STEMI Boot Camp

South Dakota Style!

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Presenter Disclosure Information

David Burt, MD

FINANCIAL DISCLOSURE:
None

UNLABELED/UNAPPROVED USES DISCLOSURE:
None
Today’s Goal:

- We are going to discuss STEMI Systems Engineering: This involves a discussion of the optimization of the Essential Elements of Reperfusion as they relate to pre-hospital STEMI Care.

- **GOAL: Optimization, NOT improvement!**
Your Speaker: Currently at the University of Virginia

Director: UVA Chest Pain Center

Director: UVA Cardiovascular Outreach (STEMI, etc.)

Active in the American Heart Association, The Society of Chest Pain Centers, and The Virginia Heart Attack Coalition
Prior to Virginia...

Associate Medical Director of Emergency and Cardiovascular Services: Grand Rapids, Michigan

- Directed emergency cardiology interfaces for a multi-center hospital system with over 200,000 total emergency department visits
- Chaired STEMI quality improvement program/committee at main campus
- Initiated development of regional STEMI networks and a 11-county pre-hospital ECG plan
- Worked shifts in both PCI and non-PCI emergency departments
- Served as a flight physician for AeroMed Air Transport
- Developed Project UPSTART, a no cost STEMI quality improvement program
Prior to Michigan...

FYI: ND has 4 PCI centers...
North Dakota – The Four “F’s”

F1) Freezing...

Coldest temp in Devils Lake last year?

-32 degrees (below zero)
North Dakota – The Four “F’s”

F2) Farming…

Life in the “Vast Lane”
North Dakota – The Four “F’s”

F3) Fishing (ice)

Snow plow on Devils Lake...

Ice House

Ice = 3.5’
North Dakota – The Four “F’s”

F4) And Flooding…

- 1997 Red River of the North flooding Grand Forks, ND
- Photo: “Come Hell or High Water” (left) won Pulitzer Prize
The Big Picture!

Provider of: STEMI System Blueprints...
Why “STEMI Boot Camp”? 

- The US Marines: Every Marine IS a rifleman
- STEMI 2010: Every STEMI provider must know the basics of the system
- Boot Camp: In order to improve a team-based process you must strengthen “all the links”
STEMI BootCamp
The 5 “R’s” of Reperfusion

David R. Burt, MD
University of Virginia
2010 STEMI BootCamp...

“Good is the Enemy of Great”

Bank of America short sales will get a LOT easier.

E = mc^2

and

BoA = Closed!
Change “hope” to “expectation”
Process standardization is key
End-arounds are not sustainable
Providers sometimes fail
STEMI Systems Engineering

- Education is a relationship
- You can’t improve what you don’t measure
- Don’t reinvent the wheel
- Base your system on “Joe the STEMI patient”
Champions get exhausted, but systems do not

STEMI Care Continuums and chains break at their weakest link

Get rid of stupid obstacles

It's all about the packet,
Optimize your “First Contact Provider” education process
Never underestimate the power of a cold beer
Good luck does not build systems but bad luck has broken plenty!
Remember the screening ECG!
Remember...Most of the Time

...the easy ones are easy!

So, make more of them easy!

No one writes songs about the ones that come easy.
OVERCONFIDENCE

This is going to end in disaster, and you have no one to blame but yourself.
Hope, Optimism & Expectation...

When Grandma has a heart attack and we hope for “nearly perfect” care, that’s optimism.

When Grandma has a heart attack and we have a system in place designed to deliver nearly perfect care, that’s expectation.
The “STEMI Care Continuum”

- **THE PATIENT**
  - EMS personnel
  - ED triage personnel
  - Medical Command
  - ED nursing staff
  - ED physician
  - EMS transfer staff
  - Paging system personnel
  - Cath lab staff
  - Cardiologist
  - Quality Improvement staff

Relationships

Recognition!

