

Prehospital Quality Metrics for STEMI

Mark E. Pinchalk, MS, EMT-P

Division Chief

City of Pittsburgh EMS

Benefits of Collecting Data The QI process

Why?

- Comply with local/state protocols/system requirements



Pennsylvania Department of Health Cardiac 5001 - ALS - Adult
**SUSPECTED ACUTE CORONARY SYNDROME
STATEWIDE ALS PROTOCOL**

Criteria:

A. Adult patients with symptoms of possible cardiac ischemia. Diabetics, women, and elderly patients may have atypical symptoms without retrosternal chest pain. May include:

1. Retrosternal chest heaviness/pressure/pain
2. Radiation of pain to arm(s), neck, or jaw
3. Associated SOB, nausea/vomiting, or sweating
4. Possibly worsened by exertion
5. Patient with history of recent cocaine/amphetamine use

Performance Parameters:

- A. All patients should either receive aspirin or the PCR should include documentation of why aspirin was contraindicated.
- B. Review for appropriate transmission of 12-lead ECG when possible. Review for appropriate diversion to facility capable of PCI and/or for appropriate notification of receiving facility when STEMI is identified.

Effective 09/01/15

5001-2 of 3


Are we providing good care?

UPMC Presbyterian Hospital
ST-Elevation Myocardial Infarction (STEMI) Case Follow-Up

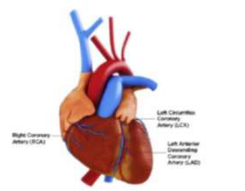
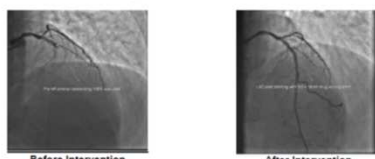
Date: 07/17/2016
EMS Agency: PGH Medic-9

	Time	Interval
First Medical Contact (EMS)	10:51	0 min
Prehospital EKG	10:53	2 min (Time to EKG)
Cath Lab Team Activated	11:09	19 min (Time to Activation of Cath Lab)
Arrival to ED	11:17	26 min (Time to ED)
Arrival to Cath Lab	11:40	49 min (Transport Time to Lab)
First Balloon Aspiration	11:59	68 min (Procedure Time)

Qualities - Mission: Lifeline
Patient Outcome: 60 Y/O male c/o right side 9/10 chest pain radiating to the R shoulder and arm. PT had just completed a run and shower. Sitting in chair when sudden severe pain began. EMS 12 lead showing anterolateral STEMI. STEMI alert initiated. IV ASA, NTG and Fentanyl. Transp to PUH. At PUH, eval in ED, transferred to Cath Lab. Cath reveals 100% Mid LAD occlusion. Successful PCI and placement of a 3.0x18mm drug eluting stent. PT discharged to home 7/19.



First Medical Contact to Balloon Time: 68 min
STEMI Receiving Center Door to Balloon Time: 42 min

Rapid reperfusion is a key to the management of patients with ST-elevation myocardial infarction. We strive for a first medical contact to device time of ≤ 90 minutes for scene transports and <math>< 120</math> minutes for interfacility transfers. Keys to success are early recognition of STEMI with prehospital 12-lead EKG, Medical Command contact, and transport to a STEMI Receiving Center. For questions about the UPMC continuous quality improvement process for STEMI patients, please call 412-623-2263.

UPMC LIFE CHANGING MEDICINE

Are we meeting National Standards/Best Practices?

National Association of State EMS Officials

Quality Improvement

Key Documentation Elements

1. The time of symptom onset
2. The time of arrival on scene to the time of 12-lead EKG acquisition
3. The time of 12-lead EKG acquisition to the time of identification of a STEMI
4. The time ASA administered, or reason why not given
5. The time of STEMI notification

Performance Measures

1. The time of EMS arrival on scene to the time of 12-lead EKG acquisition
2. The time of a STEMI patient's ultimate arrival to a PCI center
3. The time of EMS notification to the time of activation of a cardiac catheterization laboratory
4. The time of arrival at the PCI center to the time of cardiac catheterization (door-to-balloon time)
5. The time of prehospital 12-lead EKG acquisition to the time of cardiac catheterization (EKG-to-balloon time)

National Model
EMS Clinical Guidelines

EMS COMPASS

Improving Systems of Care Through Meaningful Measures

Improving Patient Care Through Evidence Based Performance Measures



Using the QI process to Develop Systems of Care

AHA Conference Proceedings

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

The Emergency Medical Services and Emergency Department Perspective

Peter Moyer, MD, Co-Chair; Joseph P. Omato, MD, FAHA, Co-Chair; William J. Brady, Jr, MD; Leslie L. Davis, MSN, RN, ANP-C; Chris A. Ghacemaghani, MD; W. Brian Gibler, MD; Greg Mears, MD; Vincent N. Mosesso, Jr, MD; Richard D. Zane, MD

Central to the development of systems and centers of care for ST-elevation myocardial infarction (STEMI) patients will be the key role played by emergency medical services (EMS) at entry into the system and within the system when emergency interhospital transport is required.

