

As Serious as a Heart Attack: Navigating the Hurdles in Creating STEMI System

Marc Eckstein, MD, MPH, FACEP

Medical Director

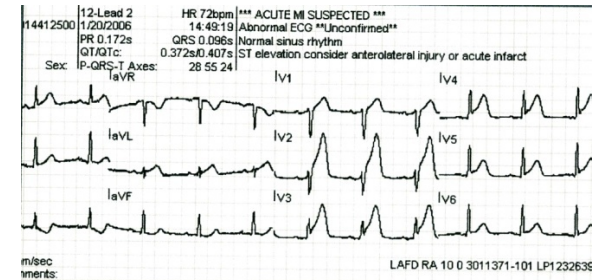
Los Angeles Fire Department

Professor of Emergency Medicine

University of Southern California School of Medicine



Background



- Early PCI has been shown to be superior to fibrinolytic therapy and is associated with ↓ morbidity and mortality for patients with STEMI
- Fewer than 1 out of every 4 pts with STEMI in the US undergo PCI within the established benchmark 90 minutes, as recommended by the American Heart Association

Los Angeles County



- One of the nation's largest counties with 4,084 square miles, an area some 800 square miles larger than the combined area of the states of Delaware and Rhode Island.
- Population = 10.3 million
- 75 paramedic receiving hospitals



Development of SRCs



- Paramedics were instructed to acquire a 12 lead ECG on all patients > age 35 c/o CP and also on all patients with any s/sx suggestive of an acute cardiac condition
- A prehospital 12 lead ECG interpreted by computer analysis as, “acute MI suspected” was considered a positive prehospital STEMI.

Initial Opposition

- Community hospitals without 24/7 PCI
- Concerns over loss of revenue
- All chest pain patients
- All cardiac chest pain patients
- All STEMIs

Gradual transition

- 12 lead ECGs introduced in the field (LAFD) in 2004
- Paramedics urged to transport/divert patients where 12 lead reads “Acute MI Suspected” to cath lab hospitals
- Early successes
- No formalized specialty center/diversion criteria

Creation of STEMI Receiving Centers

- 24/7 PCI
- Interventional cardiologist as medical director of the SRC program
- Data submission to LA County EMS Agency
- Approval and audits by LA Co EMSA
- Only a few to start, but many followed
- Peaked at 34, now at 32



LOS ANGELES COUNTY
EMERGENCY MEDICAL SERVICES



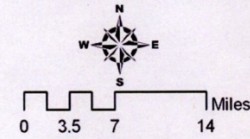
ST ELEVATION MYOCARDIAL INFARCTION APPROVED RECEIVING CENTERS

File: SRC_101409

Effective Date: 11/12/2009

Code	Hospital Name
AMH	Methodist Hospital of Southern California
AVH	Antelope Valley Hospital
BEV	Beverly Hospital
CSM	Cedars Sinai Medical Center
DHL	Lakewood Regional Medical Center
GAR	Garfield Medical Center
GMH	Glendale Memorial Hospital and Health Center
GSH	Good Samaritan Hospital
GWT	Glendale Adventist Medical Center
HCH	Providence Holy Cross Medical Center
HGH	LAC Harbor-UCLA Medical Center
HMH	Huntington Memorial Hospital
HWH	West Hills Hospital and Medical Center
ICH	Citrus Valley Medical Center-Intercommunity Campus
LBM	Long Beach Memorial Medical Center
LCH	Lancaster Community Hospital
LCM	Providence Little Company of Mary Medical Center Torrance
LRR	Los Robles Hospital & Medical Center
NRH	Northridge Hospital Medical Center
PIH	Presbyterian Intercommunity Hospital
PVC	Pomona Valley Hospital Medical Center
SAC	San Antonio Community Hospital
SJD	St. Jude Medical Center
SJH	St. John's Hospital & Health Center
SJS	Providence Saint Joseph Medical Center
SMH	Santa Monica-UCLA Medical Center
SMM	St. Mary Medical Center
TOR	Torrance Memorial Medical Center
TRM	Providence Tarzana Medical Center
UCL	Ronald Reagan UCLA Medical Center
USC	LAC+USC Medical Center
VPH	Valley Presbyterian Hospital
WMH	White Memorial Medical Center