Reperfusion!
AHA: STEMI System Blueprints

Mission: Lifeline Recommendations for Criteria for STEMI Systems of Care

The criteria are divided into:

- Non-PCI Hospital/STEMI Referral Center
- PCI Hospital/STEMI-Receiving Center sections
- EMS
- STEMI Systems of Care
D2B: PCI Engineering

1. ED physician activates cath lab
   a. Via Field Interpretation
   b. Via Referral Interpretation
   c. Via ED Interpretation
2. One call activates the cath lab
3. Cath lab team ready in 20-30 minutes
4. Prompt data feedback
5. Senior management commitment
6. Team-based approach
STEMI Builder’s Toolkit

www.projectupstart.com
Today: The 5 Essential Elements of STEMI System Optimization

R1 Relationships
R2 Recognition
R3 Reperfusion
R4 Real-time data collection
R5 Reassessment & refinement

More on this later!
Hot off the Press: System Delay and Mortality in STEMI Patients

- Long term mortality based on total systems time (time from first contact to reperfusion) was determined in 3 high volume Danish PCI centers
- Total of 6209 patients from 1/02 to 12/08 undergoing primary PCI within 12 hours of symptom onset
- Median follow up was 3.4 years
- **Each hour of delay time was independent predictor of MI**
  - Pre-hospital systems delay OR 1.1 (95% CI 1.02-1.18, p=0.02)
  - Door to balloon delay OR 1.14 (95% CI 1.05-1.24, p=0.001)
  - Total systems delay OR 1.1 (95% CI 1.04-1.16, p=0.002)

Terkelsen CJ JAMA 2010;304:763-771
System Delay and Mortality in STEMI Patients

Mortality, %

- 0 to 60 min: 15.4%
- 61 to 120 min: 23.3%
- 121 to 180 min: 28.1%
- 181 to 360 min: 30.8%

Same old Story!

Terkelsen CJ JAMA 2010;304:763-771
Think Always: Recognition (Or First Medical Contact)…. to Reperfusion (R2R) Not Just D2B!

- **R2R**: The time interval from STEMI Recognition on ECG (*regardless of location*) to final Reperfusion (*regardless of the strategy*)!

- **System Goal**: How can we minimize R2R on each patient?
  - Earlier Recognition at any STEMI “portal”
  - Earlier Reperfusion -including thrombolytics!
Endpoints: Recognition and Reperfusion

- All attempts at reducing STEMI treatment times must ultimately focus on improving one (or both) of these endpoints.

- The goal: (very) early Recognition followed by early Reperfusion.
“Joe the STEMI Patient”

STEMI Systems Engineering:

“Optimize Average”
(standardization)

& Measure it!
(real-time data collection)
The Cardinal Rule: Once STEMI is identified → it must trigger a clear response downstream!

- ECG Acquisition
- EMS Evaluation
- Communication
- !Decision!
STEMI: A Needle in the Haystack

- STEMI cases are few and far between
- But, no STEMI can be treated until it’s first identified
- So, you just have to do a lot of ECG’s!

...It’s a cost of doing business!
“STEMI Vision” – Just Say No!

95%+ of EMS calls are NOT STEMI!

- Ab Pain
- EtOH
- Altered
- STEMI
- MVA
- Chest Pain
- Need ride
- ???
During a STEMI, do everything possible to minimize time to reperfusion.

We must think “before the door and beyond the balloon.”
STEMI 2010: “60 is the New 90”

Mortality Reduction (%)

Shifts in Potential Outcomes

Critical Time-dependent Period
Goal: Myocardial Salvage
A-B – No Benefit
A-C – Benefit
B-C – Benefit
D-B – Harm
D-C – Harm

Time-independent Period
Goal: Open Infarct-related Artery

i.e. 44 is better than 66!!!

Time From Symptom Onset to Reperfusion Therapy
(hours)

Extent of Salvage (% of area at risk)

**STEMI 2012: “60 is the New 90”**

- **<30 Minutes**: First Medical Contact (Recognition) to Thrombolytic administration

- **<90 Minutes**: First Medical Contact to on-site PCI (AHA/ACC recs) ?????

- **<90 Minutes**: First Medical Contact followed by inter-facility transfer to a PCI-capable facility

- ***BUT realistically <60 Minutes should be the goal for Contact/Recognition to Reperfusion @ a STEMI Receiving Facility (PCI Center)!***
Thrombolytics vs PCI

- Both are excellent: Nothing cures chest pain like a quarter ounce of metal or a teaspoon of “Drano for the vein”
- Faster is almost always better!
- Think “sequentially” If not A then B, don’t waste time trying to make “A” work!
Plan A1: PCI in a Timely Manner!

