Treatment Approach to Patients with STEMI: The Current Paradigm

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Modern Approach to STEMI
The Old Paradigm

Early Complete Sustained

STEMI

Lytics Fibrino-Specific

Lytics vs PCI

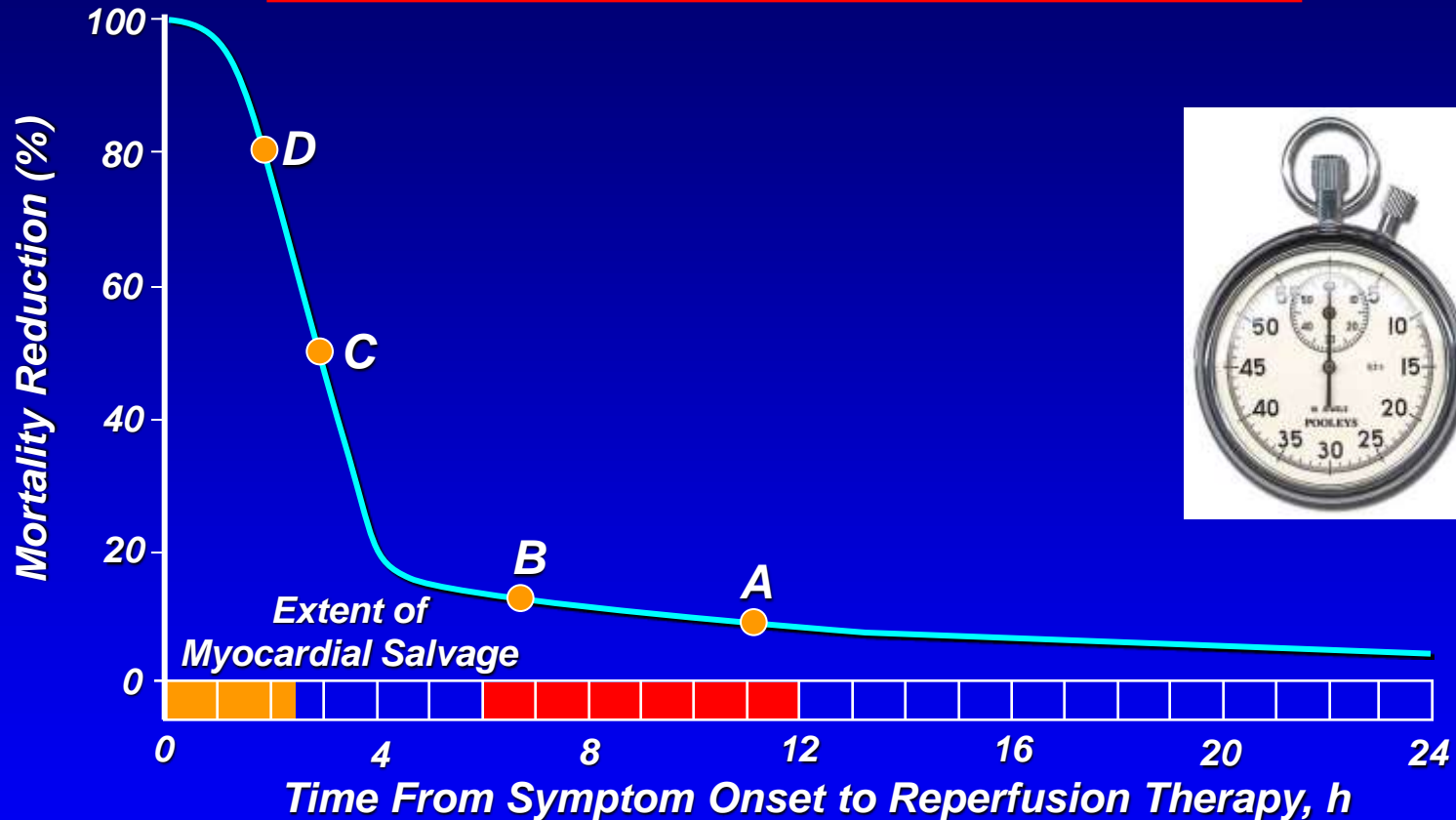# PCI is the preferred reperfusion treatment for patients with STEMI

PTCA vs Trombolytics Meta-Analysis n= 2611

	PTCA	Lytics	P
Death	4.5%	7.1%	0.006
Death/MI	7.2%	10.9%	0.001
Stroke	0.6%	2.0%	0.003
Hemorragic	0.08%	1.2%	0.003

Nurm et al. J Am Coll Cardiol 1996,27:153A

TIME IS MUSCLE

Y-axis: **Mortality Reduction (%)** — 0, 20, 40, 60, 80, 100

Points: D, C, B, A

Extent of Myocardial Salvage

X-axis: **Time From Symptom Onset to Reperfusion Therapy, h** — 0, 4, 8, 12, 16, 20, 24

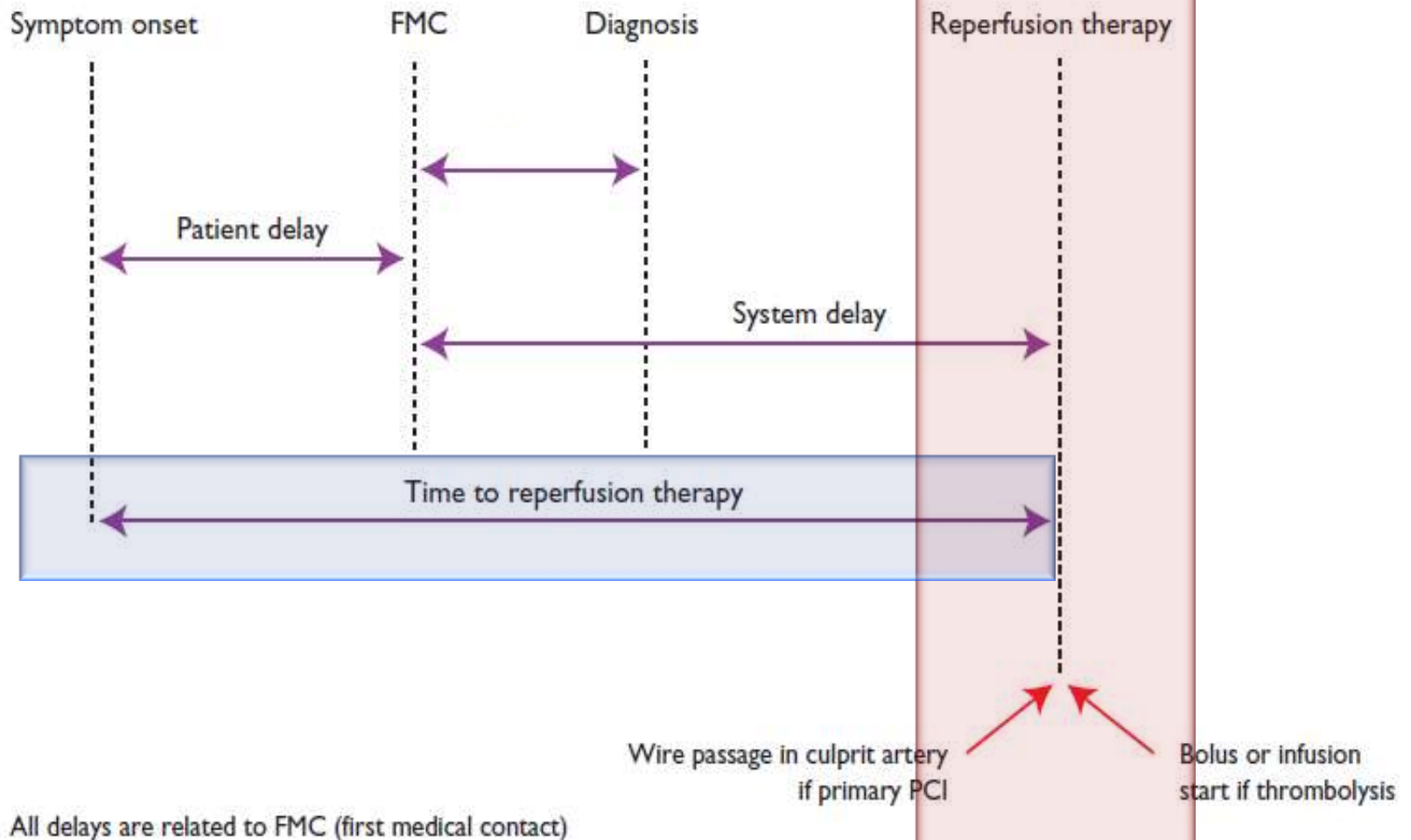**Critical Time-dependent Period**
Goal: Myocardial Salvage