Kern County



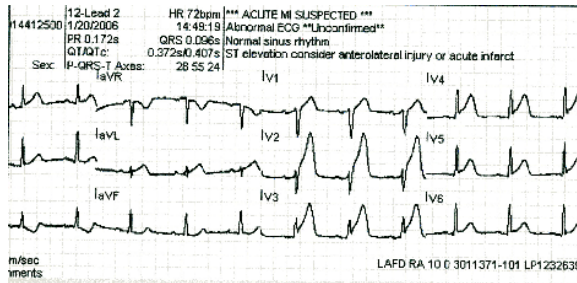
Ventura County

SRC

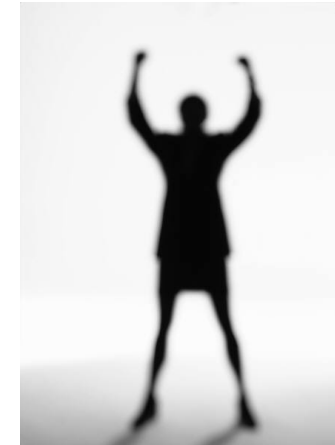
La Co. Approved SRCs

- Los Angeles
- Orange
- San Bernardino
- Ventura

Orange County



Results



- During year 1 (2008) there were 1220 patients with a STEMI identified on prehospital 12 lead ECG, of whom 734 (60%) underwent emergency PCI.