An Invasive Strategy is generally preferred if (See Section 6.3.1.6.4.2):

- Skilled PCI lab available with surgical backup † †
  Medical Contact-to-Balloon or Door-to-Balloon is less than 90 minutes
  (Door-to-Balloon) – (Door-to-Needle) is less than 1 hour *

- High Risk from STEMI
  Cardiogenic shock
  Killip class is greater than or equal to 3

- Contraindications to fibrinolysis including increased risk of bleeding and ICH

- Late Presentation
  The symptom onset was greater than 3 hours ago

- Diagnosis of STEMI is in doubt
Plan A2: STAT Thrombolytics

Fibrinolysis is generally preferred if (See Section 6.3.1.6.3.1):

- Early Presentation (less than or equal to 3 hours from symptom onset and delay to invasive strategy) (see below)

- Invasive Strategy is not an option
  - Catheterization lab occupied/not available
  - Vascular access difficulties
  - Lack of access to a skilled PCI lab †‡

- Delay to Invasive Strategy
  - Prolonged transport
  - (Door-to-Balloon) – (Door-to-Needle) is greater than 1 hour *§
  - Medical Contact-to-Balloon or Door-to-Balloon is greater than 90 minutes

A1 = A2
Key Concept: STEMI Conduits

- Each possible STEMI treatment pathway within a system

- Three types of STEMI conduits:
  - Internal, (no EMS involvement)
  - Mixed (EMS field involvement)
  - Inter-facility (EMS - inter-facility transport)
Local STEMI systems (usually) Overlap…

So, improving each one internally will improve the entire region…state
Luckily, Each Local STEMI System…

Serves just three STEMI cohorts:

1) Patients that walk up to the front door of that facility... (walk-ins)
2) Patients brought in by EMS (from the field)
3) Patients received from a Non-PCI facility or those sent to a PCI facility (inter-facility transfers)
Example I: The University of Virginia System

- The University of Virginia – a PCI hub hospital (R2R goal: 60 minutes)
- 18 EMS agencies (more or less)
- Culpeper Regional, a non-PCI hospital
- Augusta Medical Center, a non-PCI hospital
- Page Memorial, a non-PCI hospital
Example II: The Culpeper Regional Hospital

- Culpeper Regional, a non-PCI hospital with 14 ED beds that is 44 miles from a PCI center
- The University of Virginia, a PCI hub hospital (R2R goal: 60 minutes)
- 6 EMS agencies (more or less)
A Few Examples…

Spotting a STEMI

STEMI stands for ST-segment elevation myocardial infarction, a type of massive heart attack caused by the sudden, total blockage of an artery in the heart.

100 percent blockage of a coronary artery can severely damage the heart muscle within a short time.

- These attacks should be treated as soon as possible with an angioplasty, in which a balloon-shaped catheter is inserted into the artery and inflated to restore blood flow.

- STEMI attacks are detected by a device called an electrocardiogram, which measures electric pulses from the heart.

Sources: American Heart Association; Cleveland Clinic

Star staff
64 year-old male presents to large community ED Monday at 9 a.m. with severe chest pain. “Just like my prior heart attacks – except worse!” He is sweaty and pale.

PMH: Diabetes, prior MI x 2, smokes 2 PPD, and medication noncompliant.

Tells ED resident “Doc, I need an EKG!”

ECG tech is right there...
Good or Bad?
Treatment Milieu of the Day

- EKG... STEMI! (AAMI) a.k.a tombstones
- ED Crowding? Only a “few” patients waiting
- ED attending? Shown EKG in <2 minutes
- Cath Lab? Just opening for business
- Cardiologist? In the parking lot!
- Reperfusion time (DTB)? 21 minutes

OUTCOME? Patient healthy enough to leave AMA the next day (needs to smoke his Camels) **BUT** does promise to switch to the filtered version...
Most of the Time

…the easy ones are easy!

So, make more of them easy!
STEMI Fact:
“STEMI” is a Simple Disease!

STEMI management depends on optimizing rapid recognition of a rare but distinct phenomena on a piece of paper followed by the timely reopening of a tubular conduit via mechanical or chemical means!

AKA: “Got STEMI, open Artery!!!”
B. Later that Day

- Monday night, (same day, same ED, and same doctor) - multiple patients in triage. All beds are full and multiple trauma codes are in progress.
- 38 year-old female presents to triage staff with assault and heartburn. Small lac to face, +ETOH. (3) prior visits for similar complaints.
- Sent to waiting room and social work consulted.
- Brought back to treatment area several hours later with increased indigestion and
Assault/ETOH....