Current System of Care

Emergency Medical Services System Design
Pedi-hospital EMS systems have 3 major components: emergency medical dispatch, public safety (fire and law enforcement) first response, and EMS ambulance response. Each of these operates within a broader emergency care system, which includes acute care facilities and regionalized healthcare services. In most states, an EMS regulatory entity within the state government oversees the emergency care system. Many states have regional EMS councils and advisory boards that function with varying levels of authority.

fixed location, new technology exists that allows triangulation

tion

bein

lr

offi

in a

are

Disq

med

occi

med

stan

prot

or n

men

and

true

for

the

prear

ival

instr

uctions

that

are

given

to

cardiac

arrest

br

eat

ers

to

instr

uction
bein
lr
offi
in a
are
Disq
med
occi
med
stan
prot
or n
men
and
true
for
the
prear
ival
instr
uctions
that
are
given
to
cardiac
arrest
br
eat
ers
to
instr

ACCF/AHA Guideline

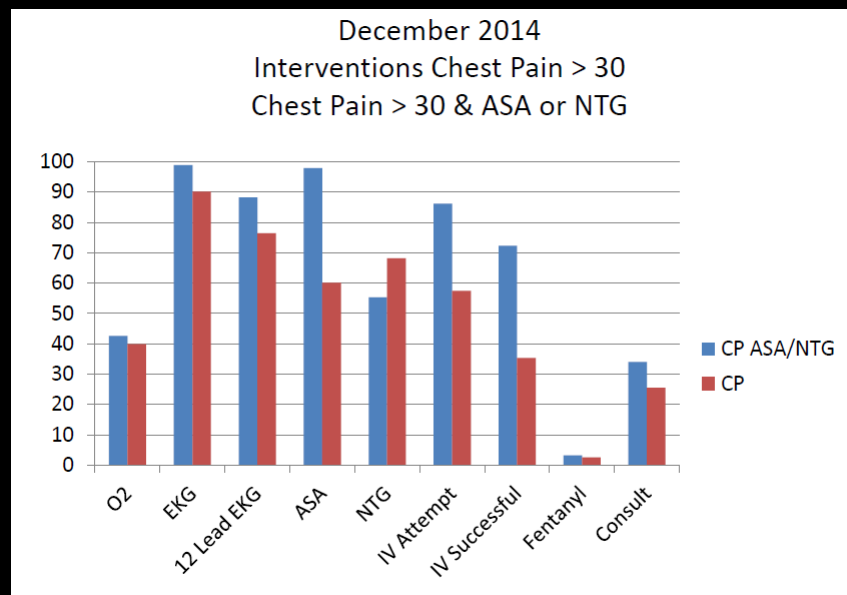
2013 ACCF/AHA Guideline for the Management of ST-Elevation Myocardial Infarction: Executive Summary

A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines

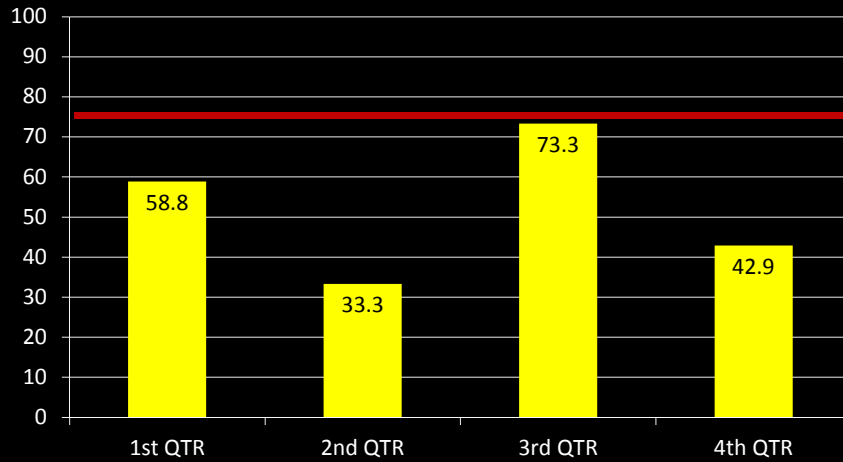
Developed in Collaboration With the American College of Emergency Physicians and Society for Cardiovascular Angiography and Interventions

Pittsburgh EMS 2014

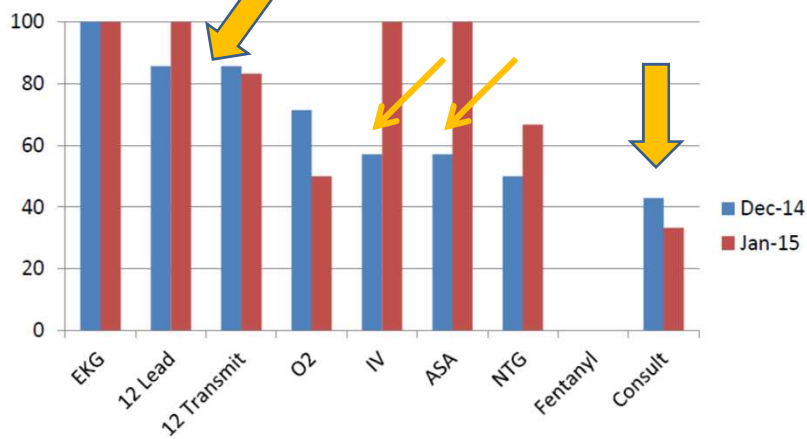
- No QI Program for ACS, NSTEMI or STEMI
- Extremely variable performance of key care metrics
- Out of compliance with national benchmarks
- Missed STEMI/NSTEMI



Pittsburgh EMS: 2015 AHA Mission Lifeline Compliance
 90 Minute FMC 2D < 90 minutes in 75% of cases