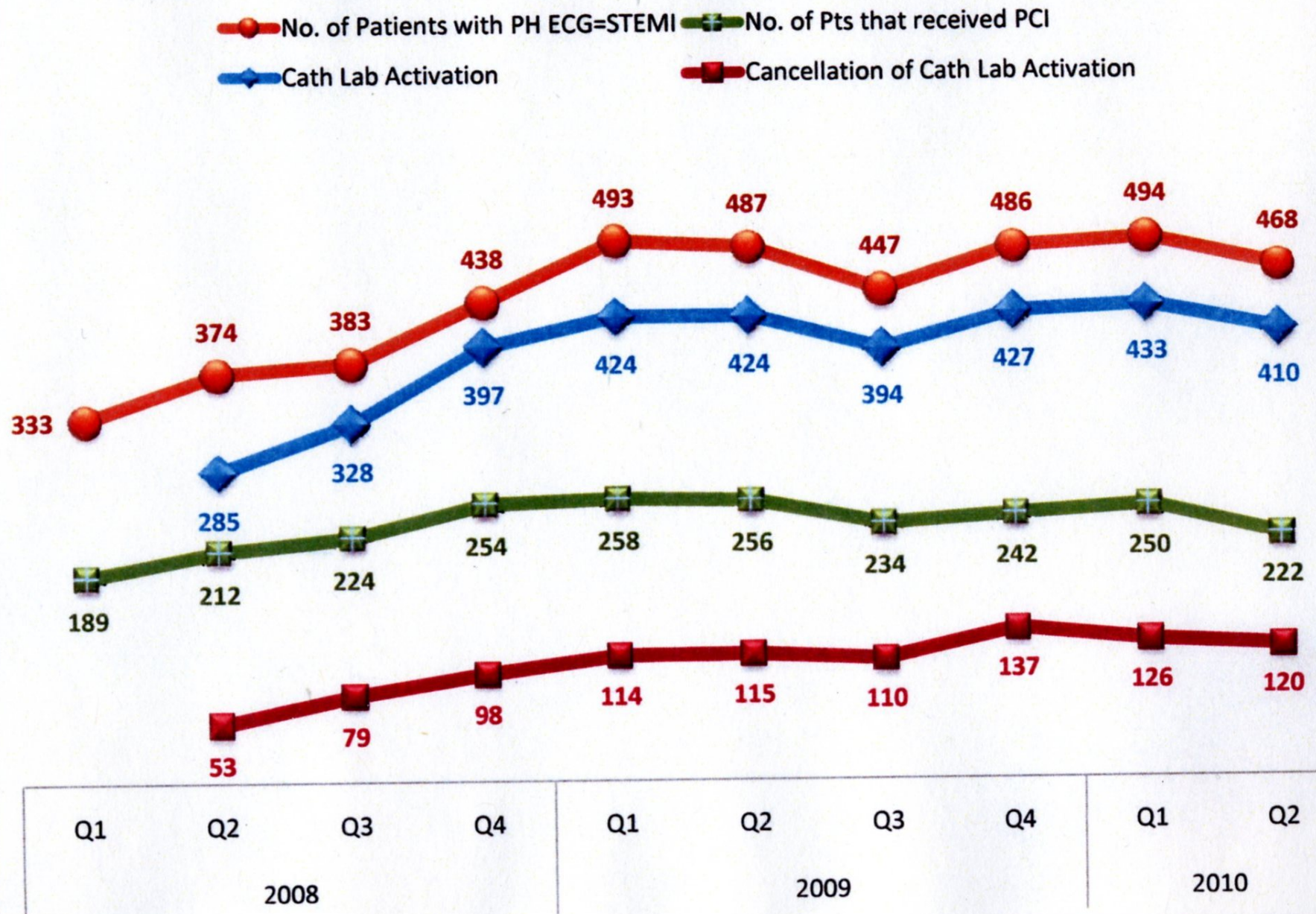
Los Angeles County SRC Data

		2008				2009				2010
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
# pts with PH ECG=STEMI	333	374	383	438	493	487	447	486	494	468
# SRC'S	29	32	32	32	34	31	32	33	32	32
MEAN AGE	64.8	66	65	66.1	65.7	64.7	64.8	65.7	66.4	65.1

Median Times

		2008				2009				2010
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
EMS TO BALLOON (E2B)	88	88	84	84	82	78	79	80	77	77
DOOR TO BALLOON (D2B)	63	65	64	62	58	57	60	62	58	57
EMS TO ER DOOR (E2D)	19	20	21	22	20	20	19	19	19	19

Los Angeles County EMS Agency **STEMI RECEIVING CENTER VOLUME REPORT**



Disposition of Prehospital “STEMIs”