Time-independent Period
Goal: Open Infarct-Related Artery

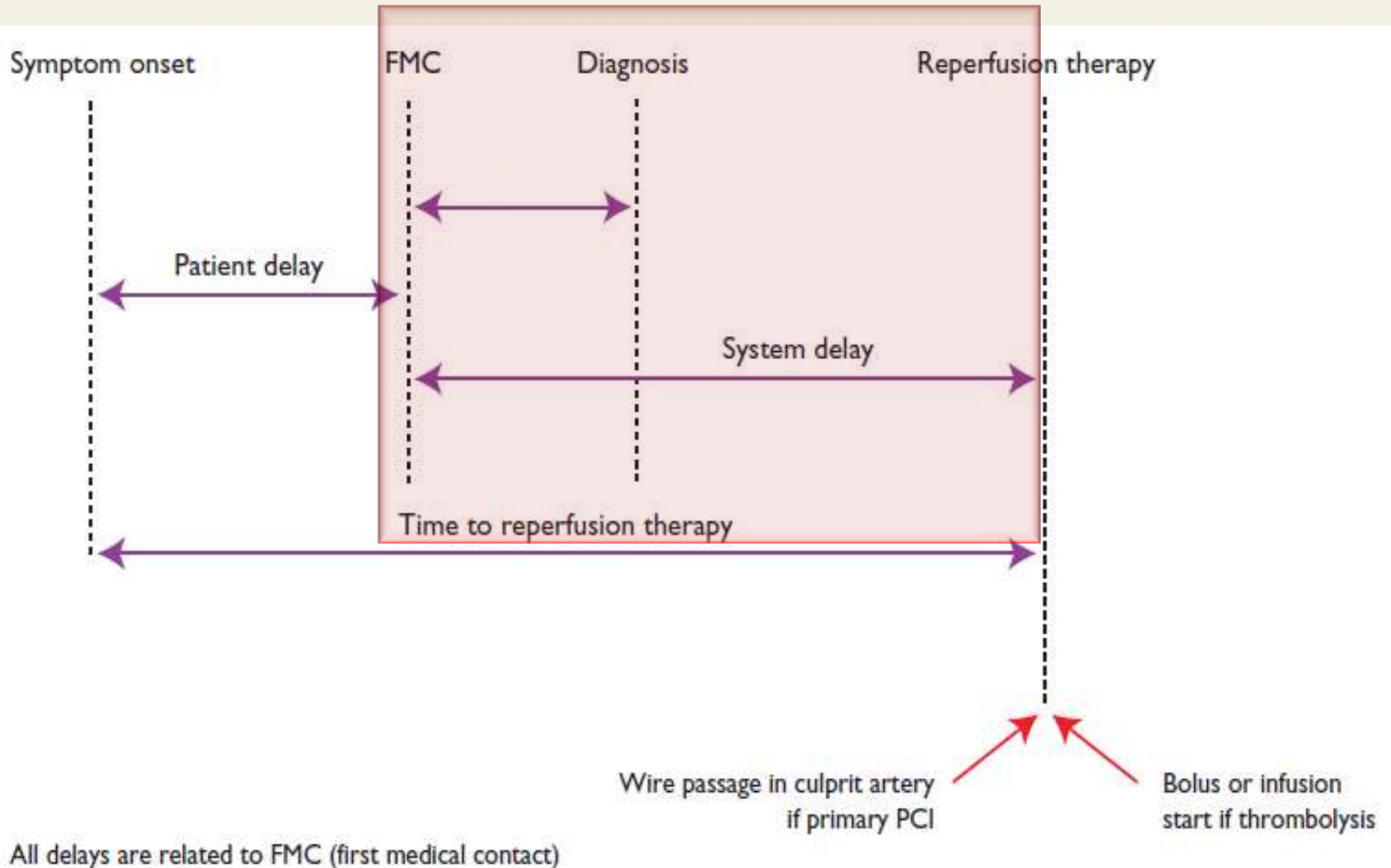*Gersh BJ, et al. JAMA. 2005;293:979.*

Modern Approach to STEMI
The Old Paradigm

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The New Paradigm

Modern Approach to STEMI
The New Paradigm

System Based Care

Increase the number of patients with access to timely reperfusion

AHA Conference Proceedings

Development of Systems of Care for ST-Elevation Myocardial Infarction Patients

The Primary Percutaneous Coronary Intervention (ST-Elevation Myocardial Infarction–Receiving) Hospital Perspective

Christopher B. Granger, MD, Co-Chair; Timothy D. Henry, MD, Co-Chair;
W. Eric R. Bates, MD, FAHA; Bojan Cercek, MD, FAHA;
W. Douglas Weaver, MD; David O. Williams, MD, FAHA

ACC/AHA Recommendations
Door to Balloon Time (D2B)

Door to Balloon   *90 minutes*

Hospital Transfer   *120 minutes*

Door to Needle   *30 minutes*

Modern Approach to STEMI
The New Paradigm

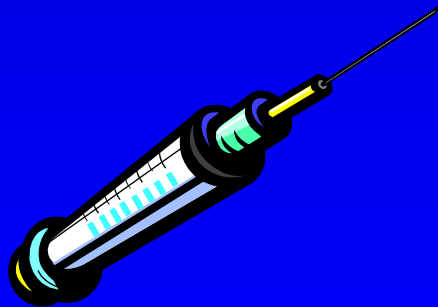**Door to Balloon**

System Based Care

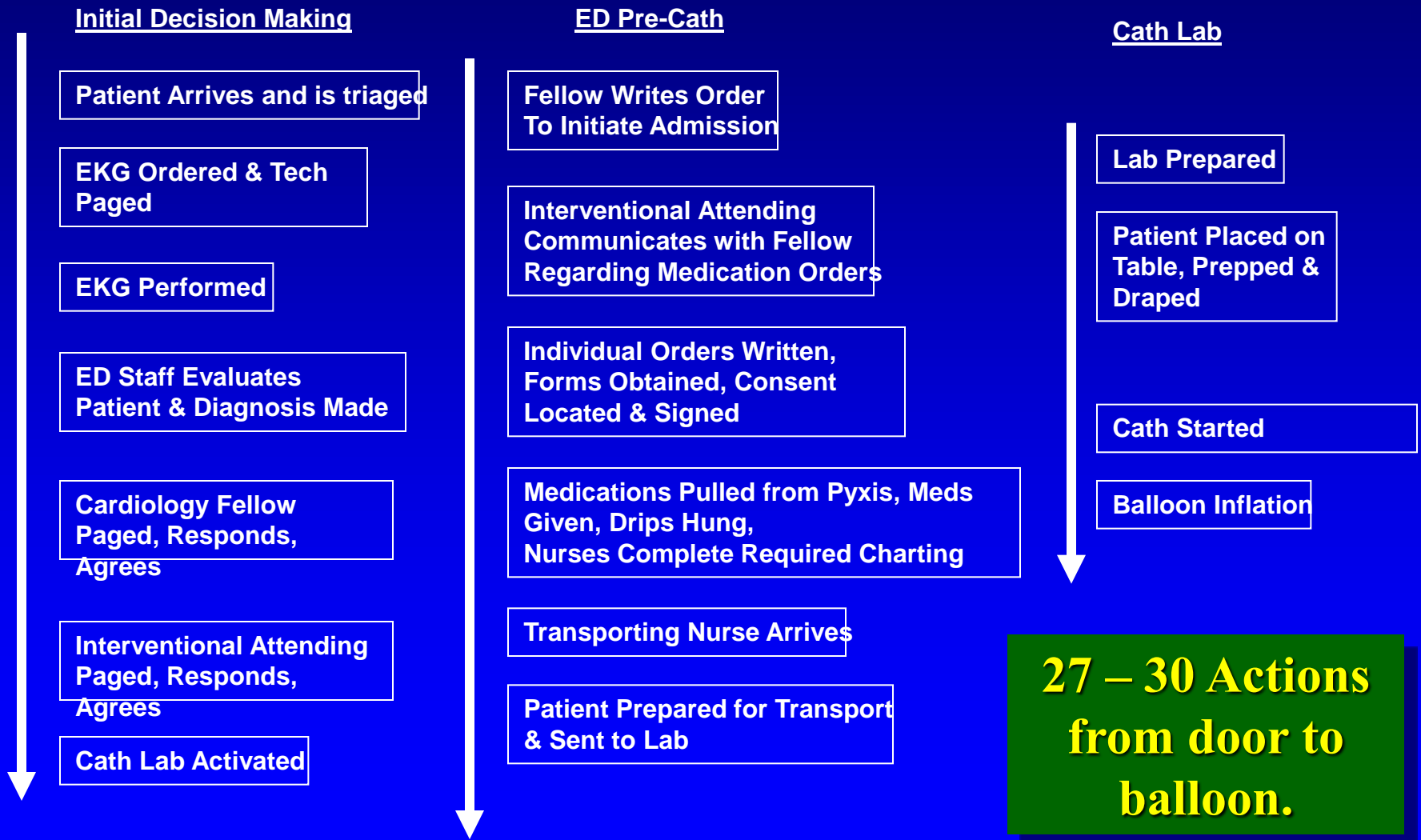# Modern Approach to STEMI
The New Paradigm