- Patient presented by resident as an assault / ETOH / laceration repair.
- Upon exam patient minimizes “heartburn” to ED attending (EKG ordered anyways).
- EKG completed but not presented to ED attending for signoff. Put in patient’s box.
- On recheck, patient has BP of 78/40; shortly proceeds to arrest in the hallway.
Hallway Care...

- Patient defibrillated and intubated in hallway after prolonged arrest
- EKG NOW examined, and shows AMI with profound reciprocal changes
- Cath team called in - ready in 59 minutes (delay secondary to weather)
- D2B Time? 332 minutes
ECG in the Chart... Prior to Arrest!

No physician signature!
What happened?

- The same environment
- The same day!
- The same physician!
- The system failed. It allowed the individual provider errors and circumstances to aggregate into a major failure.
STEMI Fact: If it Can Go Wrong, it Will (sooner or later)

Leave nothing to chance!

Approach STEMI systems building like a system’s engineer...

Don’t try to error-proof your providers. Error-proof your system!
C. One More Case

- Gerber Memorial Hospital
  *(the house that baby food built)*

- A non-PCI Center “out in the sticks”

- 47 ground miles from nearest PCI center

- Ground transport time variable but usually an hour or more

- Air transport: 21 minutes
Situation: Packers are Losing!

- 44 year-old male
- Sudden on-set of chest pain while watching the Green Bay Packers game
- PMH: None (does not go to the doctor)
- Pain began about an hour ago
- Works as an attorney in Fremont
EMS Obtains an ECG
Treatment?

Transfer for PCI versus immediate on-site thrombolytics?

- Age
- Time on onset
- Treatment options available
- Risks vs. benefits

Decision made to transfer patient for emergent PCI.

Air transport notified immediately!

No lag to decision!
Problem!
No Landing Zone at the PCI Center!

- Helicopter had crashed on the landing zone two hours prior
- Next nearest LZ is 20 minutes from the PCI lab
- Next nearest available PCI center is 60 (air) minutes away
- Now what would YOU do?
- Transfer for PCI versus on-site thrombolytics?
Time versus Muscle

STAT Lytics?

Delayed PCI?
Immediate Decision Made!

- TNK per protocol - 7 minutes later!
- EMS ground transport arranged (urgently)
- At departure, patient continue to have pain and ST-elevation
- Pain resolved in route to PCI center
- PCI next day shows a partially occluded artery; DES stent placed
- Patient home in 48 hours; EF of 55%

Again, no lag to decision!
A properly designed system allowed for early Recognition followed by rapid Reperfusion, even though the “standard plan” was not “available” for this patient.

Required: An optimized system (a good plan) combined with individual provider excellence (training and experience)!
Lesson: Plan & Train Concurrently!

- During “change management”, the mandate (plan) usually comes from “the top down.”

- For optimal success, “the plan” must also be accompanied by training and education.

- Those “working in the trenches” need to be given the tools and skills (and responsibility) to accomplish the mission.
In Other Words: “Git-R-Done!”

“Improving STEMI care involves standardizing the process and enhancing decision-making speed.”

Larry the Cable Guy
Don’t Re-invent the Wheel!

Convergent Evolution: all wings look the same (bird/bat/flying squirrel, etc.)

System’s engineering theory: form (should) follow from function

Lesson: All high performance STEMI systems share similar but not identical processes
Work Smarter, Not Harder!

Learn where to apply your time. The key is efficient effort on select points.
So, What Can We Do “Tomorrow”?  

“STEMI Boot Camp: Lessons of Combat”

- Important concepts in STEMI care
- Required for STEMI system excellence
- May be implemented quickly
- Produce immediate results
- Minimal funding required
- Mission: Lifeline compliant strategies
- Tested...over and over...and over
STEMI Lingo…

STEMI Relative Value Unit: STEMI RVU

- A practice or concept that is extremely important within the “STEMI Care Continuum” is worth high RVUs
- I.E. Reperfusion
Today: The 5 Essential Elements of STEMI System Optimization

R1 Relationships
R2 Recognition
R3 Reperfusion
R4 Real-time data collection
R5 Reassessment & refinement
The “5 R’s of Reperfusion”:

- True “Essential Elements” of STEMI care
- Perfection of each of these will optimize any local STEMI Systems of Care
- They provide focus points for immediate improvement
- True “Pareto Points” of STEMI Care!
- Efficient improvement with less effort!
Optimize each R!