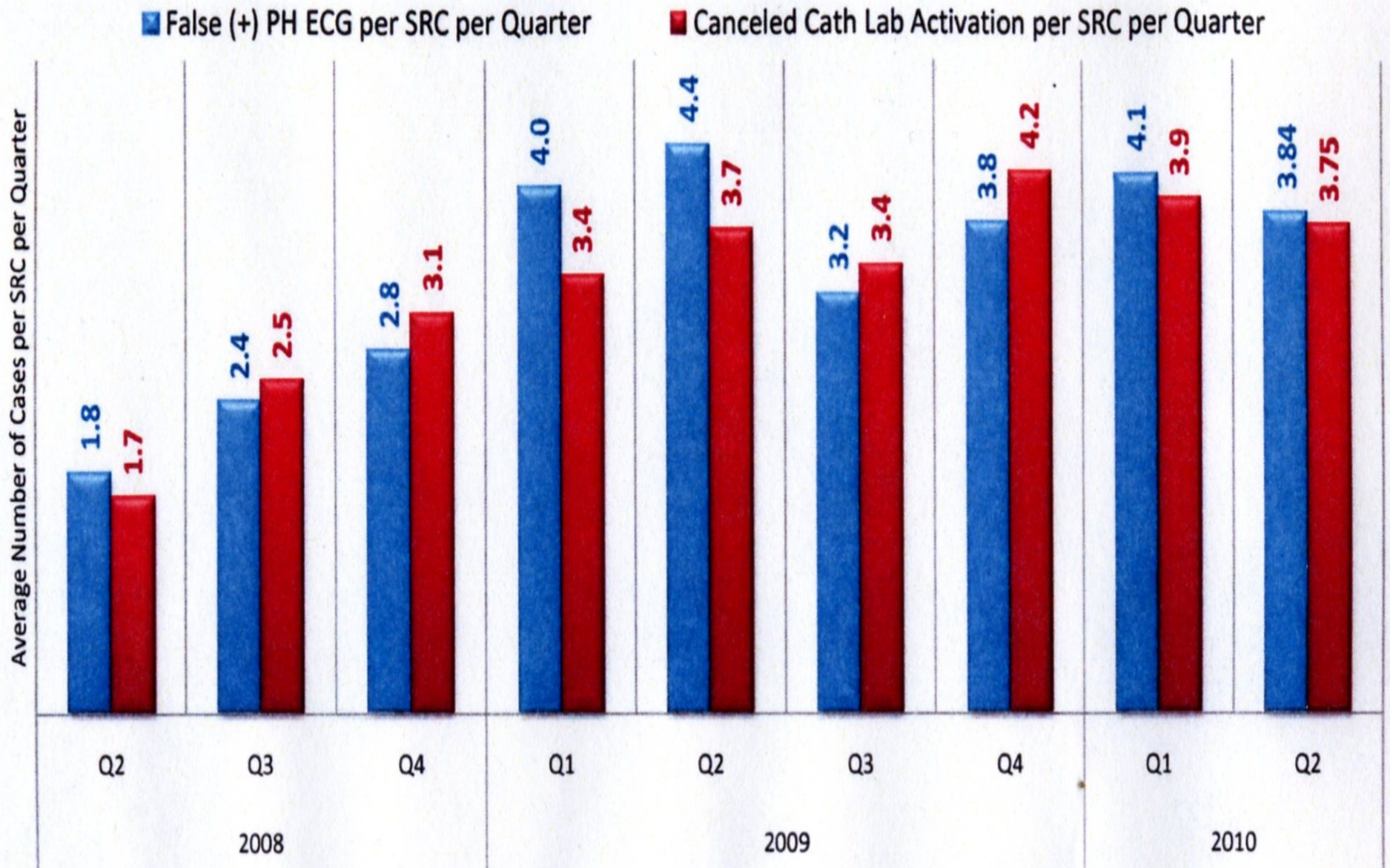
		2008				2009				2010
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
PH+/ER+ AND PCI	189 (57)	212 (57)	224 (59)	254 (59)	258 (52)	256 (53)	234 (52)	242 (50)	250 (51)	222 (47)
PH+/ER+ BUT NO PCI	46 (14)	90 (24)	70 (18)	59 (14)	78 (16)	66 (14)	92 (21)	96 (20)	81 (16)	86 (18)

False positive prehospital ECGs

- 19-34%
- Average # of false positive ECGs per SRC per quarter 1.8 - 4.4
- *Of those cases where cath team was canceled, 49% were attributed to false + prehospital ECG*