Pittsburgh EMS
 January 2015 STEMI Audit – Interventions
 NSTEMI Cases December vs January



Cardiac Care Identified Issues

- Inconsistency of care
- Atypical Chest Pain
- EKG Acquisition
- EKG Interpretation
- STEMI Alert Activation
- Documentation
- Medical Command Issues
- Hospital Issues – off hour activations

Pittsburgh EMS
Chest Pain & Acute Coronary Syndrome
Quality Improvement Project
2015

Cardiac Care Bundles

Pittsburgh EMS: Clinical Bundle of Care: Acute Coronary Syndrome		
Condition: <ul style="list-style-type: none"> • Patient age > 30 • Chest Pain believed to be cardiac/ischemic in nature • STEMI • NSTEMI 	Goals: <ul style="list-style-type: none"> • Identify STEMI if present • Early Cardiac Catheterization Lab Activation • Relieve Ischemia • Relieve Pain 	
Intervention	Time Standard	Completed?
1. Supplemental O2 to maintain a SpO2 94-99%	< 5 minutes	
2. Apply EKG	< 5 minutes	
3. 324 mg Aspirin po unless TRUE ASA Allergy <ul style="list-style-type: none"> • Hold if patient has taken 324 mg ASA within < 12 hours • If the patient has taken < 324 mg ASA within < 12 hours then administer additional ASA to bring the dose up to 324 mg 	< 10 minutes	
4. Obtain 12 Lead EKG	< 10 minutes	
5. Transmit 12 Lead EKG	< 10 minutes	
6. If 12 Lead EKG flags as ***Acute MI*** and crew agrees contact Medic Command on Dispatch 2 and request STEMI alert <ul style="list-style-type: none"> • Format: Unit #, Age, Sex, CC, STEMI Alert, Destination Hospital & ETA 	< 10 minutes	
7. 0.4 mg NTG SL x3 prn if SBP > 100 <ul style="list-style-type: none"> • Male patient – ask & use caution of ED drug usage • Use caution if evidence of Right Ventricular MI 	< 10 minutes	
8. Obtain IV access <ul style="list-style-type: none"> • If clear lungs may give 500cc NSS boluses prn to maintain SBP > 100 	< 15 minutes	
9. Consult Command MD <ul style="list-style-type: none"> • Assure 12 Lead EKG received and reviewed • Have command MD verify interpretation • Assure command notifies receiving facility of EKG Transmission • Confirm STEMI Alert & Cath Lab Activation at receiving facility 	< 15 minutes	
10. Fentanyl 1 mcg/kg for continuing chest pain after NTG x3	< 20 minutes if needed	
11. Initiate Transport: if STEMI minimize on scene time	< 21 minutes	

ACS Bundle: Critical Clinical indicators

- Titrated supplemental O2: SpO2 94-99% < 5 minutes
- 324 mg ASA po < 10 minutes
- Obtain & Transmit 12 Lead EKG < 10 minutes
- Initiate STEMI Alert < 10 minutes
- 1st NTG SL < 10 minutes
- IV access < 15 minutes
- Command Consult < 15 minutes
- Fentanyl if indicated < 20 minutes
- Initiate transport if STEMI in 20 minutes

DOCUMENT IN TREATMENT LOG!!!

Pittsburgh EMS: Clinical Bundle of Care: Atypical Chest Pain		
Condition: <ul style="list-style-type: none"> • Patient age > 30 • Atraumatic Chest Pain with atypical presentation <ul style="list-style-type: none"> ◦ Increases with movement, respiration, cough, etc. • STEMI/NSTEMI/PE/other intra-thoracic pathology 	Goals: <ul style="list-style-type: none"> • Identify STEMI/ACS/PE if present • Early Cardiac Catheterization Lab Activation of indicated • Relieve Ischemia • Relieve Pain 	
Intervention	Time Standard	Completed?
1. Supplemental O2 to maintain a SpO2 94-99%	< 5 minutes	
2. Apply EKG	< 5 minutes	
3. Obtain 12 Lead EKG	< 10 minutes	
4. Transmit 12 Lead EKG	< 10 minutes	
5. If 12 Lead EKG flags as ***Acute MI*** and crew agrees contact Medic Command on Dispatch 2 and request STEMI alert <ul style="list-style-type: none"> • Format: Unit #, Age, Sex, CC, STEMI Alert, Destination Hospital & ETA 	< 10 minutes	
6. Obtain IV access <ul style="list-style-type: none"> • If clear lungs may give 500cc NSS boluses prn to maintain SBP > 100 	< 15 minutes	
7. Consult Command MD <ul style="list-style-type: none"> • Assure 12 Lead EKG received and reviewed • Have command MD verify interpretation • Assure command notifies receiving facility of EKG Transmission • Discuss case with Command MD and determine clinical management 	< 15 minutes	
8. 324 mg Aspirin po after consultation with command MD <ul style="list-style-type: none"> • Hold if patient has taken 324 mg ASA within < 12 hours • If the patient has taken < 324 mg ASA within < 12 hours then administer additional ASA to bring the dose up to 324 mg 	< 20 minutes	
9. NTG SL or Fentanyl 1 mcg/kg if ordered by Command MD	< 20 minutes if needed	
10. Transport Expectation: Patient is transported on the stretcher	< 30 minutes	