Door to Needle

System Based Care
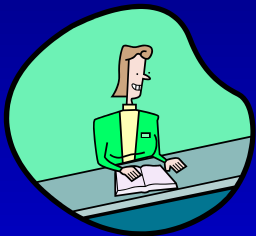
Reperfusion Therapy in AMI

STEMI Protocol at SHANDS/UF Hospital

Previous Process

Initial Decision Making

- Patient Arrives and is triaged
- EKG Ordered & Tech Paged
- EKG Performed
- ED Staff Evaluates Patient & Diagnosis Made
- Cardiology Fellow Paged, Responds, Agrees
- Interventional Attending Paged, Responds, Agrees
- Cath Lab Activated

ED Pre-Cath

- Fellow Writes Order To Initiate Admission
- Interventional Attending Communicates with Fellow Regarding Medication Orders
- Individual Orders Written, Forms Obtained, Consent Located & Signed
- Medications Pulled from Pyxis, Meds Given, Drips Hung, Nurses Complete Required Charting
- Transporting Nurse Arrives
- Patient Prepared for Transport & Sent to Lab

Cath Lab

- Lab Prepared
- Patient Placed on Table, Prepped & Draped
- Cath Started
- Balloon Inflation

27 – 30 Actions from door to balloon.

Walking in with a Heart Attack: Time to First ECG
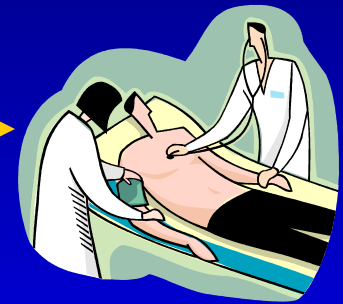
Welcome/ID

Triage

Transport

Rx area

ECG

Average 35 minutes

Walking in with a Heart Attack: Time to Activation
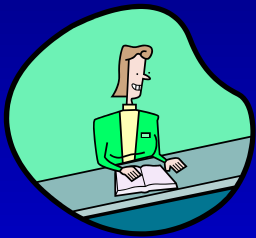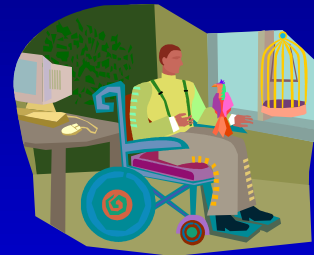
Welcome/ID → **Triage** → **Transport** → **Rx area**
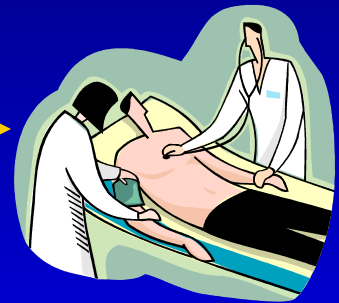
Average 72 minutes

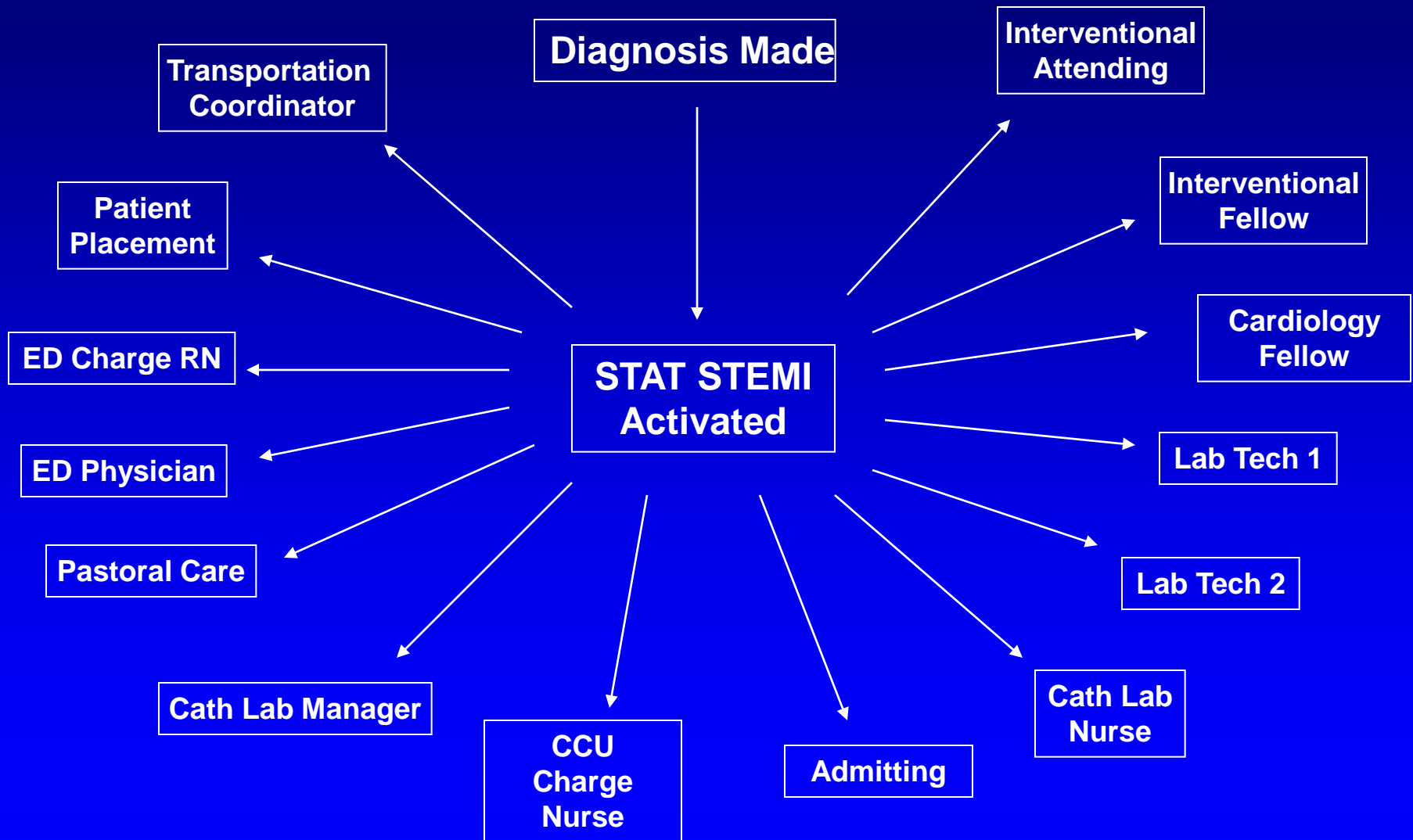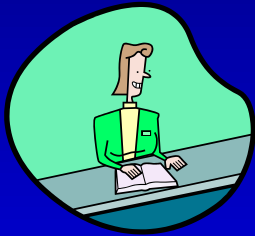**Page IC** ← **Diagnosis** ← **ECG**