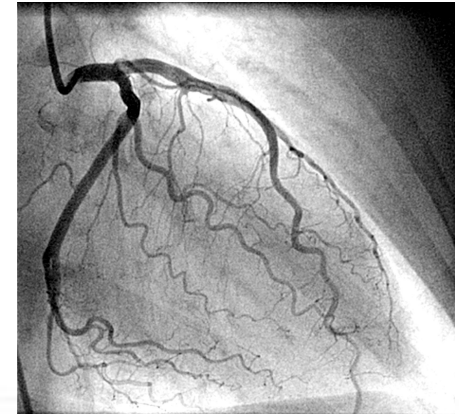
LOS ANGELES COUNTY EMS AGENCY STEMI RECEIVING CENTER REPORT



Prehospital ECG + and ER ECG -

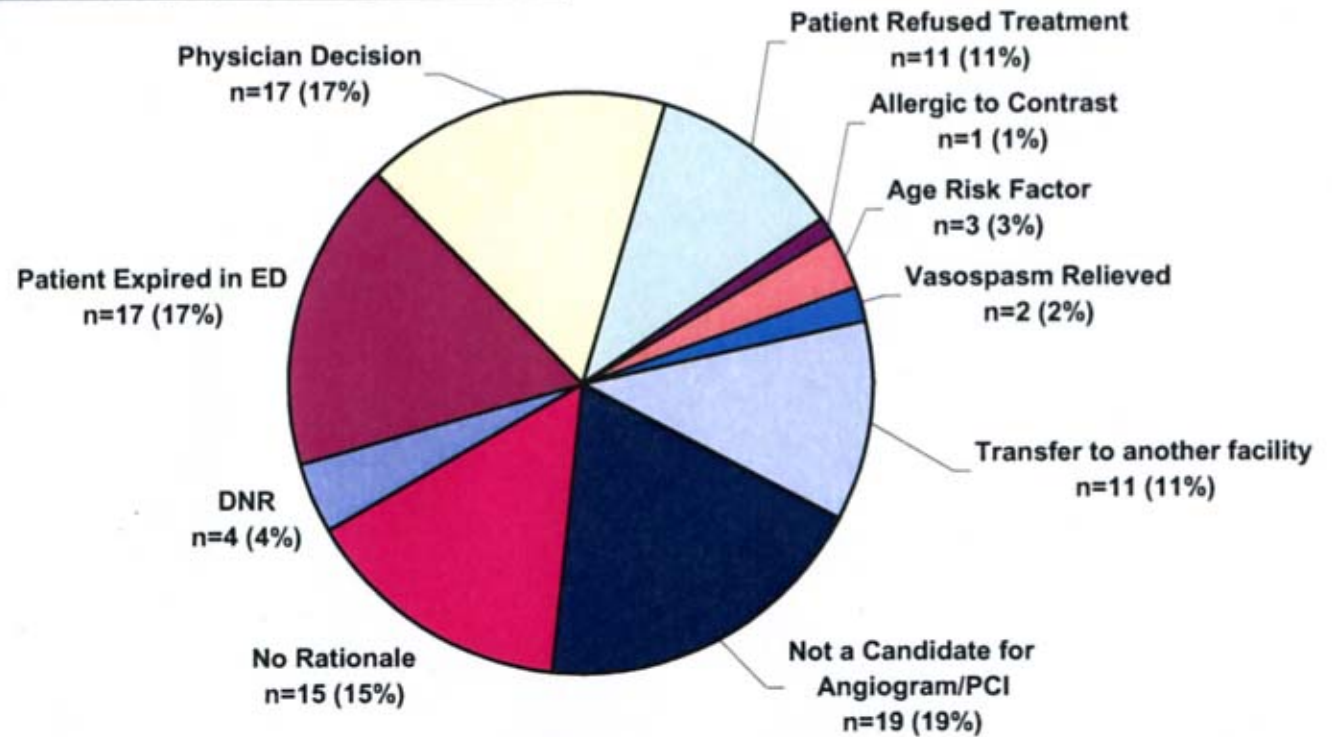
	2008				2009				2010
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
98 (29)	72 (19)	89 (23)	125 (29)	157 (32)	165 (34)	121 (27)	148 (31)	163 (33)	160 (34)

