



# **STEMI Accelerator**

Regional Systems of Care Demonstration Project



## **Final Results of the Regional Systems of Care Demonstration Project: Mission: Lifeline™ STEMI Accelerator Study**

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Christopher B. Granger for the Accelerator Project**

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- *The Medicines Company*
- *AstraZeneca*
- *Philips Healthcare*
- *Abiomed, Inc.*

**I have no relationships with industry related to this study**

# Organization

Duke Clinical Research Institute in Collaboration with The American Heart Association

## Regional Leadership

### AHA National and Affiliate\* Leadership

Lori Hollowell  
Chris Bjerke

**169 Primary PCI Hospitals\*\***

**214 Non PCI Hospitals**

**1253 EMS Agencies**

\*Listed slide 4

\*\*Listed at end of presentation

## Study Coordinating Center

DCRI

### Central Organizing Committee

Dr. Chris Granger, MD

Dr. James Jollis, MD

Mayme Lou Roettig, RN, MSN

Tammy L. Gregory, American Heart  
Association- National Center

### DCRI Project Team & Statistics

Kathleen Fox, BA, RN

Hussein Al-Khalidi, PhD

Joan Gu, M.S

Ashley Mitchell

Michael Redden

# Organization

# Regional Leadership

Region	Regional Leader	Affiliation	AHA Personnel
Atlanta, GA	Michael A. Ross, MD Mike Jernigan, EMT-P	Emory University Metro Atlanta Ambulance Service	Jeffrey Walker Mary Robichaux
Columbus, OH	Ernest Mazzaferri, Jr., MD	The Ohio State University Medical Center	Lory Sheeran Winland
Denver, CO	Jeb Burchenal, MD Fred Severyn, MD	University of Colorado Denver	Loni Denne
Hartford, CT	Richard Kamin, MD C. Steven Wolf, MD	Univ. of Conn. Health Science Center John Dempsey /St Francis Care	Lisa Bemben
Houston, TX	James McCarthy, MD Todd Caliva, MD Catherine Bissell	Memorial Hermann Hospital HCA Healthcare SETRAC	Loni Denne
Kern County, CA	Lynn Ashbeck, MS, RD, Jeff Fariss, Ross Elliott	Hospital Council Bakersfield, Public Health Dept	Rea Anne Arcangel Ron Loomis
Louisville	Jesse Adams, MD	Baptist Health Louisville	Alex Kuhn
New York City, NY	Norma Keller, MD; Jacqueline Tamis-Holland, MD; Glenn Asaeda, MD; John Freese, MD	New York University Medical Center, Mount Sinai St Lukes Hospital, Fire Department New York City	Zainab Magdon-Ismail Molly Perini Pamela Borg-Jensen
Northern NJ	Mark Zucker, MD; Mark Merlin, DO; Steven Sheris, MD	Newark Beth Israel Medical Center, MONOC Control & Newark Beth Israel/Barnabas Health, Overlook Medical Center	Samantha Cole
Oklahoma City, OK	Charles Bethea, MD Tim Cathey, MD	Plaza Medical Center Oklahoma Department of Health	Loni Denne
Philadelphia, PA	Elliot Barnathan, MD	Johnson and Johnson	Laurie St. Claire
Pittsburgh, PA	Bruce MacLeod, MD	West Penn Hospital	Alex Kuhn
St. Louis, MO	Richard G. Bach, MD, Michael J. Lim, MD, George M. Kichura MD, Stuart T. Higano, MD	St. Louis should be Barnes-Jewish Hospital, St. Louis University Hospital, and Missouri Baptist Hospital	Robin Hamann
San Antonio, TX	Dudley Wait, BBA, EMT-P, Eric Epley, NREMT-P, Jorge Alvarez, MD	Schertz EMS, Southwest Texas Regional Advisory Council for Trauma	Diana Barrett
Tampa, FL	Robert Sanchez, MD Xavier Prida MD	HCA Healthcare Bay Heart Group	Kathy Fenelon
Wilkes-Barre / Scranton	Steven Voyce, MD John Ellis, MD	Geisinger Health System Commonwealth Health	Alex Kuhn