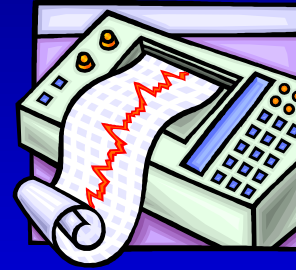# *STEMI Protocol at SHANDS/UF Hospital*
A Single Call

Walking in with a Heart Attack: Time to First ECG

Welcome/ID
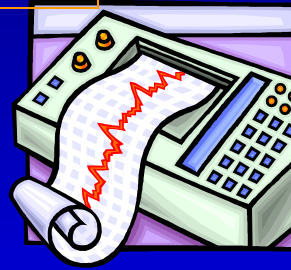
Triage
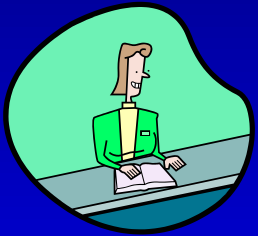
ECG

Less than 10 minutes

Walking in with a Heart Attack: Time Activation

Welcome/ID

Triage

ECG

Diagnosis /Page IC

Less than 20 minutes

STEMI Protocol at SHANDS/UF Hospital

What are the Results?
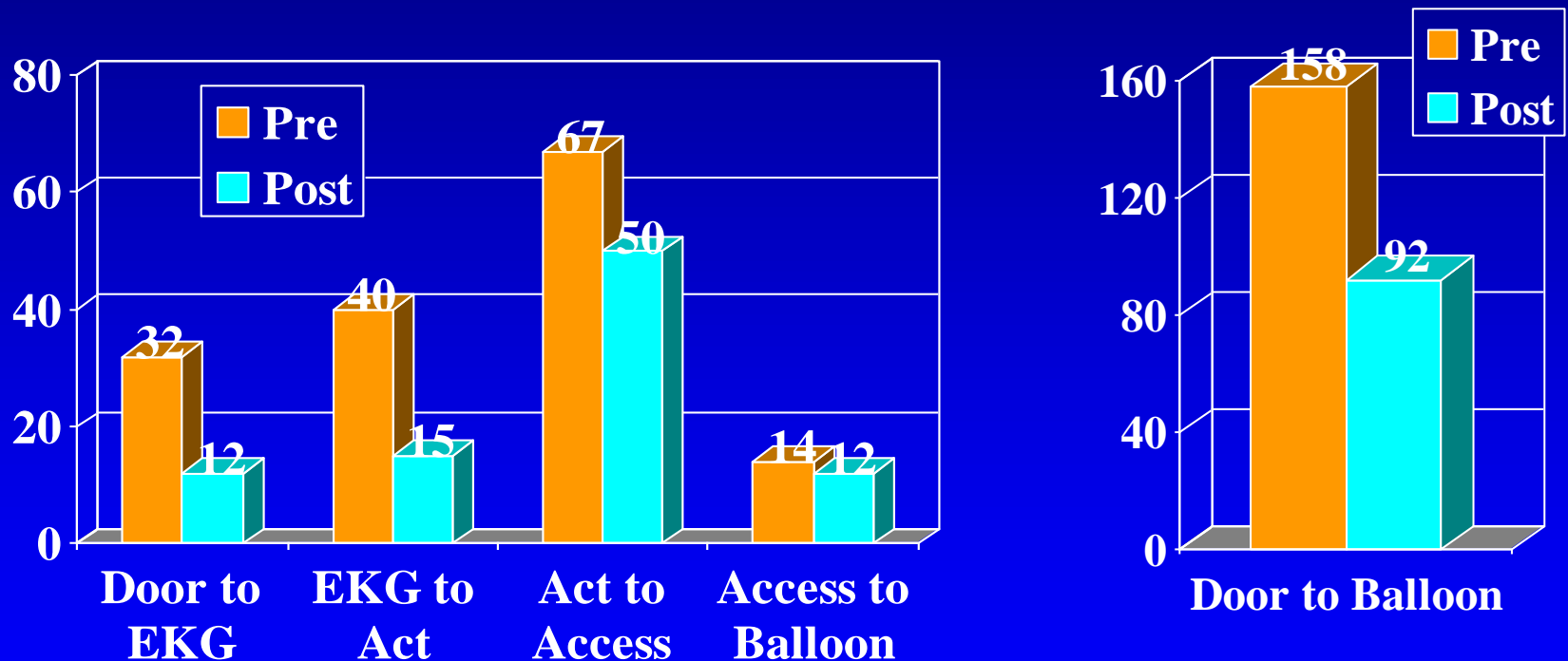
Modern Approach to STEMI
The New Paradigm

Symptom onset — FMC — Diagnosis — Reperfusion therapy

Patient delay

System delay

Time to reperfusion therapy

Wire passage in culprit artery if primary PCI

Bolus or infusion start if thrombolysis

All delays are related to FMC (first medical contact)
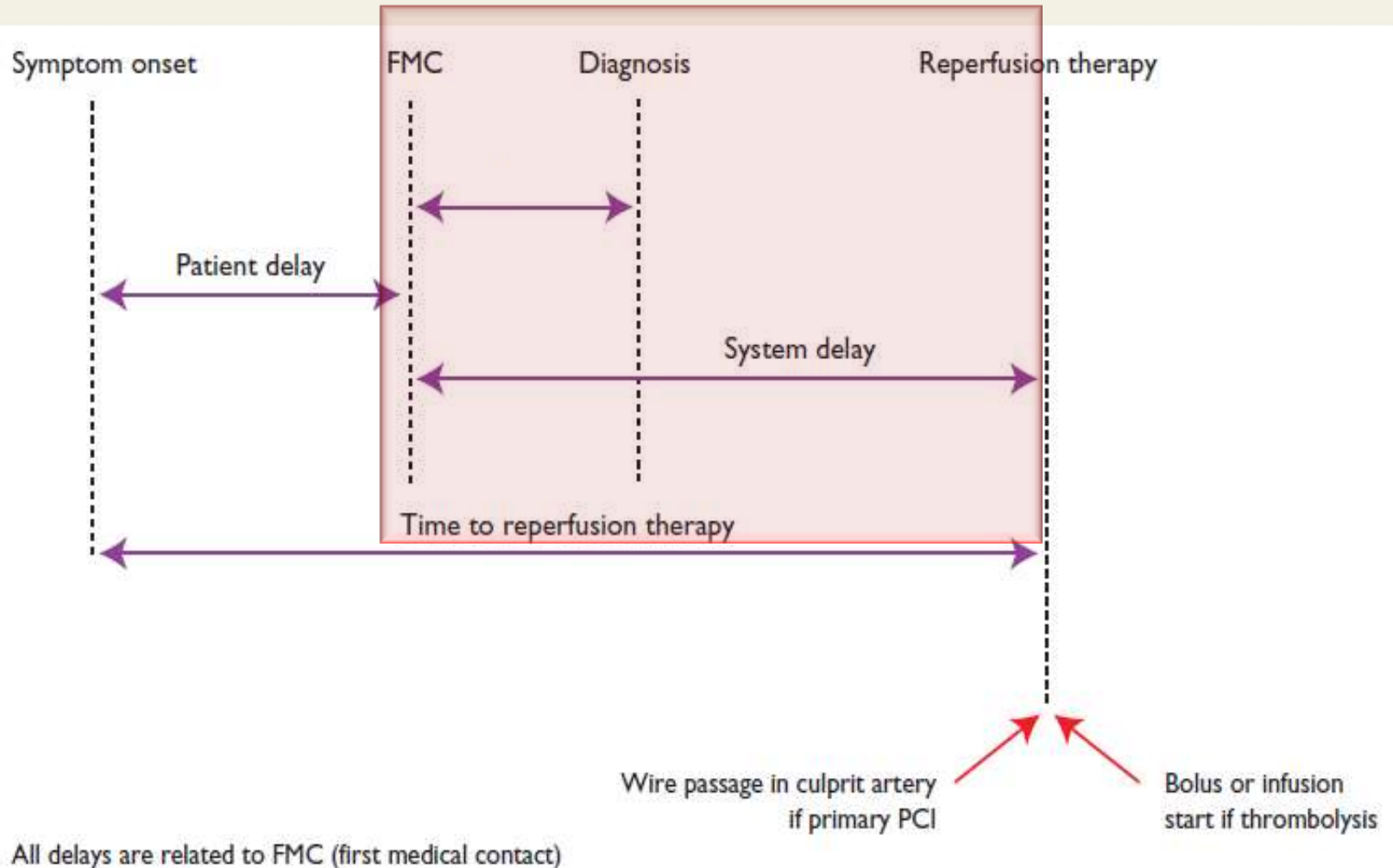
Modern Approach to STEMI
The New Paradigm