Rationale for no PCI

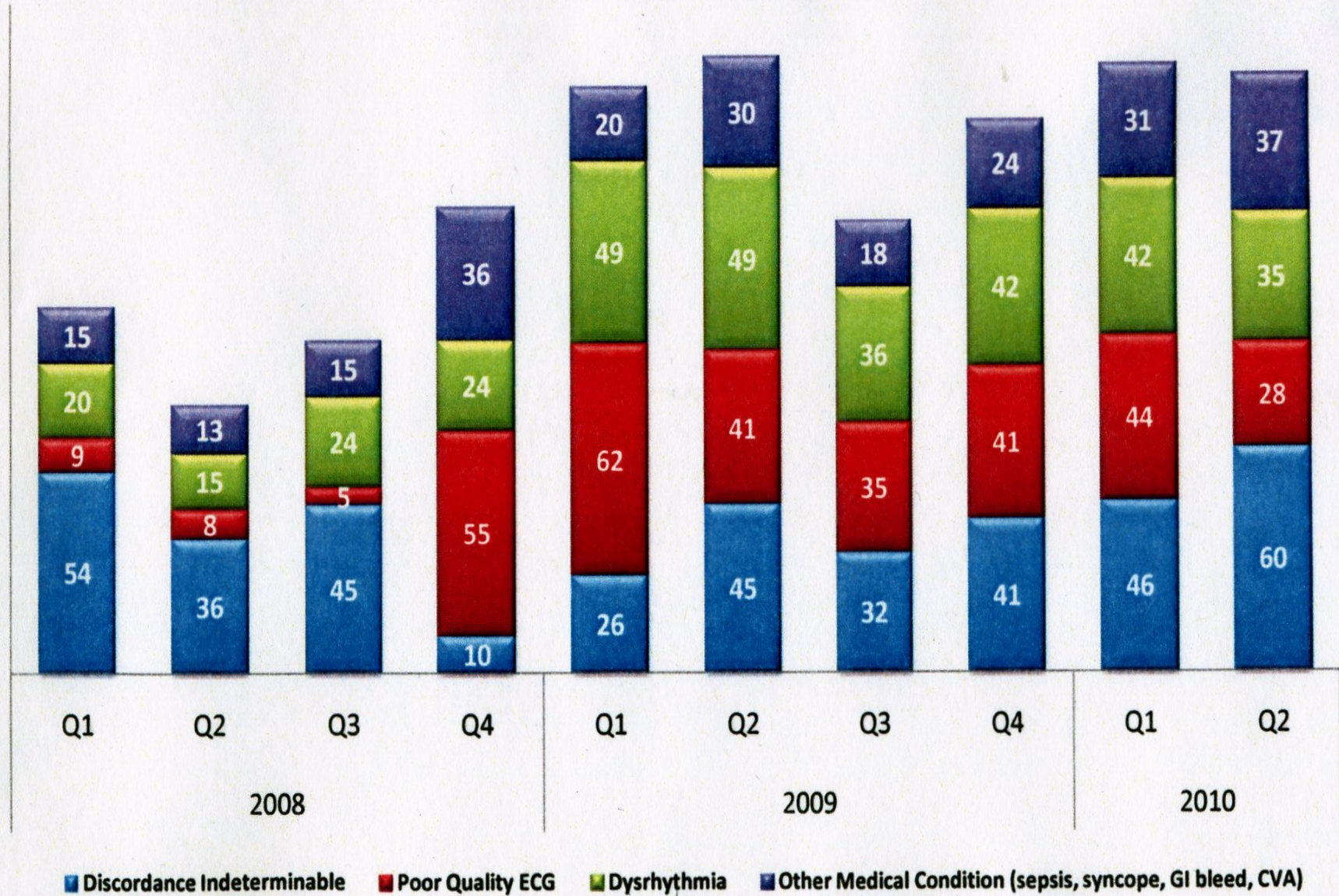


Rationale: PH ECG (+) and ED ECG (+) but NO Cath Lab

n = 100 (8.2%)
(Dec-06 - Dec-07)