# Organization

## National Faculty

### Physician Faculty

**Peter Berger, MD** - Interventionalist; Geisinger Clinic, Danville, PA

**Harry Dauerman, MD-** Interventionalist; University of Vermont, Burlington, VT

**Lee Garvey, MD-** Emergency Medicine; CMC, Charlotte, NC

**Christopher B. Granger, MD-** Cardiologist; Duke University Medical Center, Durham

### **Timothy D. Henry, MD**

Cedar Sinai Heart Institute

**James G. Jollis, MD-** Cardiologist; Duke University Medical Center, Durham, NC

**William Koenig, MD-** Emergency Medicine

Los Angeles EMS Medical Director

**Craig Manifold, DO-** Emergency Medicine

University of Texas, HSC San Antonio

**Greg Mishkel, MD** - Interventionalist; Prairie Heart , Springfield, IL

### Physician Faculty (continued)

**Ivan Rokos, MD-** Emergency Medicine; Los Angeles, CA.

**B. Hadley Wilson, MD-** Interventionalist; CMC, Charlotte, NC

### Implementation Faculty

### **Claire Corbett, MS, EMT-P**

New Hanover Regional Medical Center, Wilmington, NC

### **Loni Denne, RN, BSN**

American Heart Association

### **Russell Griffin, EMT-P**

American Heart Association

### **Mayme Lou Roettig, RN, MSN**

DCRI, Durham, NC

### **Stephanie Starling, MHA, BSN**

Novant Health Winston-Salem, NC

# Background

- Timely reperfusion improves survival in patients with ST segment elevation myocardial infarction (STEMI) yet only half of patients are treated within guideline goals.
- These delays in treatment are primarily related to fragmentation of the health system and lack of coordination among 15,000 EMS agencies and 5,200 acute care hospitals.
- For example only 17% of EMS agencies can pre-activate cardiac cath. labs in all receiving hospitals.

Am J Emerg Med. 2014 ;32:856-63.

# 2013 ACCF/AHA Guideline for the Management of ST-Elevation Myocardial Infarction



**All communities should create and maintain a regional system of STEMI care** that includes assessment and continuous quality improvement of EMS and hospital-based activities.



EMS transport directly to a PCI-capable hospital for primary PCI with an ideal **FMC-to-device time system goal of 90 minutes** or less.



Immediate transfer to a PCI-capable hospital for primary PCI with an **FMC-to-device time system goal of 120 minutes** or less.

# Objective

To increase the rate of timely coronary reperfusion by organizing coordinated STEMI care on a regional basis.



# Study Design

Recruitment of 21 Metropolitan Statistical Regions  
2012 Q2 – 2013 Q1

Gap Analyses - Strategic Planning - Regional Leadership Meetings  
2012 Q3- 2013 Q1

Regional Education Intervention  
2012 Q3- 2013 Q1  
Focus on pre-hospital activation and common regional plans  
for reperfusion

16 Regions Met Study Requirements  
Quarterly data review, ongoing mentorship,  
establish and execute protocols

5 Regions Continued to Recruit  
Beyond Entry Deadline

23,809 STEMI Patients with Symptoms <12 Hours  
Oct. 2012 – March 2014

**Goal:** Improve the % patients  
reaching guideline goals

**STUDY REQUIREMENTS**  
70% of PCI Hospitals in ARG  
Regional Leadership  
Common Protocols  
Enter all STEMI patients for  
6 consecutive quarters

# Intervention



## OPERATIONS MANUAL

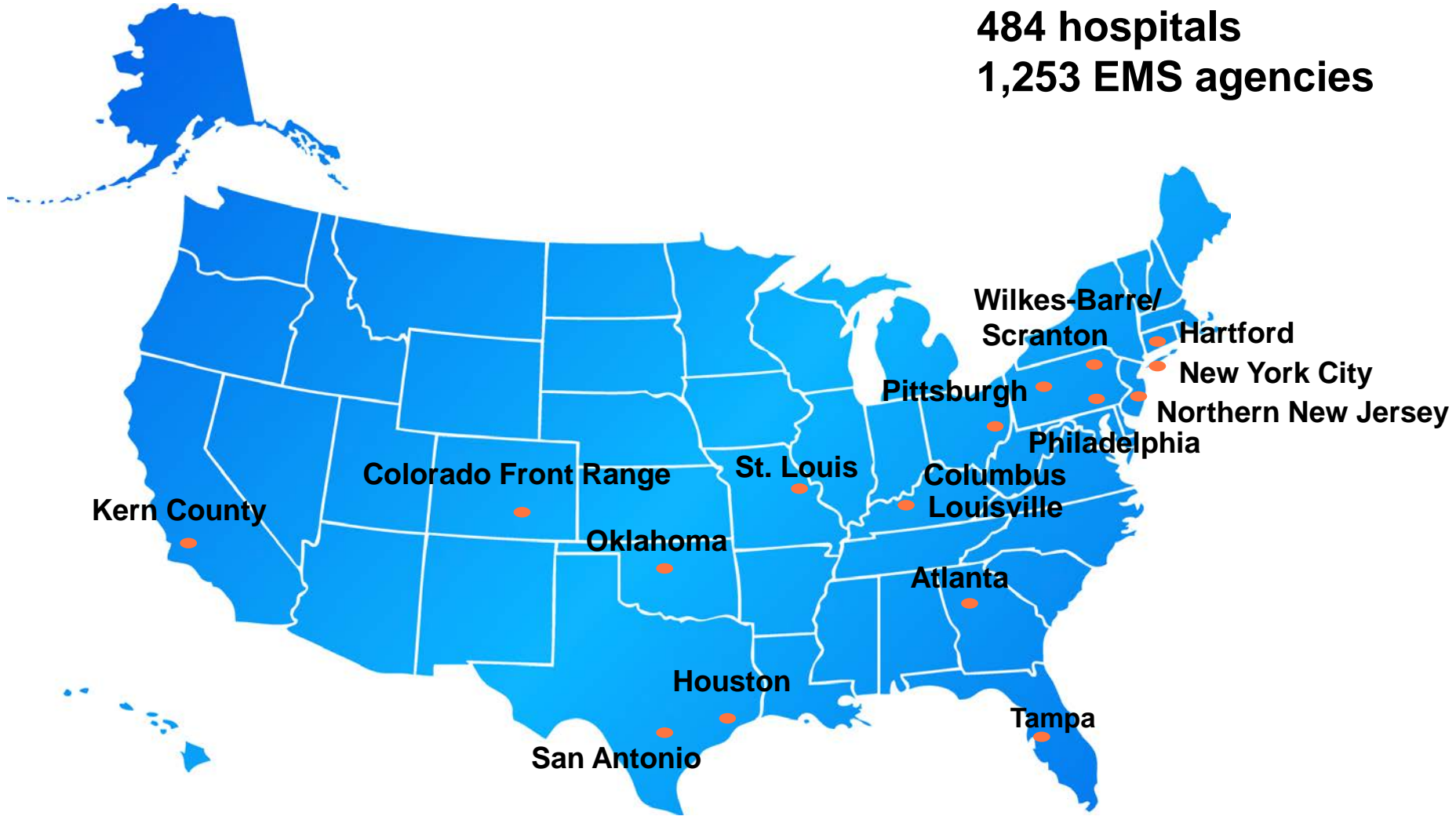
Optimal system specifications by point of care