- A focus on optimizing each of the “5 R’s” will allow rapid improvement of any local STEMI system in the most efficient manner possible.

- A precise application of the Pareto Effect (the 80/20 rule)!
Optimizing Each Essential Element is Critical

- Failure to optimize each of the 5 R’s will lead to delay at some later time
- Each step is critical to sustainable success
- Implementation of systematic change sets the stage for provider gap closure
- An optimized system minimizes provider delays and enhances provider excellence
The 5 R’s: The 5 Essential Elements of STEMI System Optimization

R1 Relationships
R2 Recognition
R3 Reperfusion
R4 Real-time Data Collection
R5 Reassessment & Refinement
Without question, the most important factors in successful optimization of a local STEMI systems is development of strong relationships at all levels, both formal and informal.
Remember the R2R Continuum?

Cemented by Relationships!

- EMS first contact personnel
- ED triage personnel
- ED nursing staff
- ED physician
- EMS transfer staff
- Paging system personnel
- Cath lab staff
- Cardiologist
- Quality Improvement staff

Recognition!

Reperfusion!
The 5 R’s: The 5 Essential Elements of STEMI System Optimization

R1  Relationships
R2  Recognition (where it all begins)
R3  Reperfusion
R4  Real-time data collection
R5  Reassessment & refinement
Recognition:

Implement an optimal STEMI screening process at each “STEMI portal”

Goal: *Each* qualifying patient receives a timely screening ECG!

All portals - fixed or floating
Excuse Me, Sir (Madam) Are You Having a STEMI?

- 44 year-old male with a flare-up of his GERD. Wife was at the annual AHA Gala last night and wants him checked out.
- 58 year-old learning-impaired female with nausea and vomiting for one hour.
- 32 year-old female with pleuritic chest pain. Additional PMH unknown. Intoxicated.
“Fred Sanford Syndrome”...
Recognition...

- Print It
- Post It
- Expect It
- Measure It

Look Familiar?

Who requires a screening ECG?

Patients > 30 years old experiencing any of the following:
- Chest pain or discomfort
- Chest pressure or tightness
- “Heartburn” or epigastric pain
- Complaints of “heart racing” (HR >150 or irregular and >120)
- Complaints of “heart too slow” (HR < 50 and symptomatic)
- A syncopal episode or severe weakness in patients > 45 years old
- New onset stroke symptoms (< 24 hours old)
- Difficulty breathing (with no obvious non-cardiac cause)

These patients require an ECG immediately in any available bed or at triage. Time to ECG < 5 minutes!

Patients (regardless of age) with any of the above symptoms and history of:
- Prior cardiac disease such as heart attack
- A family history of early heart disease
- Diabetes mellitus
- Severe obesity
- Recent cocaine use

These patients require an ECG within 10 minutes!

Show all ECG’s immediately to a physician for signature!

Remember:
- Please transport patients by wheelchair
- Women and diabetic patients are more likely to present with atypical symptoms
- Elderly patients may have symptoms such as generalized weakness, altered mental status or syncope as their only sign of acute heart attack
- When in doubt, do the ECG!

www.projectupstart.com
South Dakota: Work with EMS to Design a Pre-hospital STEMI ALERT Protocol

- Consider EMS a floating “STEMI portal”
- Up to 50% of STEMI patients may use this “pre-hospital portal system”
- Simple protocols will address most needs
- More on this later
The 5 R’s: The 5 Essential Elements of STEMI System Optimization

R1  Relationships
R2  Recognition
R3  Reperfusion
R4  Real-time data collection
R5  Reassessment & refinement
Reperfusion

A precision reperfusion plan in place for each STEMI portal

A “STEMI ALERT Process for every portal”
- including pre-hospital portals
- including in-house recognition
- including inter-facility transfers
1) Design a STEMI ALERT Plan for Each “Fixed” Portal!