Door to Balloon

STEMI

Field EKG

Transporting with a Heart Attack: The goal is time from 1ˢᵗ contact to balloon

Modern Treatments for Heart Attack

Transporting with a Heart Attack: Pre-hospital ECG

Welcome/ID

Triage

ECG
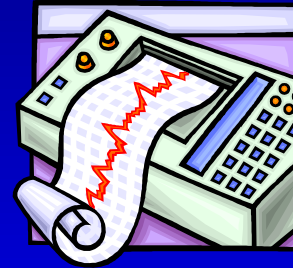
Less than 5 minutes

Strategies for Reducing Door to Balloon time in STEMI. A Survey of 365 Centers
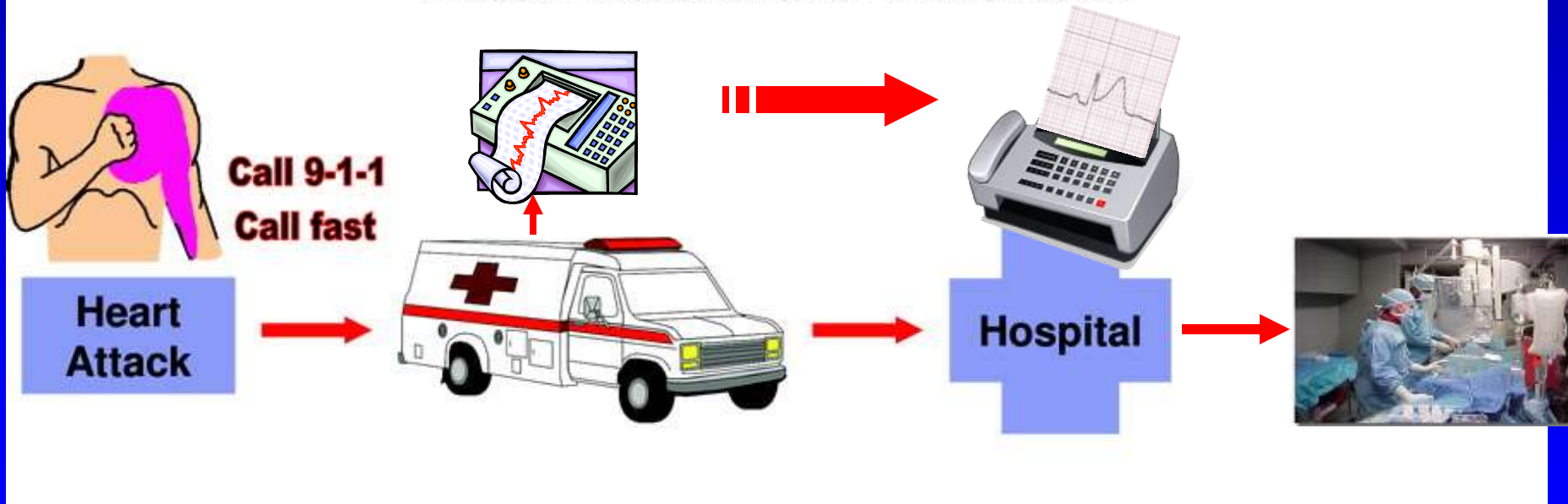
1- To have ER physician to activate Cath Lab   < 8.2 min

2- Single center central paging system   < 13.8 min

3- EKG in field and transmission   < 15.4 min

4- Staff to arrive to Lab within 30 min   < 19.4 min

5- Having a cardiologist on site 24 hrs   < 14.6 min

6- Process of data collection in real time   < 8.6 min

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Strategies for Reducing Door to Balloon time in STEMI

- **Variation in door to activation time explained 93% of the variation in door to balloon time (r:0.97)**
- **Achieving door to activation time < 20 min was associated with door to balloon time < 90 min in 90% of patients**

*McCabe JM ,et al. Circ CQO 2012,5:672*

Strategies for Reducing Door to Balloon time in STEMI

- **Variation in door to activation time explained 93% of the variation in door to balloon time (r:0.97)**
- **Achieving door to activation time < 20 min was associated with door to balloon time < 90 min in 90% of patients**
- **Predictors of shorter door to activation: typical angina, inferior EKG changes, pre hospital EKG and no CT scan**
- **Predictors of door to balloon: pre-hospital EKG (decrease by 20%) and CT scan (increase by 75%)**

McCabe JM ,et al. Circ CQO 2012,5:672

Strategies for Reducing Door to Balloon time in STEMI (2010)
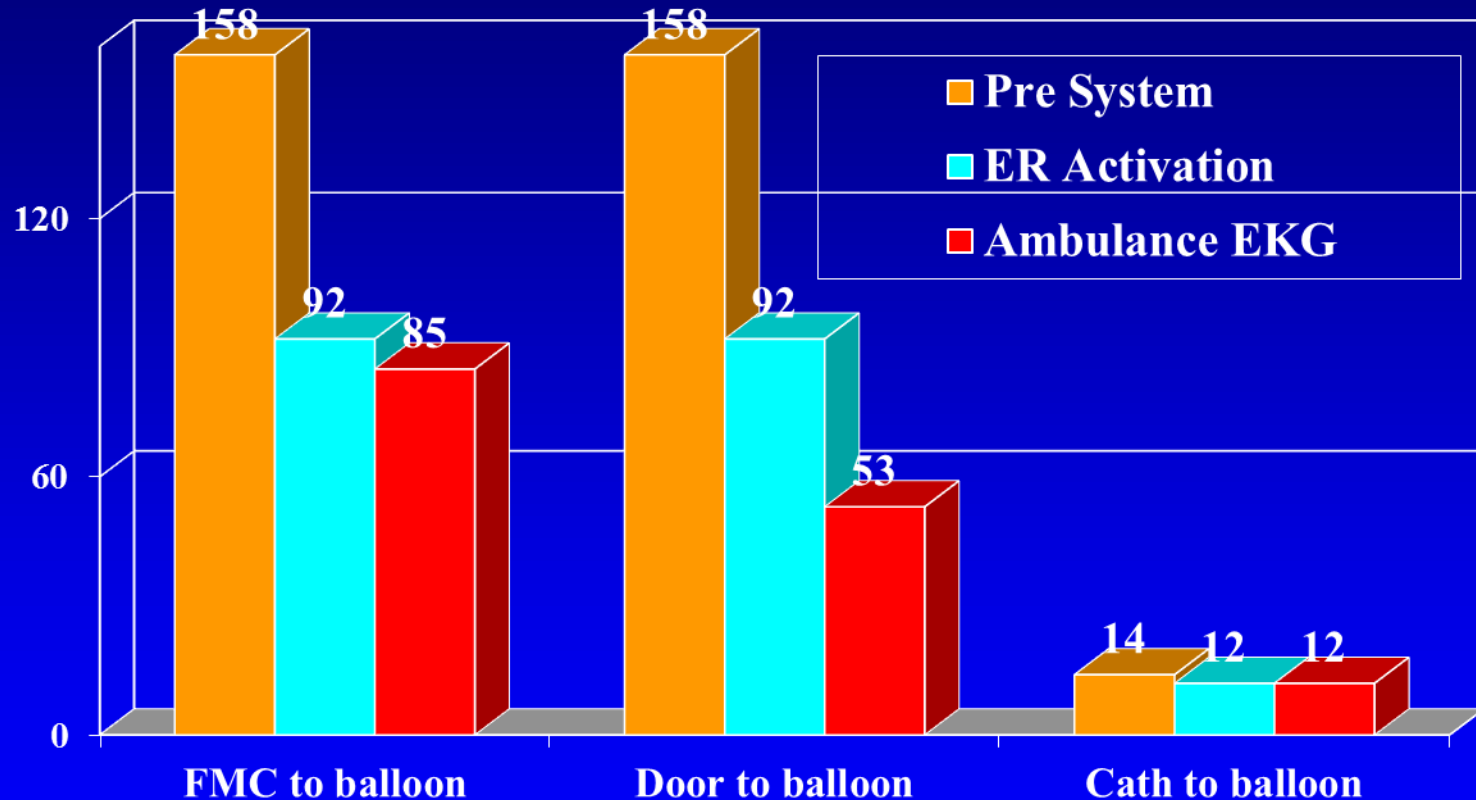
Modern Approach to STEMI
The New Paradigm