- **EMS**
- **Non-PCI and PCI ED**
- **Transfer**
- **Catheterization lab**
- **Other system issues – payers, regulations**
- **Choice of PCI or lytic reperfusion regimens**

available at [www.dcri.org/cee/stemi/additional-resources-links/OPs%20Manual%202-12.pdf/view](http://www.dcri.org/cee/stemi/additional-resources-links/OPs%20Manual%202-12.pdf/view)

# Intervention Sites

16 regions  
484 hospitals  
1,253 EMS agencies



# Patient characteristics

	Direct		Transfer	Overall
	<i>EMS</i>	<i>Self</i>		
Number	11,765	6,502	5,542	23,809
Age (median)	62	59	60	60
Female	32%	26%	27%	29%
No insurance	16%	17%	16%	16%

# Patient characteristics

	Direct		Transfer	Overall
	<i>EMS</i>	<i>Self</i>		
Diabetes	27%	27%	26%	27%
Prior MI	13%	11%	11%	12%
Cardiac arrest	10%	3%	10%	8%
Shock	11%	3%	8%	8%

# Patient characteristics

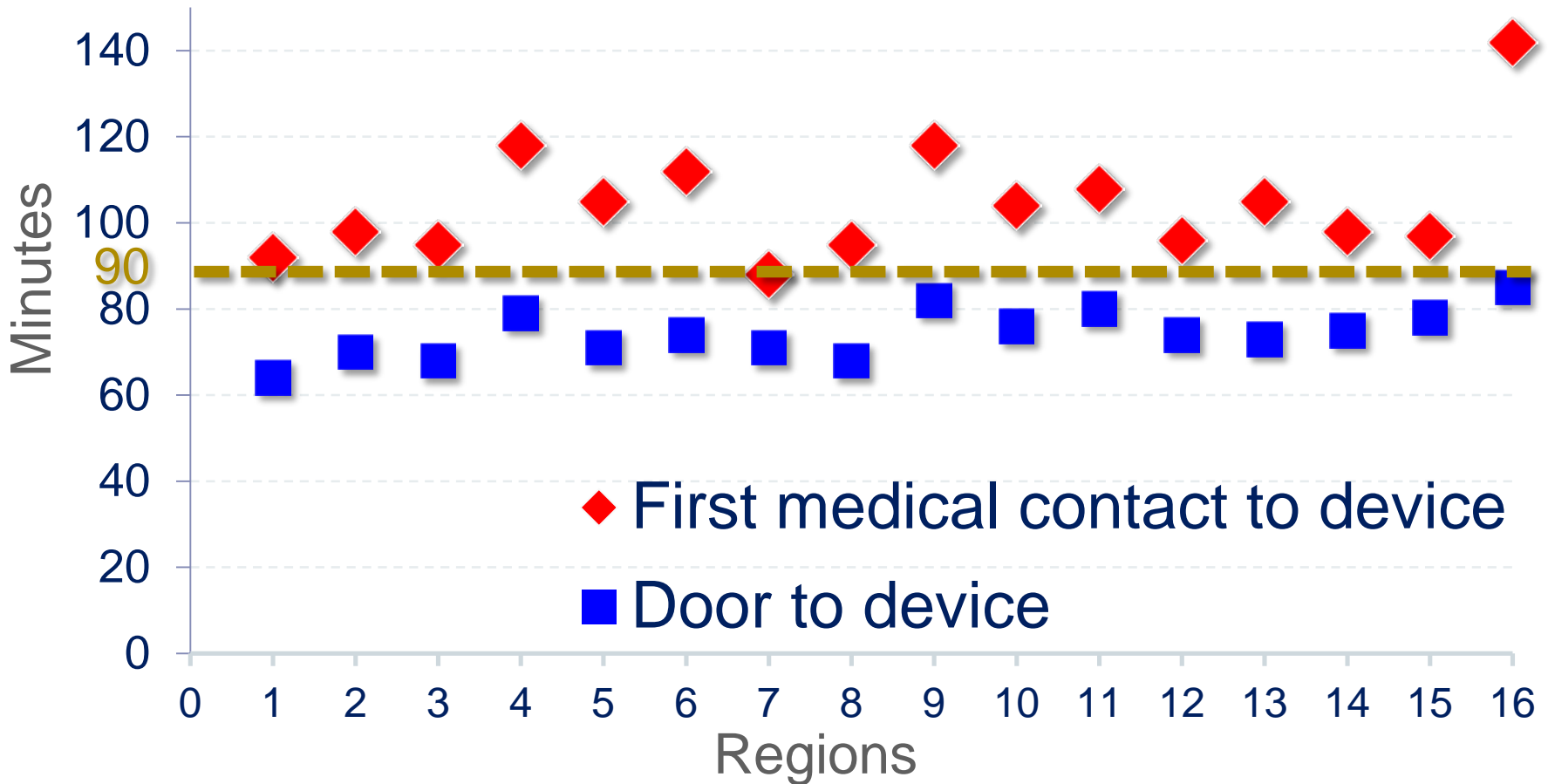
	Direct		Transfer	Overall
	<i>EMS</i>	<i>Self</i>		
Symptom onset to first medical contact (median)	47	114	89	69
PCI	90%	90%	89%	90%
Eligible untreated	6%	6%	6%	6%