- carefully customized to each specific “portal”
- instantly accessible
- simple
- incorporates real-time data collection (more on that later)

GOAL:
Neutralize the effects of chaos theory, paralysis by analysis and other STEMI system maladies!
Be real in your expectations

- Establish realistic goals and treatment strategies based on both science (the guidelines) AND a realistic appraisal of the situation (your experience)

- Combine guidelines with experience to design an approach to fit your system.
Repeat: Set Realistic Goals!

- Develop strategies based on the best available science applied to your situation
- Have an agreement to change if current practices are not supported by current results
- Establish realistic “STEMI conduits” based on a “Joe STEMI” approach
Think Beyond the Balloon!

- A small town in North Dakota: 83 ground miles from the nearest PCI center
- 2005 strategy: transfer for PCI. Optimized air transport time: One hour
- Result: Could not meet ACC/AHA goal of 90 minutes to PCI
- 2009 Strategy: A change to thrombolytics with a goal of Recognition to Reperfusion (Drano)
2010: A Much Better Fit!

Potential outcomes:
- A → B — no benefit
- A → C — benefit
- B → C — benefit
- E → D — harm

Time to treatment is critical
Opening the artery is the primary goal (PCI > lysis)

The 5 R’s: The 5 Essential Elements of STEMI System Optimization

R1  Relationships
R2  Recognition
R3  Reperfusion
R4  Real-time Data Collection
R5  Reassessment & Refinement
Recognize (and accept) that accurate real-time data collection is essential to monitor improvements and affect change.

You can’t improve what you don’t measure!
You Must Measure Each STEMI!

Measuring a minimum number of carefully selected quality improvement parameters on each STEMI ALERT in your system (as it occurs) is absolutely essential for sustainable success and improvement!
The “5 R’s”: Essential Elements

Real-time Data Collection:

Data collected during each STEMI ALERT to continually measure the process.

You can’t improve what you don’t measure.
Sample Data Sheet for STEMI

- **Real-time data**
- **Simple**
- **Easy**

Collected in every STEMI

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**ED Copy (Yellow)**  
**Time Study for STEMI Alerts**  
**STAYS IN ED**

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time of Onset of CP Symptoms</td>
<td></td>
</tr>
<tr>
<td>Time Patient Arrived ED</td>
<td></td>
</tr>
<tr>
<td>Time of 1st EKG</td>
<td></td>
</tr>
<tr>
<td>Time ECG Read by ED Attending</td>
<td></td>
</tr>
<tr>
<td>Time ED STEMI Alert Initiated</td>
<td></td>
</tr>
<tr>
<td>Did ED Attending Activate Cath Lab?</td>
<td>Y</td>
</tr>
<tr>
<td>(circle one)</td>
<td></td>
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<tr>
<td>If not, Time CCU Fellow Paged</td>
<td></td>
</tr>
<tr>
<td>Time CCU Fellow Responds to Page</td>
<td></td>
</tr>
<tr>
<td>CCU Fellow Arrival Time</td>
<td></td>
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<tr>
<td>Time Cath Lab Team Calls for Patient</td>
<td></td>
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<tr>
<td>Time Patient Left ED</td>
<td></td>
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<tr>
<td>Time Patient Arrived in Cath Lab Room</td>
<td></td>
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<td>Attending Arrival Time</td>
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<tr>
<td>Lido Time</td>
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<tr>
<td>Access time</td>
<td></td>
</tr>
<tr>
<td>Time of 1st wire across lesion</td>
<td></td>
</tr>
<tr>
<td>Time of 1st Balloon Inflation</td>
<td></td>
</tr>
</tbody>
</table>

**FORM TO STAY IN ED. Place in Mailbox of Barbara Craighead. DO NOT SEND WITH PATIENT.**

**Comments/Suggestions:**

**NOT PART OF THE MEDICAL RECORD**
Inter-facility Real-time data in action!
**Transfer D2B (Door to Balloon)**

**To Be Completed by ED Staff:**
- **Time of Symptom Onset:**
  - **Bedford Memorial Southside Community**
- **Prehospital ECG:** YES [ ] NO [ ]
- **Time of Arrival in ED:**
  - **EMS**
- **Time of Arrival in ED:**
- **ECG Time:**
- **Medflight Called Time:**
- **Cardiologist Called:**
- **Medflight Arrival Time:**
- **Medflight Depart Time:**

**To Be Completed by Cath Lab Staff:**
- **Medflight Arrival to Ligh Time:**
- **Time of Arrival in Cardiac Cath Lab:**
- **Device (Balloon) Activated:**

**Total Door to Balloon Time:** __89__

**F2B (Flight to Balloon):** __________

**Goal:** <120 minutes D2B

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**Real-Time Data at Lynchburg!**

**Partner Sites**
Collecting (accurate) data on each STEMI:

Demonstrates changes in the process on a day-to-day basis.