12 Lead EKG: PCR Documentation

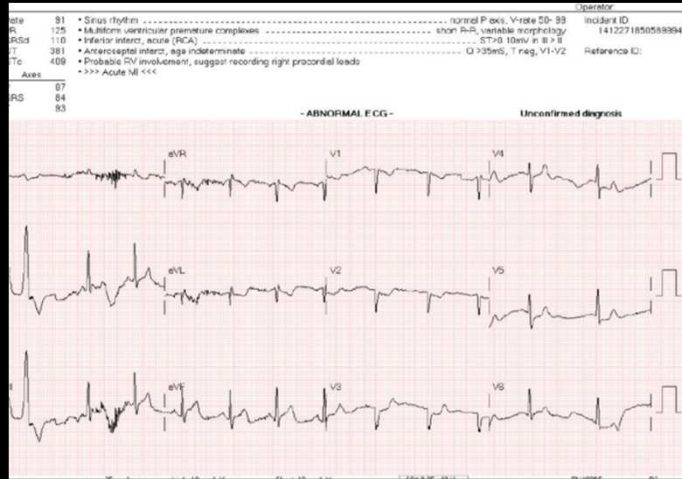
- 12 Lead EKG Transmission:
 - Add Action
 - Cardiac
 - Action
 - 12-Lead EKG-Transmission
 - Can add comments that it was reviewed by the MD who agrees/disagrees

```

22:02      124      304 / 254  99      24      Sinus Tachycardia  4/5/6      106      #1
                                     (RMG)
Electric Monitor - Manual Cuff      Labored
Cardiac
12-Lead EKG performed by James Dlutowski. Sinus tachycardia. The P-R and R-R intervals are regular. The PR, QRS and
QT segments are within normal limits for duration. There is minimal ST elevation in V1 with some concave ST
elevation in V2 and V3. This is probably due to LVH but there is ST depression with T-wave inversion in V4, V5 and
V6 which is concerning that it could be acute or a reciprocal change. Successful. Authorization: Via Protocol.
22:04      Cardiac
12-Lead EKG - Transmitted performed by James Dlutowski. Successful. Authorization: Via Protocol.

```


Best Practices for Obtaining 12 Lead EKG's



No STEMI Alert
D2D = 72
FMC 2D = 98

EKG Interpretation

PITTSBURGH EMS

SETTING THE STANDARD FOR STEMI RECOGNITION

Who gets a 12-lead?

- Typical "cardiac" chest pain
- Atypical "pleuritic/reproducible" chest pain
- Shortness of breath
- Post cardiac arrest
- Hypotension
- Syncope/near syncope
- First time seizure
- Age > 30 abdominal/epigastric pain
- Age > 30 nausea/vomiting
- Age > 30 weakness/dizziness
- Age > 30 back pain w/o hx of back problems or back trauma
- Stroke
- All arrhythmias

STEMI Criteria

- ST elevation in 2 or more contiguous leads
- ST elevation must be > 1mm in limb leads
- ST elevation must be > 2mm in precordial leads
- Reciprocal ST depression MAY or MAY NOT be present, however...
- Reciprocal ST depression in any lead other than V1 or aVR rules in STEMI and rules out any STEMI mimic in the absence of a left bundle branch block

I Lateral	aVR	V1 Septal	V4 Anterior
II Inferior	aVL Lateral	V2 Septal	V5 Lateral
III Inferior	aVF Inferior	V3 Anterior	V6 Lateral

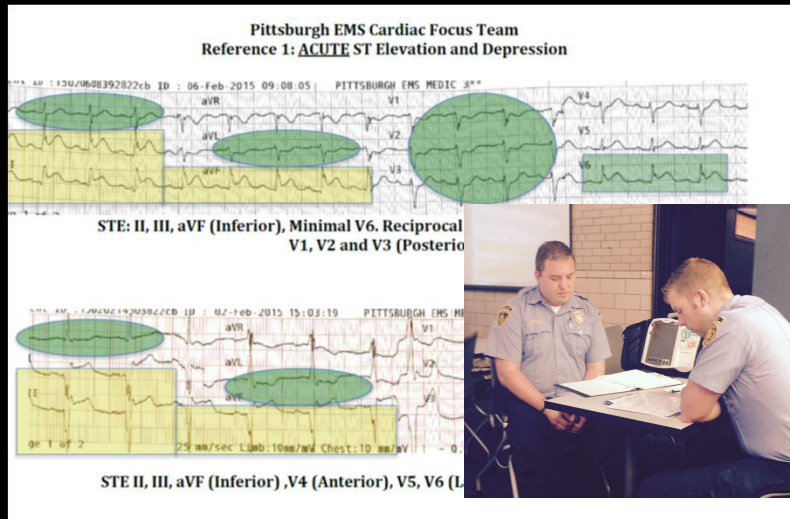
Right Ventricular MI

- RV MI is always a possibility in patients presenting with inferior wall MIs.
- In all patients with ST elevation in the inferior leads, the V4 lead should be moved to the right side of the chest (same location as left, mirror image)
- If ST elevation present in V4R lead, RV MI is present
- Caution with NTG in these patients.
- Aggressive fluid boluses

Isolated Posterior MI

- Can make up to 11% of all MIs
- Easy to miss, as no ST elevation present on initial 12-lead.
- V1, V2, V3 will have tall R waves, ST depression and upright T waves
- Perform V7, V8, V9 by placing your V4, V5, V6 leads around the back under the left scapula and look for ST elevation

EKG Interpretation – QI Cardiac Focus Team



Serial EKG's

- Keep all lead attached to patient & monitor
- Repeat the 12 lead with changes in status or changes seen on the monitor





STEMI Alert/Notification

- If the EKG Reads *****Acute MI***** and you agree :
 - Contact command on Dispatch 2
 - Unit identification
 - Advise them you have a STEMI Alert and you have transmitted the EKG
 - Destination Hospital and ETA
 - If you want to consult now or if you will get back to them
- Document time STEMI Alert Initiated in PCR

Pittsburgh EMS



Patient Safety Alert 15-10

STEMI ALERTS: 10 Minute Standards

We continue to provide excellent care to Acute Coronary Syndrome & STEMI patients. To improve this care we are implementing time standards to identify STEMI's and initiate STEMI Alerts.