# Patient characteristics

	Direct		Transfer	Overall
	<i>EMS</i>	<i>Self</i>		
<b>In hospital outcomes</b>				
<b>Stroke</b>	0.8%	0.7%	0.9%	0.8%
<b>Shock</b>	9%	6%	8%	8%
<b>Death</b>	8%	3%	6%	6%

# First medical contact and door to device

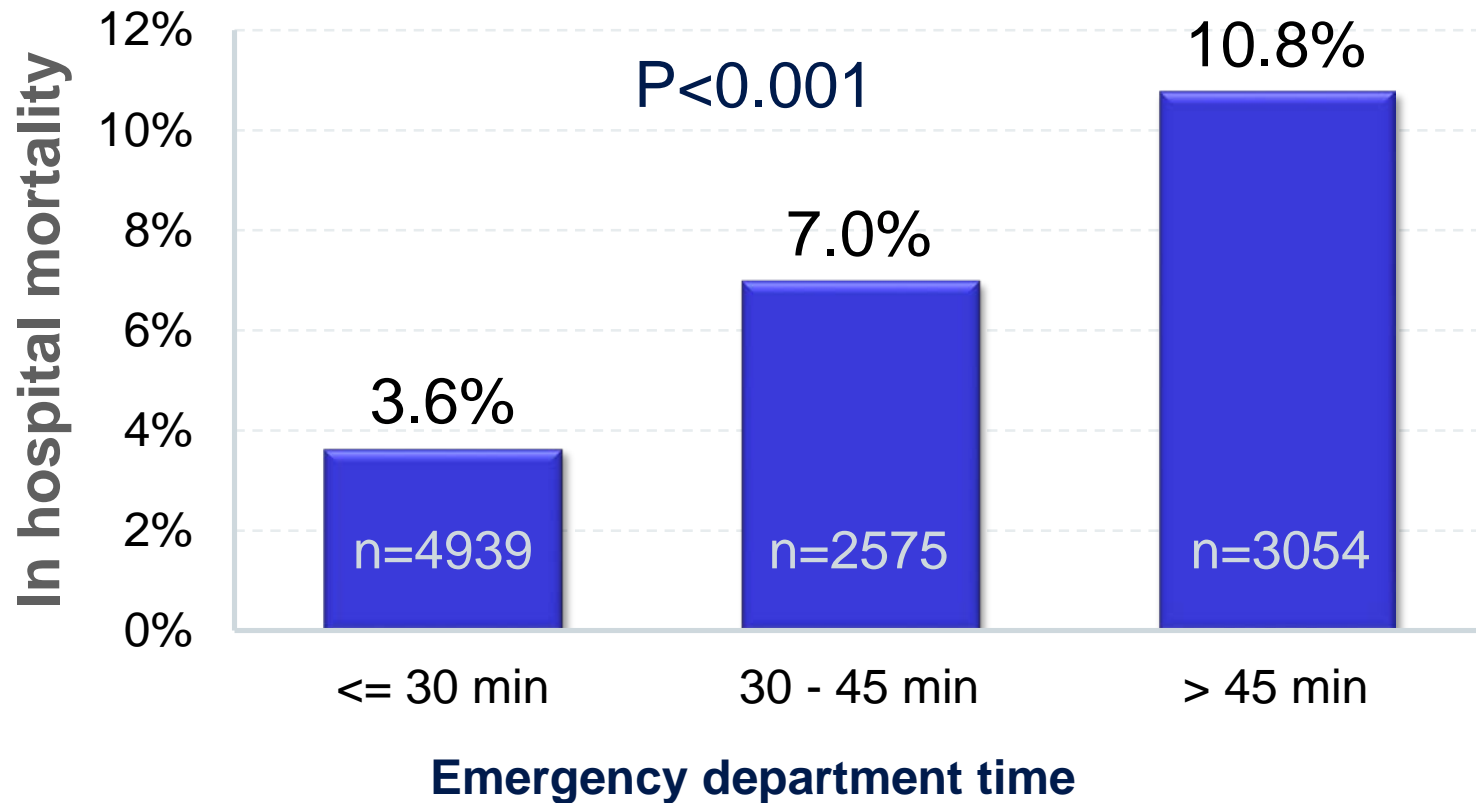
75<sup>th</sup> Percentile for Baseline Quarter (*Mission:Lifeline goal*)