Allows for careful, accurate, case-specific feedback to individuals.

Creates a sense of urgency and usefulness.
Data: Long Term Benefits…

Repeated measurement of your process over time give an accurate picture of what is actually happening!

If your best efforts at optimizing your primary treatment strategy, do not meet the Guidelines, maybe you should reconsider your primary strategy!
“Tier I” vs “Tier II” Data

**Tier I:**
Real-time data collection

“How are we doing?”

As it occurs

**Tier II:**
Registry-quality data collection

“How did we do?”

Chart Biopsy
Tier I Data: Real-time Info

- Focused on key system juncture points
- Collected as the process occurs
- Does not have to be minutely accurate
- Minimal data points (12-14) one page max
- Reliant on clinical staff for collection
- Allows for immediate QI activity
Tier II Data: Registry Quality

- A more complete data set
- IE: Action, CDR
- Focused on the process and the patient
- Valuable longitudinal data
- Usually not transferred patient
- More time consuming (chart biopsy)
- Not as helpful for real-time improvement
- Difficult to complete in “real-time”
Action: Tier II Data

- A more complete data set
- Focused on the process
- Longitudinal data collection
- More time consuming
- Not as helpful in real-time improvement
- Difficult to complete & collect in “real-time”
The 5 R’s: The 5 Essential Elements of STEMI System Optimization

R1 Relationships
R2 Recognition
R3 Reperfusion
R4 Real-time data collection
R5 Reassessment & Refinement
The “5 R’s”: Essential Elements

Reassessment and Refinement:
You now have a standardized, accessible process that is carefully measured each time it occurs.

And, a standardized process + ongoing measurement allows for measurable, rapid and sustainable improvement!
STEAMI Continuum Relationships

Allow for rapid improvement and sustained results

If periodically maintained

Recognition!

Relationships

Reperfusion!
Review: The 5 Essential Elements of STEMI System Optimization

R1  Relationships
R2  Recognition
R3  Reperfusion
R4  Real-time Data Collection
R5  Reassessment & Refinement

...R1  Relationships (again)
Let’s Have Some Fun with This!

Consider “Relationships” – the most important Essential Element...

Do some of the following questions look familiar?
Questions That Drive Relationship Development

- Is your hospital a part of a formal regional STEMI system?
- Do regularly scheduled meetings occur involving EMS providers and reps from all facilities within your regional STEMI system?
- Can you name your partner facilities?
- Does your hospital have a contact person within each of these facilities?
Do you have mechanisms (such as an EMS STEMI Story Board) to constantly let EMS know about cases gone right?

Do you involve patient advocates (STEMI survivors) to help improve your STEMI system?

Do you provide regular written feedback to EMS providers within your system?

Does your system have a formalized method of providing case-specific feedback to providers of the entire STEMI care continuum?
Relationships....

- Do you feel comfortable contacting each facility to discuss STEMI issues and/or individual cases?
- Do you know the names of the EMS and transport provider organizations within your area?
- Do you invite EMS personnel to your AMI quality improvement meetings?
Relationships at All Levels!

- STEMI AMI meetings
- EMS STEMI Story Board
- Prompt data feedback
- EMS personnel visiting the Cath Lab
- Cardiologists on EMS ride-alongs
- Cardiologists to ED physician “customer updates”
- First Contact Provider Education
Relationships… At All Levels!

- STEMI AMI meetings
- EMS STEMI Story Board
- Prompt data feedback
- EMS personnel visiting the cath lab
- Cardiologists on EMS ride-alongs
- Cardiologists to ED physician phone calls
- Cold beverages in a restaurant
Another Example: Recognition

Quiz Question: As far as any potential STEMI patient is concerned, who is the most important person in your STEMI Care Continuum?
!Whoever Does That First ECG!
Would Your Institution MISS This?
Maybe... Who Wins the ECG Race Friday at 3am?