In the first ten (10) minutes after making contact with a chest pain patient:

1. Obtain 12 Lead EKG

< 10 Minutes



2. Transmit 12 Lead EKG

< 10 Minutes



3. If the 12 lead EKG Flags as *****Acute MI***** and you agree with this interpretation, **immediately go to Dispatch 2 and request a STEMI Alert to the receiving hospital** – do not consult for this, you can consult after the STEMI Alert is initiated.

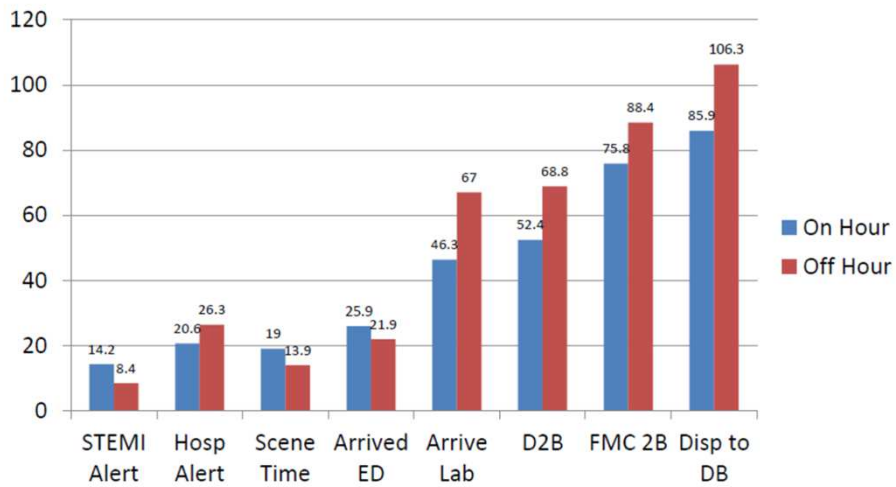


< 10 Minutes

Comparison:

On Hour Activations (M-F 0600-1700): n=8, 87.5% < 90 min

Off Hour Activations: n=7, 42.9% < 90 min



QI Cardiac Focus Team Field Training

- Care Bundles
- Time Standards
- EKG interpretation
- STEMI Alert process



QI Feedback – Case Audits

Pittsburgh EMS: Clinical Bundle of Care: Acute Coronary Syndrome		
Condition: <ul style="list-style-type: none"> • Patient age > 30 • Chest Pain believed to be cardiac/ischemic in nature • STEMI • NSTEMI 	Goals: <ul style="list-style-type: none"> • Identify STEMI if present • Early Cardiac Catheterization Lab Activation • Relieve Ischemia • Relieve Pain 	
PRID: Unit: 5107 Date: 21 June 2015 Crew: Comments: 83 y/o female chest pain – good management of this case - consider consulting the MD for 12 lead review. Thanks.		
Intervention	Time Standard	Completed/Time
1. Supplemental O2 to maintain a SpO2 94-99%	< 5 minutes	NO – SpO2 = 98%
2. Apply EKG	< 5 minutes	YES – 5 minutes
3. 324 mg Aspirin po unless TRUE ASA Allergy <ul style="list-style-type: none"> • Hold if patient has taken 324 mg ASA within < 12 hours • If the patient has taken < 324 mg ASA within < 12 hours then administer additional ASA to bring the dose up to 324 mg 	< 10 minutes	YES – 10 minutes
4. Obtain 12 Lead EKG	< 10 minutes	YES – 7 minutes
5. Transmit 12 Lead EKG	< 10 minutes	YES – 7 minutes
6. If 12 Lead EKG flags as ***Acute MI*** and crew agrees contact Medic Command on Dispatch 2 and request STEMI alert <ul style="list-style-type: none"> • Format: Unit #, Age, Sex, CC, STEMI Alert, Destination Hospital & ETA 	< 10 minutes	N/A
7. 0.4 mg NTG SL x3 prn if SBP > 100 <ul style="list-style-type: none"> • Male patient – ask & use caution of ED drug usage • Use caution if evidence of Right Ventricular MI 	< 10 minutes	YES – 17 minutes
8. Obtain IV access <ul style="list-style-type: none"> • If clear lungs may give 500cc NSS boluses prn to maintain SBP > 100 	< 15 minutes	YES – 19 minutes
9. Consult Command MD <ul style="list-style-type: none"> • Assure 12 Lead EKG received and reviewed • Have command MD verify interpretation • Assure command notifies receiving facility of EKG Transmission • Confirm STEMI Alert & Cath Lab Activation at receiving facility 	< 15 minutes	NO
10. Fentanyl 1 mg/kg for continuing chest pain after NTG x3	< 20 minutes if needed	Not administered
11. Initiate Transport: If STEMI minimize on scene time	< 21 minutes	29 minutes