Door
to
Balloon

STEMI

Field
Activation

Transporting with a Heart Attack: Field Activation

The goal is time from 1st contact to balloon

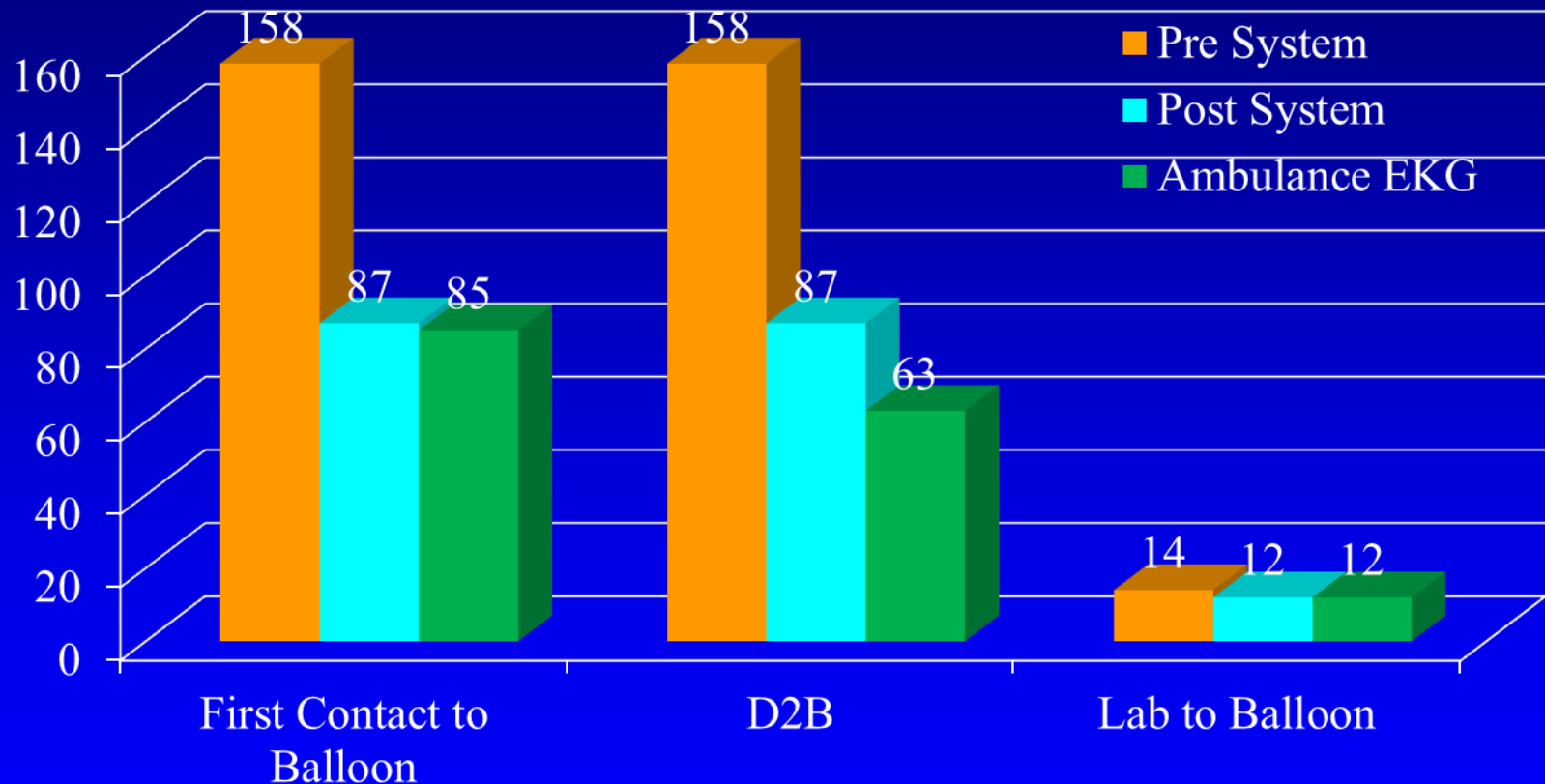Modern Treatments for Heart Attack

Modern Approach to STEMI
Field Activation

- *Education of ER, Cardiologist and IC*

- *EMS Training*

- *Patience*

- *Positive Feed back*

- *Case review*

- *Continue training*

Strategies for Reducing Door to Balloon time in STEMI (2013)

Chart showing comparison of Pre System, Post System, and Ambulance EKG across three categories:

- **First Contact to Balloon**: Pre System 158, Post System 87, Ambulance EKG 85
- **D2B**: Pre System 158, Post System 87, Ambulance EKG 63
- **Lab to Balloon**: Pre System 14, Post System 12, Ambulance EKG 12