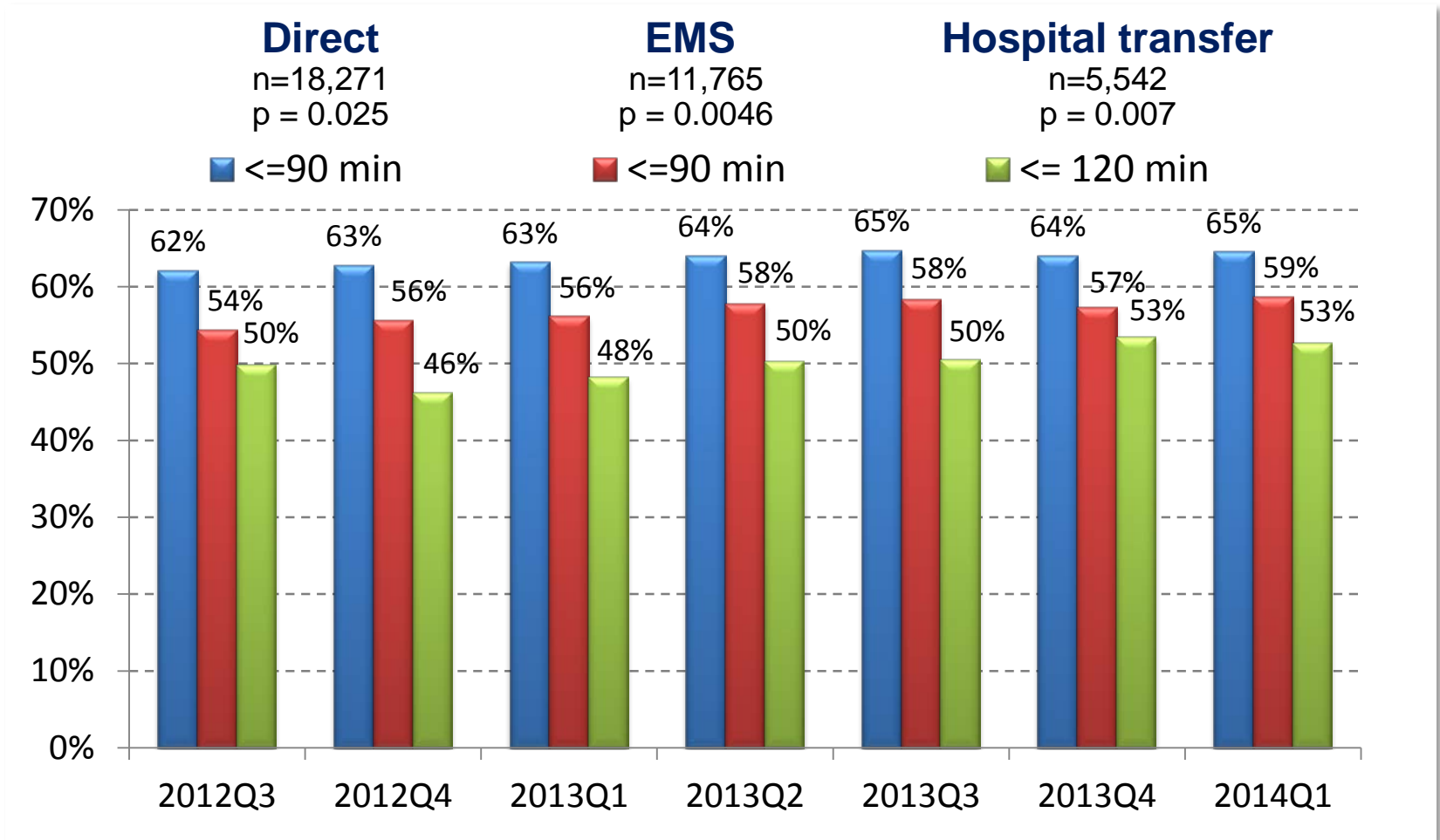
# ED time and Risk-adjusted in-hospital mortality