STEMI?

STEMI??

STEMI???
Recognition: How is Your Hospital Doing? Take This Short Quiz, Please!

1) Do you have a written “Screening ECG Protocol” at your institution?
2) Is it visibly posted in your ED & triage?
3) Do ED and triage staff follow it 24/7?
4) Have you trained your staff regarding their key role in the screening ECG?
5) Do you have multiple backup pathways in place to ensure that the screening ECG gets done during busy times?
6) Is each ECG immediately shown to a physician?
How Did You Do?

Unless you answered “yes” to all questions, your institution is at risk of overlooking the previous ECG. If not today, then next Friday.

**Solution:** Work on optimizing Recognition until you can answer yes to all six questions -24/7
The Project UPSTART “Screening ECG Protocol”

.....Easily utilized at STEMI portals Everywhere!

Combine with process optimization to ensure Recognition Success!

Who requires a screening ECG?

Any patient > 30 years old experiencing any of the following:
- Chest pain / epigastric pain
- Chest pressure / tightness
- Chest discomfort / heartburn
- Complaints of “heart racing” (HR > 150 or irregular and >120)
- Complaints of “heart too slow” (HR < 50 and symptomatic)
- Syncope episode or severe weakness in patients > 45 years old
- New onset (< 24 hours old) stroke symptoms
- Difficulty breathing (with no obvious cardiac cause)

These patients require an ECG immediately in any available bed or at triage. Time to ECG < five minutes!

Patient (regardless of age) with any of the above symptoms and history of:
- Prior cardiac disease such as heart attack
- A family history of early heart disease
- Diabetic mellitus
- Severe obesity
- Recent cocaine use

These patients require an ECG within 10 minutes of arrival!

Show all ECG’s immediately to a physician for signature!

Remember:
- Please transport patients by wheelchair
- Women are more likely to present atypically
- Diabetic patients may have atypical presentations—beware of nausea and vomiting
- Elderly patients may have symptoms such as generalized weakness, altered mental status or syncope

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How about Pre-hospital Recognition?
Recognition (Pre-hospital)

1) Yes/No Do your EMS providers utilize pre-hospital ECG to identify a STEMI
2) What percent of your EMS providers are trained to obtain a 12 Lead ECG?
3) What percent of your EMS vehicles are ECG-capable?
4) How is the activation of “STEBI Alert” usually made on pre-hospital ECG’s done within your system?
   Yes/No ECG interpretation is done by EMS personnel?
   Yes/No Determination of STEMI primarily based on machine algorithm interpretation?
   Yes/No ECG transmitted for physician over-read?
5) Yes/No Do pre-hospital providers immediately contact an ED physician once they obtain an ECG suspicious for STEMI?
Reperfusion: A Reperfusion Plan at Every STEMI Portal

- Each time a STEMI is recognized (either pre-hospital or in-hospital) a carefully developed plan specific to that site should be reflexively triggered. It should be simple, precise, written down and instantly accessible.

- No rocket science allowed
Example: Open a STEMI ALERT Packet for every STEMI

- A trigger for reperfusion
- "Got STEMI = Open Packet!"
- Education meets conditioning
- Fully teachable to all ED staff and (most) ED physicians!
Real time Data Collection…

Mandatory for optimization!

Hint: Hardwire it into your basic STEMI ALERT Process and minimize your workload…
Reassessment and Refinement…

Hold a meeting

Have people show up

Present Data

Act on the Data

Hint: Publicize your successes loudly and correct your failures quietly!
The 5 R’s: A Review

- **R1 Relationships:** Working within the STEMI care continuum
- **R2 Recognition:** Fine tune the Recognition process
- **R3 Reperfusion:** A STEMI ALERT Process at every portal
- **R4 Real-time Data Collection:** Real-time measurement of each STEMI
- **R5 Readjustment and Refinement:** On-going process adjustment based on accurate data
You Have Now Come Full Circle

- Optimizing the 5 Essential Elements will allow you to quickly improve care in your entire local STEMI System of Care.
- The system you create will maintain a standardized process and ongoing data collection, allowing you to efficiently maintain your process.
The 5 R’s Made Easy (Easier)....

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A no-cost quality improvement tool developed to efficiently improve local-level STEMI care via optimization of the five Essential Elements of Reperfusion
All Questions Accepted!

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