Reasons for PH ECG and ED ECG Discordance



Explanations for false positives

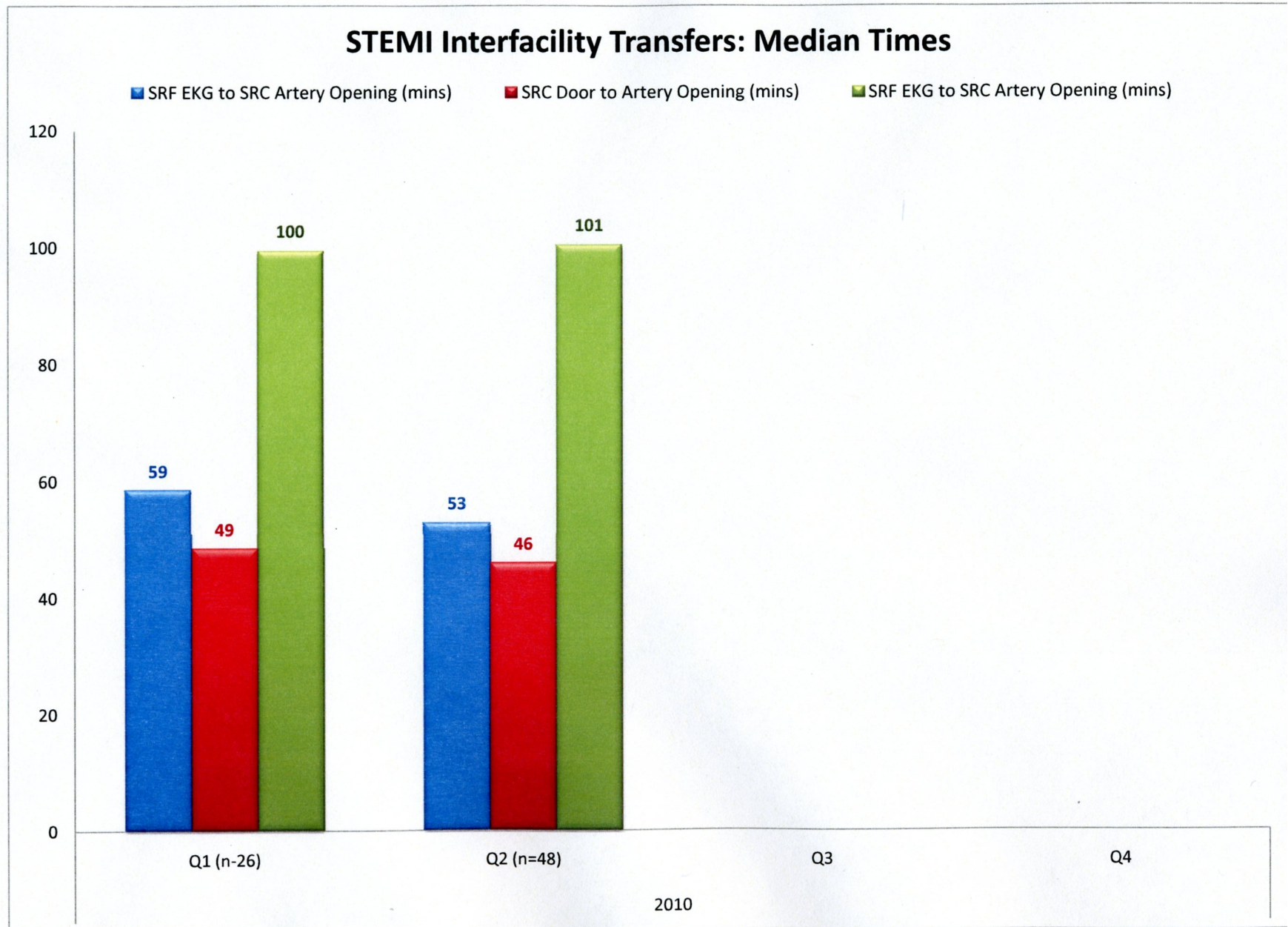
- 1st two quarters 2010: n=297
- # STEMIs = 962
- # false positives = 297 (31%)
 - Other medical conditions
 - (sepsis, GIB, CVA, etc) = 68 (23%)
 - Dysrhythmias = 77 (26%)
 - Poor quality ECG = 72 (24%)
 - Discordance indeterminate = 106 (36%)

Interfacility Transports



- IFT process approved in 2010
- Non-SRC hospitals (SRFs) may call 911 for an IFT for STEMI pts
- First two quarters: n=74 pts
- Mean SRF to SRC artery opening = 100 min
- Mean SRC door to artery opening = 47 min

Los Angeles County EMS Agency
STEMI RECEIVING CENTER REPORT



Note: All data are self-reported by hospitals.

Chart

Summary



- SRC is accessible within 20 minutes from anywhere in LA County
- D2B times within the 90 minute benchmark were achieved in almost 90% of STEMI patients after implementing our regionalized SRC system.
- *E2B is a more accurate reflection of time line*
- False positives remain a problem
- 12 lead ECG transmission is ready for prime time
- Even in a very large, complex system a regional SRC network can be established through partnership with EMS, emergency medicine, and cardiology
- Build upon your successes!



Glenn L. Allen
Los Angeles Fire Department
36 Year Veteran

Line of Duty Death Notice
February 18, 2011

Thank you!