Direct EMS patients



# Primary Outcome FMC to Device Time

## % Meeting Guideline Goal

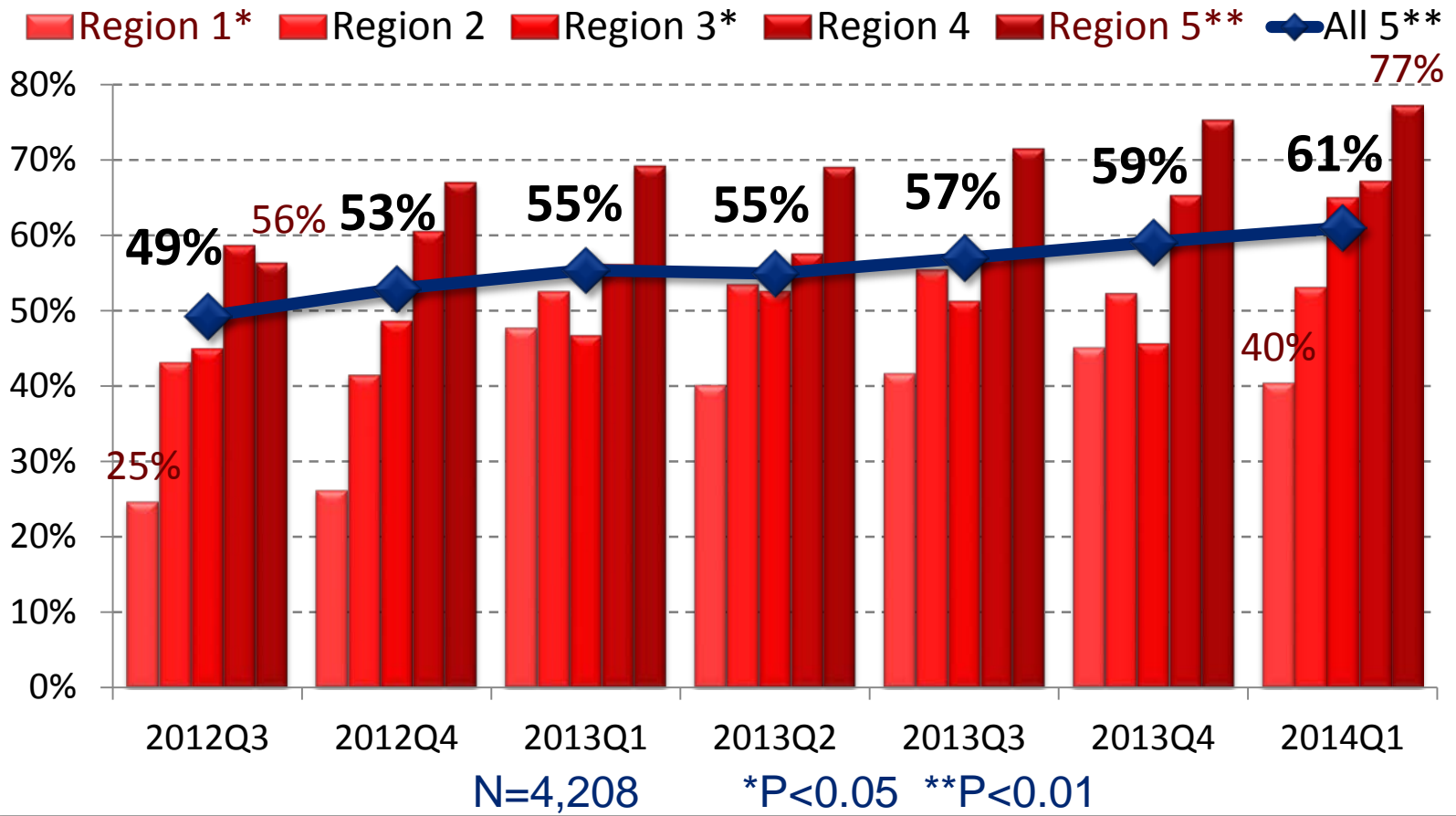


# Primary Outcome FMC to Device Time

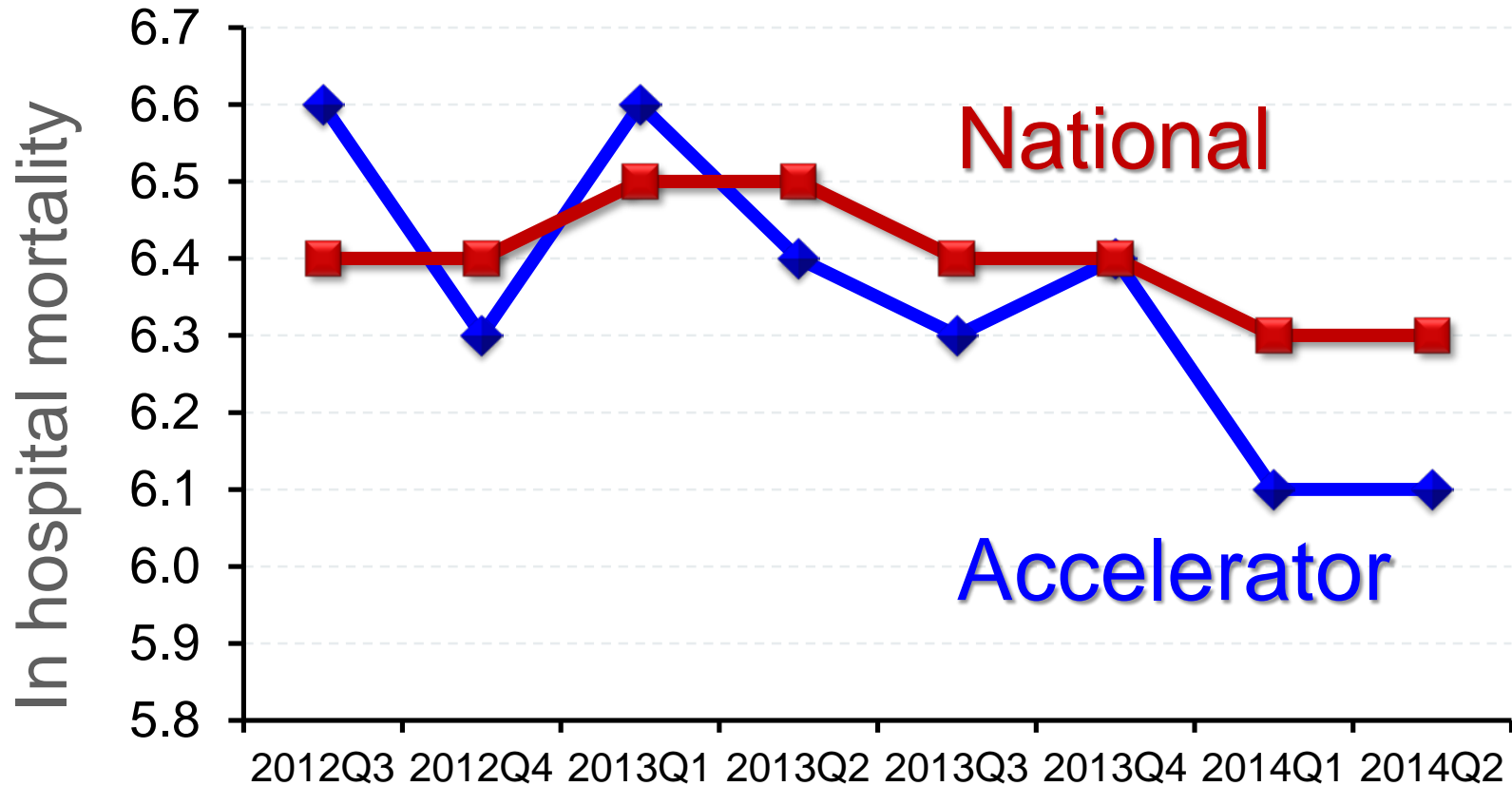
% Meeting Guideline Goal

5 Most improved regions

Direct EMS patients



# In hospital mortality (rolling 12 months)



# Limitations

- Majority of the intervention time dedicated to establishing leadership, recruiting hospitals to participate in a national database, establishing and training regional protocols.
- Thus, greatest impact toward end of study period and continuing after measurement period.
- This is an observational study and included the possibilities of confounded patient selection and improvement not related to the intervention.

# Conclusions

- Our results highlight the opportunity to shift the focus from hospital door to first medical contact to improve regional STEMI care.
- Emergency department time is an important indicator of coordination of care between paramedics and hospitals and is associated with improved survival.
- Organizing regional STEMI care results in significant improvements in the percent of patients achieving national reperfusion goals.
- We identified numerically lower mortality among participating regions compared with national rates, suggesting that regional STEMI programs can provide important improvements to public health.