Legend:
- Pre System
- Post System
- Ambulance EKG

Strategies for Reducing Door to Balloon time in STEMI (2013)
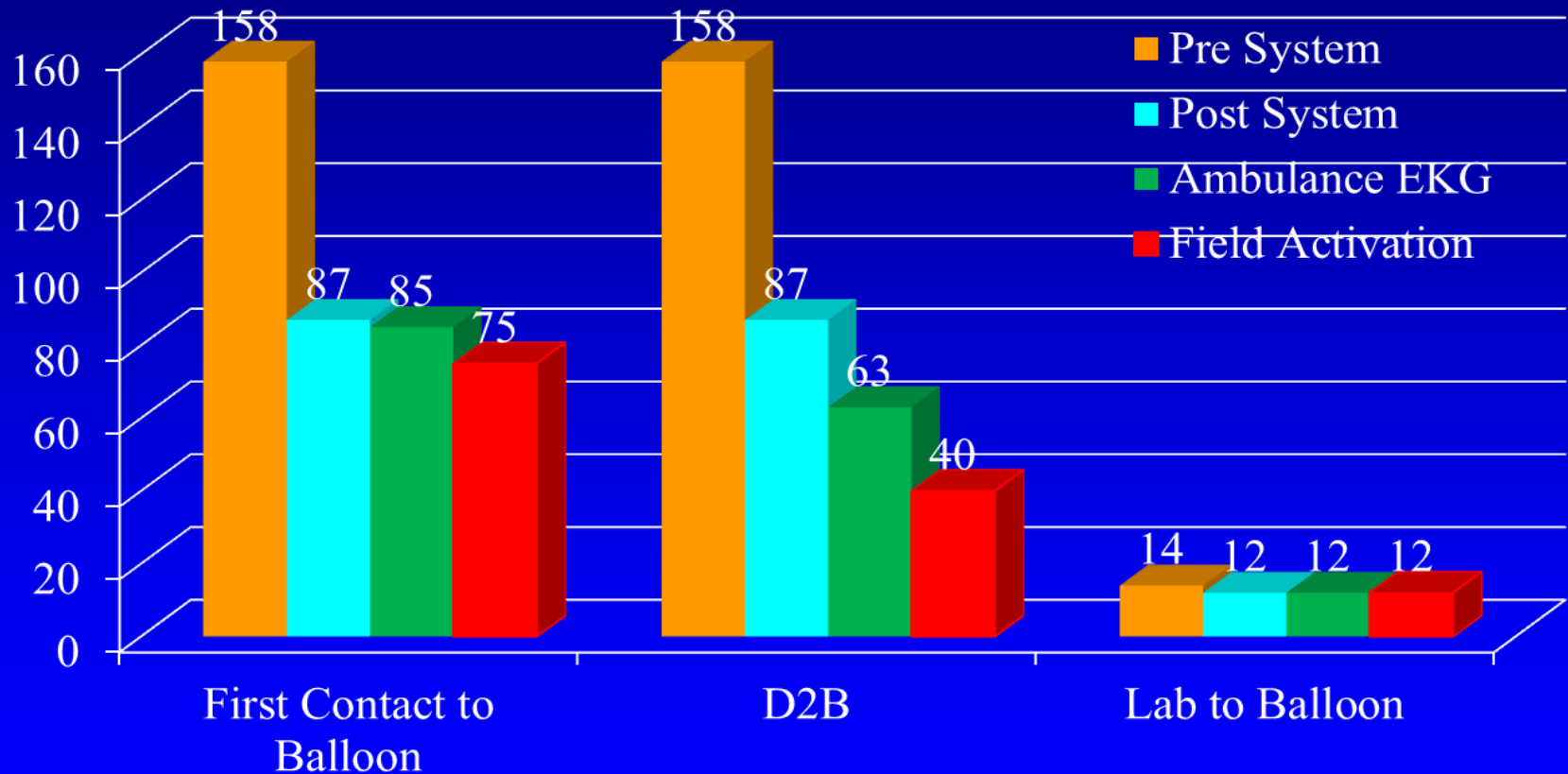
STEMI Protocol at SHANDS/UF Hospital
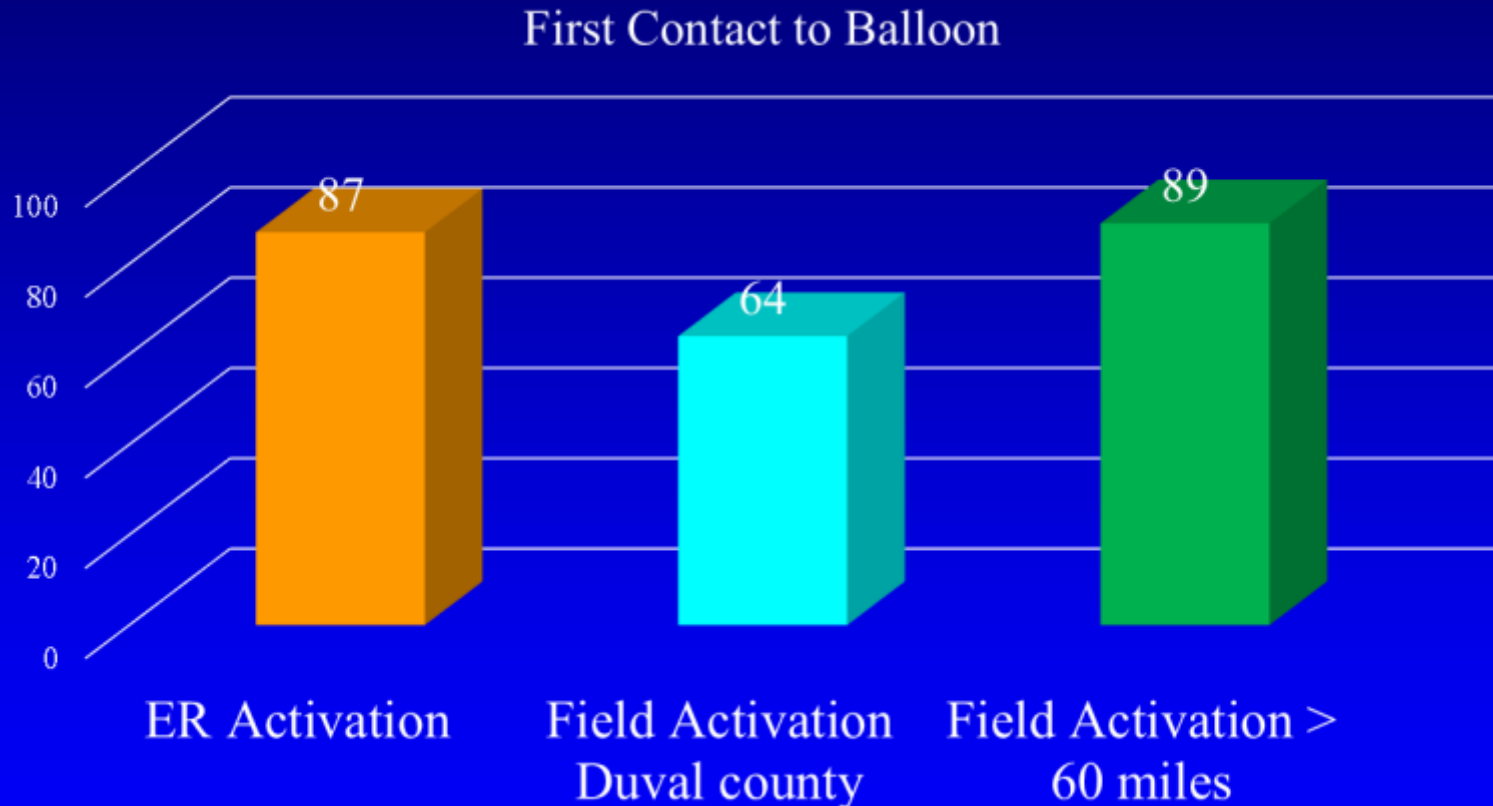## Field activation rural areas (> 60 miles)

First Contact to Balloon

Box L, Guzman L, et al. SCAI 2011

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EMS Activations: Appropriate vs Inappropriate North Caroline Cath Lab Registry
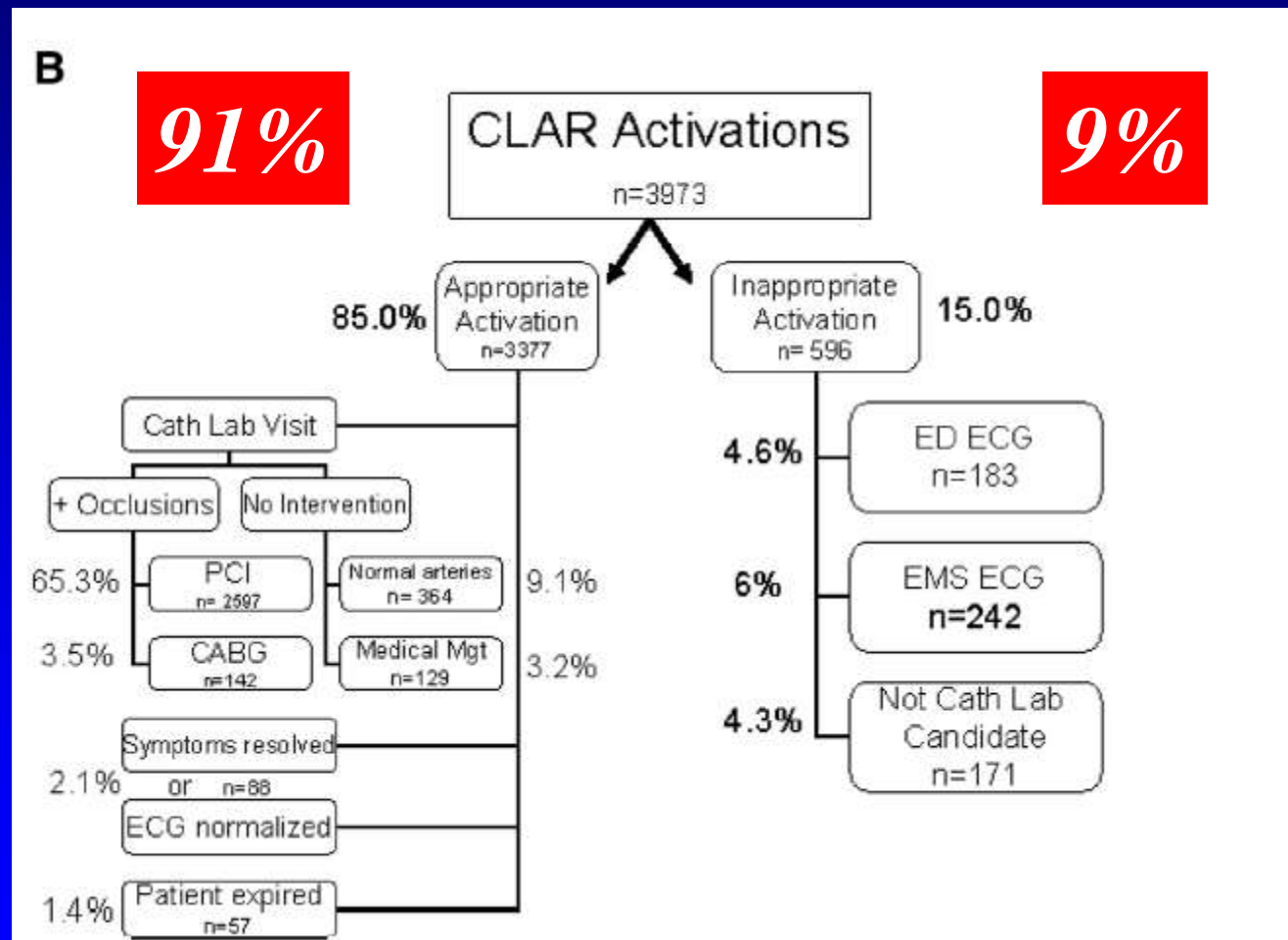
EMS Activations: Appropriate vs Inappropriate
Shands/UF Hospital

