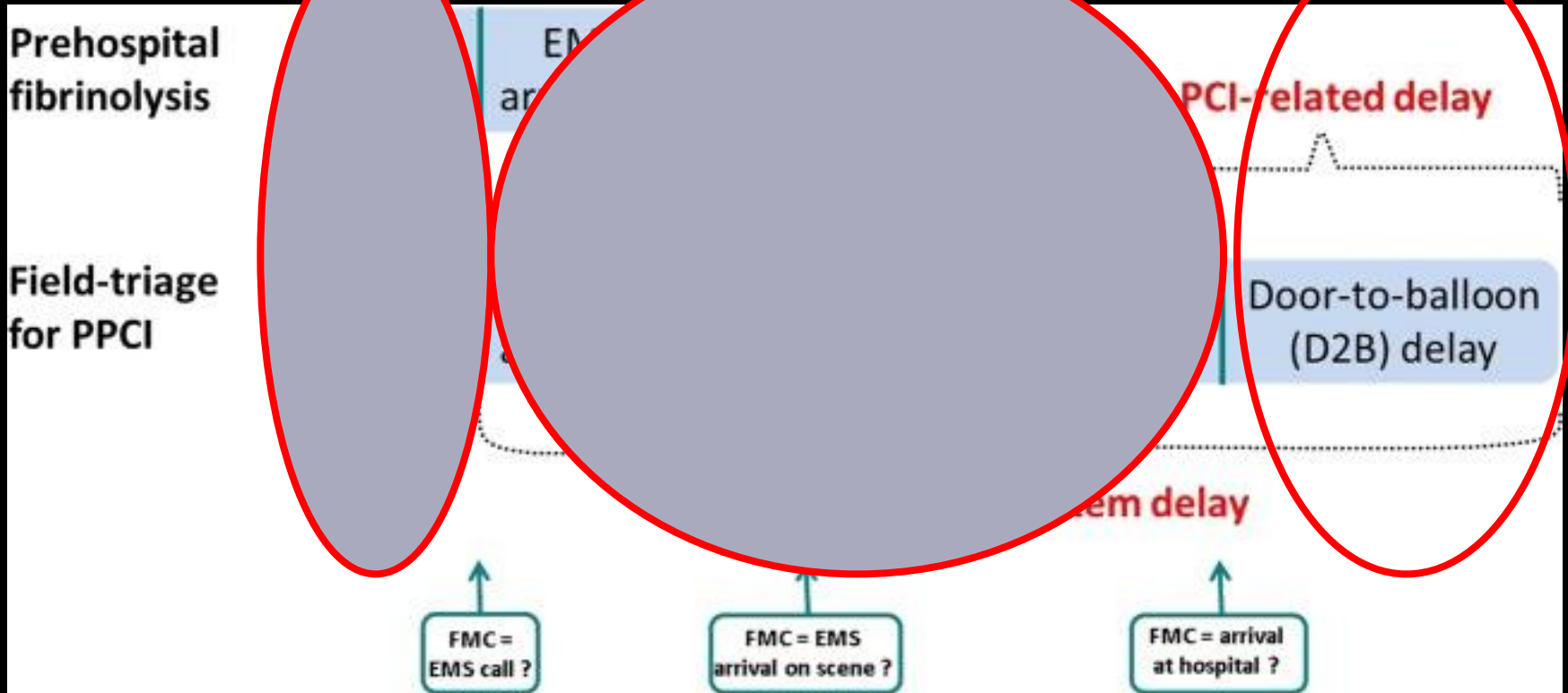


# Delay Times in STEMI Networks



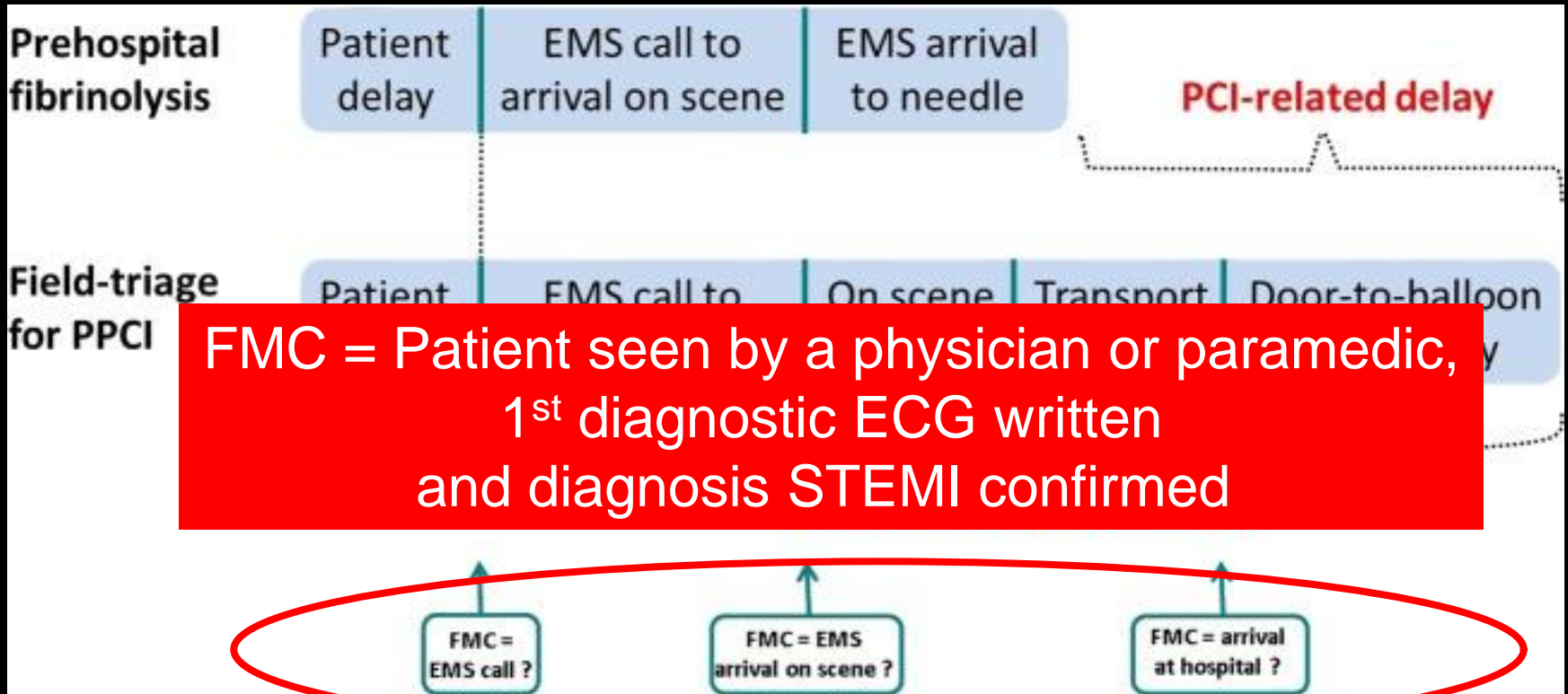


# Delay Times in STEMI Networks





# Delay Times in STEMI Networks





# Recommended logistics

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## Pre-hospital triage/care:

- EMS
- Unique telephone number
- Tele-consultation

## Ambulance

- 12-ECG recorder/defibrillator
- Staff able to provide basic and advanced life support

## Networks:

- **Implementation of a network of hospitals with different levels of technology connected by an efficient ambulance service using the same protocol**

## Targets:

- < 10 min ECG transmission
- < 5 min tele-consultation
- < 120 (< 90) min from FMC to first balloon inflation
- < 30 min start fibrinolytic therapy

# Further improvement of logistics

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## **Reduce patient delays**

Permanent public information about symptoms and whom to call ASAP

## **Reduce EMS / transfer delays (FMC-to-balloon)**

Based on the local situations, bypass non-PCI capable hospitals

## **Reduce in-hospital delays (door-to-balloon)**

This is important (e.g., bypass ER) but usually does not add most benefit

## **Organize networks where not available**



## Angina

One number

EMS (car, helicopter)

12-lead ECG, Defibrillator

Basic and advanced life support

Cell phone (direct contact with cath lab)

Trained (emergency) physicians or paramedics

Automatic ECG diagnosis or ECG-telemetry (paramedics)

Pre-hospital treatment (pain relief, UFH, Enox, Bival, pre-h lysis)

## **Network Components**

## **Network Organization**

Co-operation between EMS, PCI-hospitals, non-PCI hospitals

Lead by cardiologists or emergency physicians

Involvement of (local) health politicians

Public information campaigns

Insurance companies

Financial support

Education

Registry



# **The Organization, Function and Outcomes of STEMI Networks World-Wide: Current State, Unmet Needs and Future Directions**

**Kurt Huber, Patrick Goldstein, Christopher B. Granger,  
Paul Armstrong, and Bernard J Gersh**

**Eur Heart J 2013 in review**



**Thank You**