Pittsburgh EMS STEMI Care Bundle Audit

Unit: Medic
Date: May 10, 2016
PRID:
Crew:
Hospital:

Intervention	Performed	Time Standard	Your Time
Supplemental O2 to maintain SpO2 94% or >	YES	< 5 minutes	3 minutes
Apply EKG	YES	< 5 minutes	3 minutes
Obtain 12 Lead EKG	YES	< 10 minutes	9 minutes
Transmit 12 Lead EKG	YES	< 10 minutes	10 minutes
Initiate STEMI Alert	YES	< 10 minutes	10 minutes
Aspirin Administered unless contraindicated	YES	< 10 minutes	3 minutes
NTG Administered unless contraindicated	YES	< 10 minutes	3 minutes
IV Access Obtained	NO	< 15 minutes	
Command Consult performed	YES	< 15 minutes	10 minutes
Fentanyl administered for continuing pain after NTG unless contraindicated	NO	< 20 minutes	N/A
On scene time < 21 minutes	YES	< 21 minutes	18 minutes
Field Time < 31 minutes	YES	< 31 minutes	20 minutes

Field Time = 20 minutes (Goal 30 minutes or less)

Hospital Door to Device Time = 63 minutes (Goal 60 minutes or less)

First Medical Contact to Device Time = 82 minutes (Goal 90 minutes or less)

Dispatch to Device Time = 92 minutes (Goal 100 minutes or less)

QI Items:

- Outstanding job – all critical interventions accomplished with great times. You obtained & transmitted the 12 Lead EKG and initiated the STEMI Alert in < 10 minutes which is our goal! Fantastic management of the patient!!

UPMC Shadyside Hospital ST-Elevation Myocardial Infarction (STEMI) Case Follow-Up

Date: 09/06/2018
EMS Agency: PGH M-11

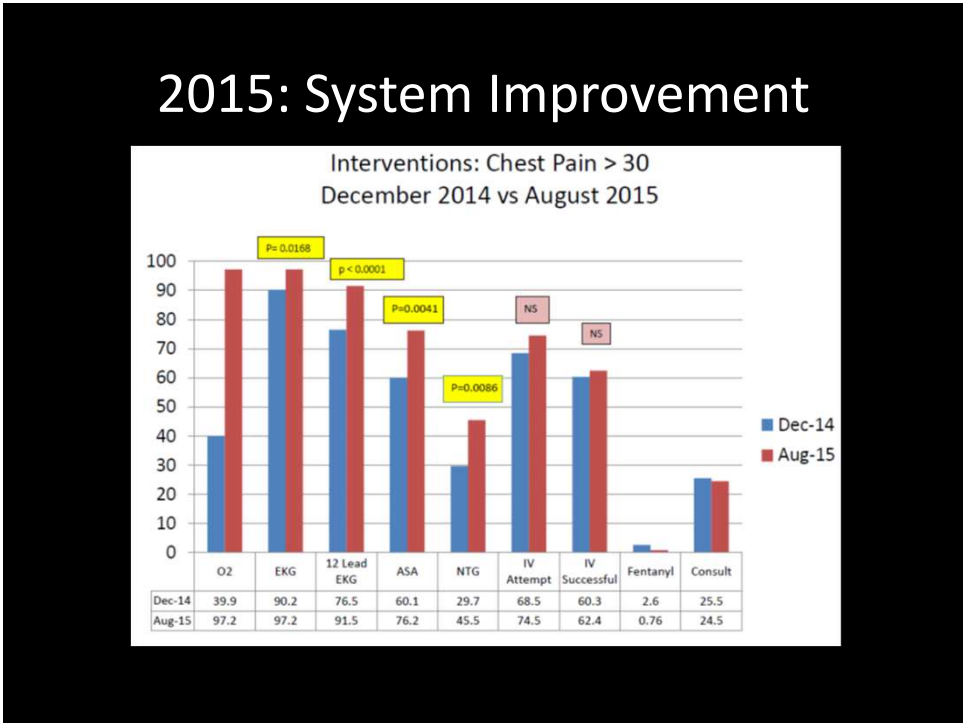
Time	Event	Interval
07:41	First Medical Contact (EMS)	0
07:44	Dispatching EKG	3 min
07:44	Call to Lab (Open Arteries)	3 min
07:44	Arrive to ECU	3 min
07:44	Arrive to Cath Lab	3 min
08:02	First Balloon/Intervention	28 min

First Medical Contact to Balloon Time: 78 min
STEMI Receiving Center Door to Balloon Time: 48 min