JFRD Ambulance Appropriate

ER Activations Appropriate

89%

69%

System Based Approach to STEMI and Outcomes

Paramedics trained to interpret EKG
(if STEMI criteria (+) patient transfered to a PCI facility)
VS
Paramedic not trained to interpret EKG
Patient transfered to the nearest ED

Le May M, et al. JACC 2012.60; 1223

System Based Approach to STEMI and Outcomes

6 months Mortality

16

■ PCI Hospital (n:822)

- 99% of patient had cardiac cath performed in both groups
- > 90% of patients had PCI in both groups
- TIMI 3 post PCI: 90% in both groups
- Symptom onset to balloon: 159 min vs 231 min, p<0.0001
- Door to balloon time: 66 min vs 117 min, p<0.0001

Mortality

System Based Approach to STEMI and Outcomes
6 months Mortality

By multivariate analysis, main predictor of reduction in mortality was field to PCI Hospital
OR:0.52 CI:0.31-0.88,p:0.01
*Using propensity score comparison*
OR:0.37 CI:0.21-0.65,p:0.0005

Le May M, et al. JACC 2012.60; 1223

2012 European Guidelines
## *Pre-Hospital care in STEMI*

Recommendations	Class[a]
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
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
Primary PCI-capable centres must deliver a 24/7 service and be able to start primary PCI as soon as possible but always within 60 min from the initial call.	I
All hospitals and EMSs participating in the care of patients with STEMI must record and monitor delay times and work to achieve and maintain the following quality targets: • first medical contact to first ECG ≤10 min; • first medical contact to reperfusion therapy; • for fibrinolysis ≤30 min; • for primary PCI ≤90 min (≤60 min if the patient presents within 120 min of symptom onset or directly to a PCI-capable hospital).	I
All EMSs, emergency departments, and coronary care units must have a written updated STEMI management protocol, preferably shared within geographic networks.	I
Patients presenting to a non-PCI-capable hospital and awaiting transportation for primary or rescue PCI must be attended in an appropriately monitored area.	I
Patients transferred to a PCI-capable centre for primary PCI should bypass the emergency department and be transferred directly to the catheterization laboratory.	IIa
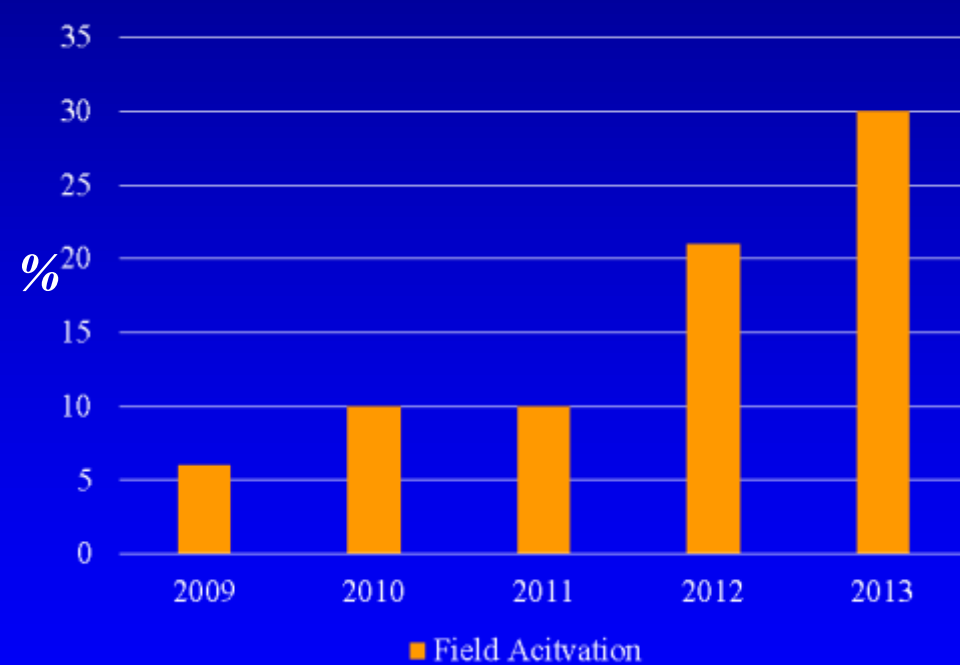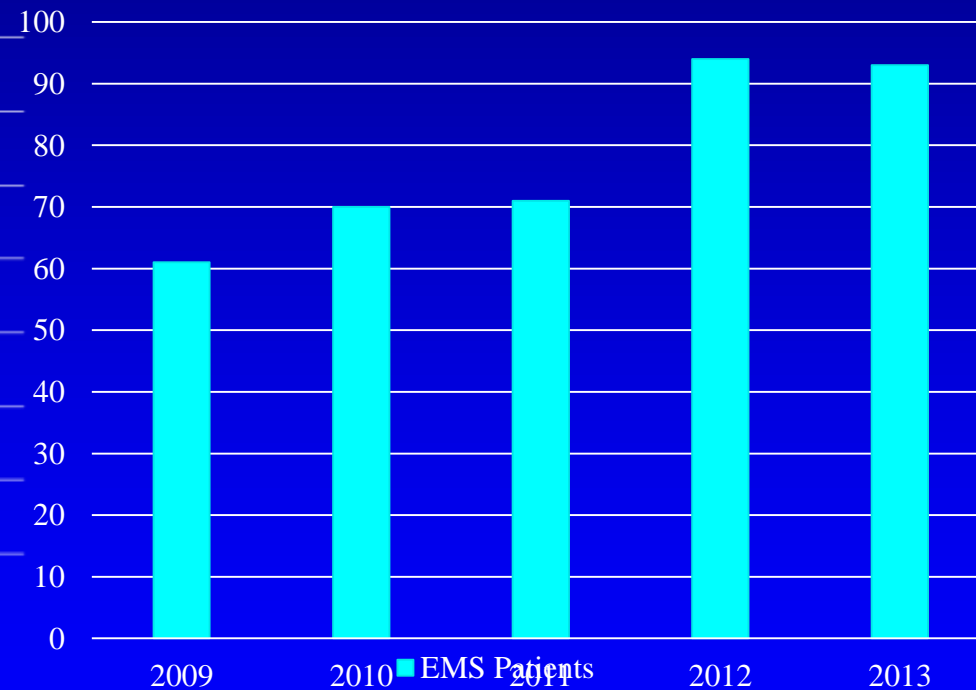
Modern Approach to STEMI
The New Paradigm

Door to Balloon

System Based Care

System based care

Hospital Transfers

STEMI: The New Paradigm

- **Individual hospital protocols should be developed with continuing reviewing of process**

- **Community based systems should be developed in order to perform timely reperfusion**

- **Goals should be D2B > 60 min and 1st contact to balloon < 90 min.**

- **Patients with early presentation (<2-3 hs from symptoms onset) should be treated with the fastest available therapy**

- **Patients presenting after 3 hs, should be primarily treated with PCI**

STEMI: The New Paradigm

- **If Lytics was the initial treatment**

- **A policy that "every patient" after lytics should be consider for transfer to a PCI center appears appropriate and probably beneficial.**

- **The timing for PCI after lytics appears to be between 3-18 hrs (*not clear*) .**

- **All patients with EKG/clinical signs of luck of reperfusion and/or clinical signs of hemodynamic decompensation should be transfer immediately for PCI.**

Thank you