# Region PCI Centers (Acknowledgement)

## New York City

Bellevue Hospital Center  
Bronx Lebanon Hospital Center  
Brookdale Hospital & Medical Center  
Jamaica Hospital Medical Center  
Lenox Hill Heart and Vascular Institute of New York  
Lutheran Medical Center  
Montefiore Medical Center  
Mount Sinai Beth Israel  
Mount Sinai St. Luke's  
New York Hospital Medical Center of Queens  
New York Methodist Hospital  
New York Presbyterian/Weill Cornell Medical Center  
New York Presbyterian/Columbia University Medical Center  
NYU Langone Medical Center  
St. Barnabas Hospital  
St. Luke's Roosevelt Hospital Center - St. Luke's

## Northern New Jersey

Bayonne Medical Center  
Chilton Hospital  
Christ Hospital  
Clara Maass Medical Center  
Englewood Hospital and Medical Center  
Hackensack University Medical Center  
Hackensack UMC - Mountainside  
Holy Name Medical Center  
Jersey City Medical Center  
JFK Medical Center  
Morristown Medical Center  
Newark Beth Israel Medical Center  
Overlook Medical Center  
Raritan Bay Medical Center  
Robert Wood Johnson University Hospital Rahway  
Saint Barnabas Medical Center  
Saint Clare's Hospital/Denville  
St. Joseph Regional Medical Center  
St. Mary's Hospital  
Saint Michaels Medical Center  
The Valley Hospital  
Trinitas Regional Medical Center  
The University Hospital