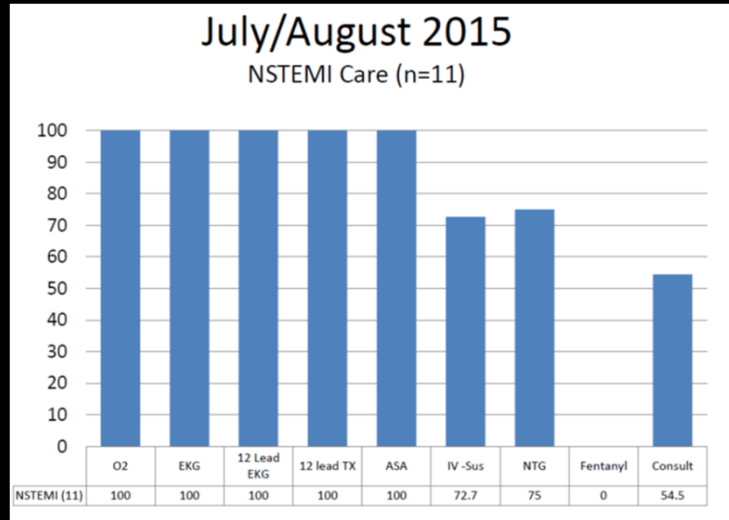
Before Intervention After Intervention

Rapid reperfusion is a key to the management of patients with ST-elevation myocardial infarction. We strive for a first medical contact to device time of 100 minutes for acute myocardial infarction and < 20 minutes for interfacility transfers. Keys to success are early recognition of STEMI with prehospital 12-lead EKG, Medical Command contact, and transport to a STEMI Receiving Center. For questions about the UPMC continuous quality improvement process for STEMI patients, please call 412-621-2252.

UPMC UNIVERSITY OF PITTSBURGH MEDICAL CENTER



2015: System Improvement



QI leading to new initiatives

Pittsburgh EMS: Acute Coronary Syndrome Risk Factor Pathways

	STEMI Alert Pathway	Chest Pain Alert Pathway	Non-Diagnostic Pathway
EKG Findings	EKG Flagging >>>ACUTE MI<<< and paramedic agrees with computer interpretation	Paramedic disagrees with presence of the computer >>>ACUTE MI<<< flag.	Typical or Atypical Chest Pain with no significant ST segment changes noted on computer interpretation of the EKG and paramedic agrees
Patient Presentation	Typical Chest Pain for ACS or Two (2) of the following Present: Syncope, dyspnea, nausea or diaphoresis	No >>>ACUTE MI<<< flag but paramedic believes that clinically significant ST elevation or depressions are present >>>ACUTE MI<<< flag present with atypical symptoms/patient presentation	
Communications by EMS	Immediately (< 10 minutes) Transmit 12 lead EKG Immediately (< 10 minutes) Initiate STEMI Alert on Dispatch 2	Immediately (< 10 minutes) Transmit 12 lead EKG Immediately (< 10 minutes) Consult Command MD to review EKG/patient presentation – Decision making to appropriate pathway for the patient.	Immediately (< 10 minutes) Transmit 12 lead EKG Consult Command MD or ALS Notify as needed
EMS Care Guidelines	Acute Coronary Syndrome Care Bundle	Acute Coronary Syndrome Care Bundle Repeat EKGs	Acute Coronary Syndrome or Atypical Chest Pain Care Bundle
Expectations at ED	Direct or Urgent Transfer to Cath Lab	Urgent Evaluation by ED Physician on Arrival Urgent repeat EKG in ED Troponin & other labs drawn Risk Stratification/Decision Making in ED	Standard ED Evaluation

Module 2 Practical Skills

Purpose: To practice and review procedures to activate the Cath Lab on appropriate cases while integrating the new Medical Alert system for UPMC. These practical skills are focused on making the appropriate decision as to whether the hospital receives a Cardiac Cath Lab Activation, a High-Risk Medical Alert or a general notification in the presence of cardiac symptoms. Module 2 is the second building block of the cardiac training and continuing education and quality assurance program, so it is important to integrate skills and lessons from Module 1 to keep a firm foundation.

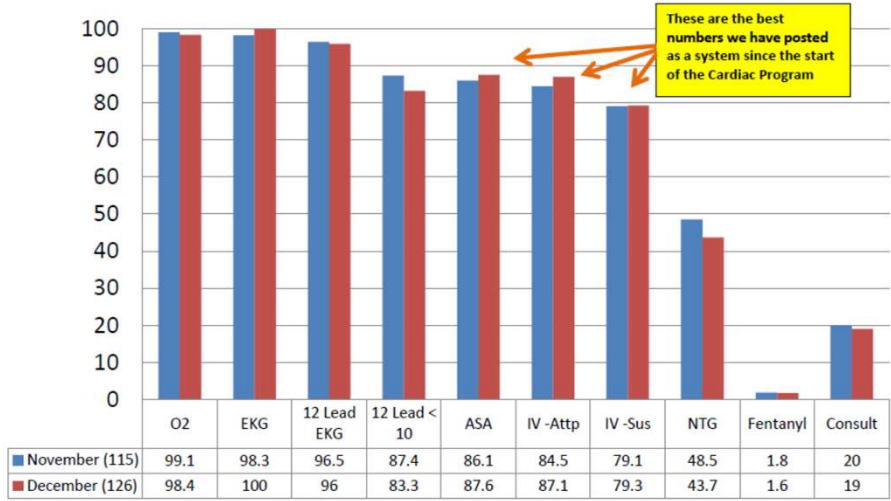
Case 1	INFERIOR WALL STEMI
Scenario	67 YOF slept on the couch last night, woke up this morning with a retrosternal chest pressure radiating to the right arm.
History	No medical history reported, On no medications. No medication allergies.
Vital Signs	HR 47, BP 112/70, SPO2 97%, RR 16, Skin Cool and Clammy, Chest Pain 5/10
EKG Finding	InferoPosterior STEMI: STE > 1 mm II, III, aVF; STD Lead I, V4; Profound STD with T-Wave Inversion aVL, V1, V2, V3
Treatment	<ul style="list-style-type: none">• Automatic Cath Lab Activation• Oxygen as Needed• Aspirin 324 mg• No Nitro: Right Ventricular/Posterior Involvement• IV Access• Transport to Limit Field Interval to an Interventional Cath Capable Facility• Consider Fentanyl• Consult Medical Command
Alert Type	Automatic Cardiac Cath Lab Activation

Pittsburgh EMS Cardiac Module 3 STEMI Mimics



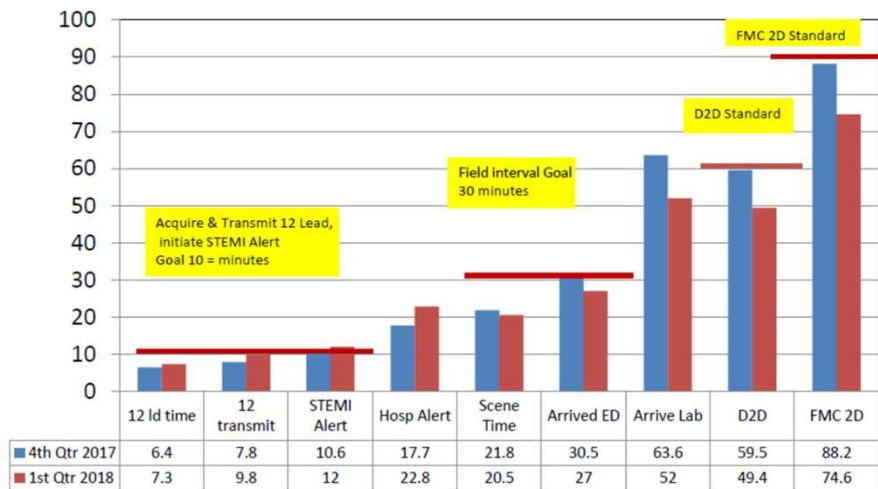
Jeff Reim, BS, NRP
James Dlutowski, BS, EMT-P
Crew Chiefs, Pittsburgh Bureau of EMS

December 2017 Chest Pain Care Bundle Care

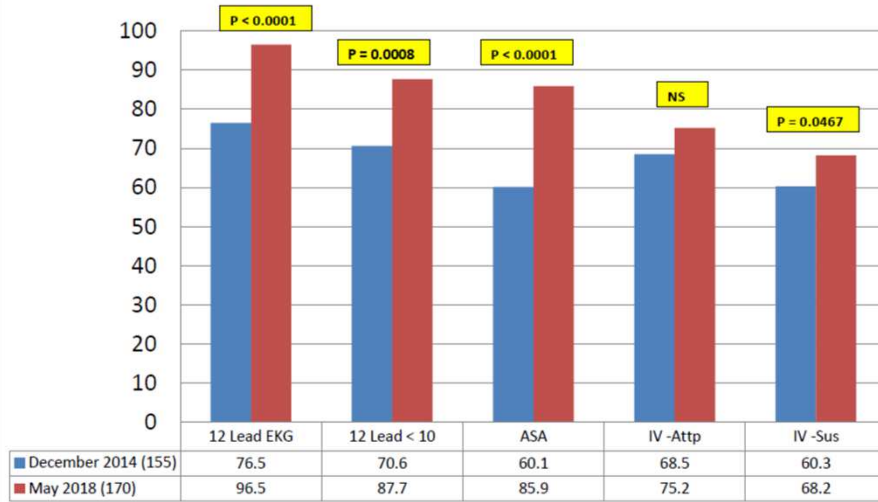


Pittsburgh EMS: Time intervals from arrival on scene AHA Mission Lifeline Non-Excluded Cases

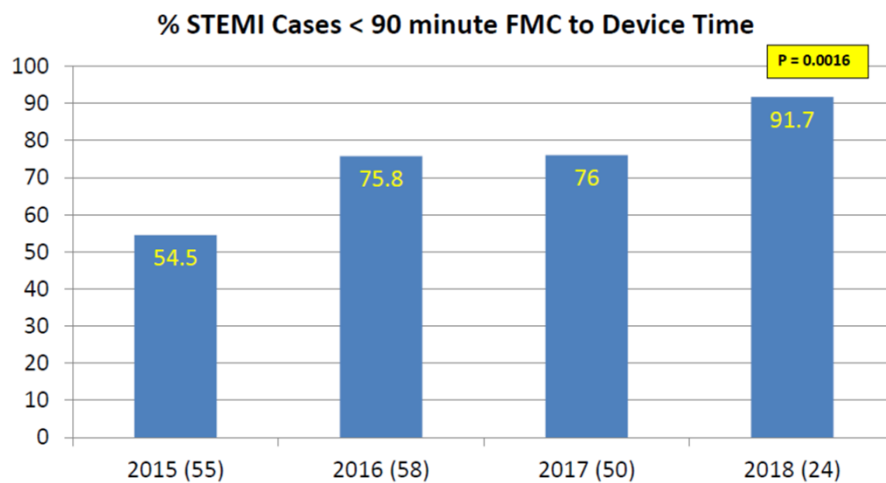
1st Quarter 2018; n=12
4th Quarter 2017; n=14



December 2014 vs. May 2018 Chest Pain Care Bundle Execution



AHA Mission Lifeline[®] Compliance 2015 – 2018



Questions?

Mark E Pinchalk, MS, EMT-P
Division Chief
City of Pittsburgh EMS
Mark.pinchalk@pittsburghpa.gov
412-622-6930