## Hartford

Hartford Hospital  
Saint Francis Hospital & Medical Center  
The Hospital of Central Connecticut  
University of Connecticut Health Center/  
John Dempsey Hospital

# Region PCI Centers (Acknowledgement)

## Pittsburgh

Butler Memorial Hospital  
Excelsa Health Westmoreland Hospital  
Forbes Regional Hospital  
Jefferson Regional Medical Center  
Monongahela Valley Hospital  
Sharon Regional Health System  
The Uniontown Hospital  
UPMC Passavant Hospital  
UPMC Presbyterian Hospital  
Washington Health System  
West Penn Allegheny Health System

## Philadelphia

Albert Einstein Medical Center  
Aria Health  
Hahnemann University Hospital  
Holy Redeemer Hospital and Medical Center  
Hospital of the University of Pennsylvania  
Jeanes Hospital  
Lankenau Hospital  
Mercy Fitzgerald Hospital  
Nazareth Hospital  
Penn Presbyterian Medical Center  
Pennsylvania Hospital  
Temple University Hospital  
Thomas Jefferson University Hospital

## Wilkes- Barre/Scranton

Geisinger Community Medical Center  
Geisinger Wyoming Valley Medical Center  
Lehigh Valley Hospital - Hazleton  
Wyoming Valley Health Care System



# Region PCI Centers (Acknowledgement)

## Colorado Front Range

Avista Adventist Hospital  
Denver Health Medical Center  
Exempla Good Samaritan Medical Center  
Littleton Adventist Hospital  
McKee Medical Center  
Medical Center of Aurora  
Medical Center of the Rockies  
Memorial Health System  
North Colorado Medical Center  
Parker Adventist Hospital  
Parkview Medical Center  
Penrose Hospital  
Porter Adventist Hospital  
Presbyterian/St. Luke's Medical Center  
Saint Mary's Hospital and Regional  
Medical Center  
Sky Ridge Medical Center  
St Anthony North Hospital  
St. Anthony Hospital  
St. Francis Medical Center  
Swedish Medical Center  
University of Colorado Hospital Authority

## St. Louis

Barnes-Jewish Hospital  
Barnes-Jewish St. Peters Hospital  
Christian Hospital  
SSM DePaul Health Center  
Des Peres Hospital  
Mercy Hospital Jefferson  
Mercy Hospital St. Louis  
Missouri Baptist Medical Center  
Progress West Healthcare Center  
Saint Louis University Hospital  
SSM St. Clare Health Center  
SSM St. Joseph Health Center  
SSM St. Joseph Hospital West  
SSM St. Mary's Health Center  
St. Anthony's Medical Center

## Louisville

Baptist Health Louisville  
Clark Memorial Hospital  
Floyd Memorial Hospital and Health  
Services  
Hardin Memorial Hospital  
Jewish Hospital  
Norton Audubon  
Norton Hospital  
University of Louisville Hospital

# Region PCI Centers (Acknowledgement)

## San Antonio

Baptist Medical Center  
CHRISTUS Santa Rosa Hospital - New Braunfels  
CHRISTUS Santa Rosa Hospital – Westover Hills  
CHRISTUS Santa Rosa Medical Center  
Methodist Hospital  
Methodist Stone Oak Hospital  
Methodist Teksan Hospital  
Metropolitan Methodist Hospital  
Mission Trail Baptist Hospital  
North Central Baptist Hospital  
Northeast Baptist Hospital  
Northeast Methodist Hospital  
St. Luke's Baptist Hospital  
Southwest General Hospital  
University Hospital

## Houston

Bayshore Medical Center  
CHI/Baylor St. Luke's Medical Center  
Clear Lake Regional Medical Center  
Conroe Regional Medical Center  
Cypress Fairbanks Medical Center  
Houston Northwest Medical Center  
Kingwood Medical Center  
Mainland Medical Center  
Memorial Hermann SouthWest  
Memorial Hermann Hospital TMC  
Memorial Hermann Memorial City Hospital  
Memorial Hermann Northeast  
Memorial Hermann Northwest Hospital  
Memorial Hermann Southeast Hospital  
Memorial Hermann The Woodlands Hospital  
St. Lukes Patients Medical Center  
St. Luke's Sugar Land Hospital  
ST. Luke's The Woodlands Hospital  
St. Luke's Vintage  
West Houston Medical Center

## North Central Oklahoma

Deaconess Hospital  
Hillcrest Hospital South  
Hillcrest Medical Center  
INTEGRIS Baptist Medical Center  
Integris Bass Baptist Health Center  
Jane Phillips Memorial Medical Center  
Norman Regional Health System  
Oklahoma State University Medical Center  
OU Medical Center  
St. Anthony Hospital  
Stillwater Medical Center

## Kern County

Bakersfield Heart Hospital  
Bakersfield Memorial Hospital  
San Joaquin Community Hospital



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