Optimizing STEMI systems in Rural and Resource Limited Environments: North Dakota - Reperfusion decision making: Lytic vs. PCI, ND Case Scenarios

Audio: Toll Free: 888-353-8396  Participant passcode: LIFELINE

Webinar: URL: https://www.mymeetings.com/nc/join/
Conference number: RG4969870
Audience passcode: LIFELINE
Participants can join the event directly at:
https://www.mymeetings.com/nc/join.php?i=RG4969870&p=LIFELINE&t=c
Almost 250,000 Americans experience STEMI, the deadliest form of heart attack, each year.

30% STEMI patients fail to receive percutaneous coronary intervention (PCI) or thrombolytic therapy.

Of those who receive PCI, only 40% are treated within the door-to-balloon timeframe of 90 minutes, recommended by the American Heart Association.

Of those who receive thrombolytic therapy, fewer than half are treated within the recommended door-to-needle timeframe of 30 minutes.

70% of those patients who aren’t eligible for thrombolytic therapy fail to receive PCI, the only other option to restore blood flow to blocked arteries.

STEMI SYSTEMS OF CARE
By working together, we can remove the barriers that stand between STEMI patients and prompt, appropriate care.
Point Of Entry Protocol: GOAL

- **Onset of symptoms of STEMI**
- **9-1-1 EMS dispatch**
- **EMS on-scene**
  - Encourage 12-lead ECGs
  - Consider prehospital fibrinolytic if capable and EMS-to-needle within 30 min
- **EMS transport**
  - Prehospital fibrinolysis: EMS-to-needle within 30 min
- **EMS Triage Plan**
- **Hospital fibrinolysis:** Door-to-needle within 30 min
- **STEMI-referral hospital** (non PCI-capable)
- **Inter-hospital transfer**
- **STEMI-receiving hospital** (PCI-capable)
- **EMS transport:** EMS-to-balloon within 90 min
- **Patient self-transport:** Hospital door-to-balloon within 90 min

**GOALS†**

- **Patient** 5 min after symptom onset
- **Dispatch** 1 min
- **EMS on scene** within 8 min
- **EMS transport**

*Golden Hour = First 60 minutes*

Less than 90 Minutes
In ND 43% of adults have 3 or more risk factors for cardiovascular disease.

CV disease is the #1 leading cause of death in ND.
ND Demographics

ND Geography: 68,975 sq. miles 680,000 people

• **Frontier counties** (37) majority of ND territory
  • Population density of < 6 people/mile
    = 21% ND residents

• **Rural counties** (10): < 5000 residents
  • Population density of > 6/mile
    = 15% ND residents

• **Urban counties** (4): 1 city of at least 15,000
  = 63% ND residents
North Dakota County Classification

- Rural (Non-Metro, completely rural, county that does not contain a town with at least 2,500 population)
- Semi-rural (Non-Metro county that contains a town or city with 2,500 population or more)
- Urban (Metro - Counties in metro areas of fewer than 250,000 population)
North Dakota Frontier Counties

37 of 53 North Dakota Counties designated as Frontier (less than seven persons per square mile)

Source: U.S. Census Bureau, 2010
2005-2009 Acute Myocardial Infarction (ICD10 I21 & I22)
35+ Age Adjusted Death Rate per 100,000
Hospital STEMI Treatment Capabilities

Death Rate per 100,000
- Insufficient Data
- Class 1 (48.0 - 96.2)
- Class 2 (96.3 - 127.8)
- Class 3 (127.9 - 162.5)
- Class 4 (162.6 - 219.1)
- Class 5 (219.2 - 239.9)

Hospitals
- PPCLI
- Transfer/Lysis

Drive Time to PPCLI
- 15 minutes
- 30 minutes
- 45 minutes
- 60 minutes

CDC Wonder On-line Database. ICD10 I21 & I22.
Improving Rural STEMI Care through Multi-State Sharing and Collaboration

Jeffrey Sather, MD Trinity Health, Tamass Stys, MD Sanford Health, Richard Mullvain, RPH, BCFPS Essentia Health, Gary Myers, MS, NREMT, Mindy Cook, RN, BSN, Pam Moe, RN, CPHQ, Michelle Gardner, MBA, American Heart Association, Midwest Affiliate

**Background**

Several factors can impede the timely delivery of optimal care to STEMI patients, particularly in rural states such as South Dakota, North Dakota and Minnesota. South Dakota has 66 counties covering nearly 76,000 square miles. Five of the seven percutaneous coronary intervention (PCI)-capable facilities are located in two communities and travel distances between hospitals can exceed 200 miles. North Dakota consists of 53 counties over 69,000 square miles. Thirty-four entire counties are designated medically underserved areas and 13 counties have some part of them designated medically underserved. Similar distances issues between referring hospitals and PCI-capable facilities are also seen in the majority of the state of Minnesota. These rural areas are heavily dependent upon volunteer ambulance services and the capabilities of the small referring (non-PCI or CAH) hospitals to receive the STEMI patient and transfer in a timely manner. Excluding the Twin Cities and Rochester, there are a total of 18 PCI-capable hospitals throughout rural Minnesota, South Dakota and North Dakota. Only two of these hospitals are Chest Pain Accredited, with one having Missions: Lifeline® Accreditation. There are 163 Critical Access Hospitals in this region, making them crucial to a STEMI system of care.

**Methods**

Mission: Lifeline® is a strategic initiative to save lives and reduce disability by improving emergency readiness and response to heart attack patients. With funding support, the American Heart Association, hospital, EMS and state stakeholders have worked together to improve each component of STEMI systems, including across state borders. The South Dakota project started in 2010 followed by North Dakota in 2011. Minnesota was launched in 2013. In each state, STEMI task forces and provider-specific sub-committees were formed. Each PCI-capable hospital was asked to participate in data collection through ACTION Registry®-GWTG™. EMS agencies in North Dakota and South Dakota were granted funds to purchase 12-lead monitor-defibrillators. Minnesota is currently in the process of allocating these devices, based on funding availability. Critical Access Hospitals and other non-PCI-capable facilities participated in STEMI education, which included ways to improve time critical processes and transfer protocols. An education plan was delivered to EMS agencies South Dakota and North Dakota as well, and this same plan is being adjusted to meet the needs in Minnesota.

**Results**

A statewide STEMI protocol was adopted in 2012 in North Dakota. South Dakota used this to create their own guideline which was adopted in 2013. Both protocols will be shared with the Minnesota task force in 2014 by the South Dakota and North Dakota physician champions. The number of 12-lead ECG transmissions have more than tripled in South Dakota since the start of the project. In addition the time from First Medical Contact (FMC) to PCI was 77 minutes in South Dakota from Q4 2012-Q3 2013 beating the national average of 82 minutes. North Dakota is also beating the national average with a FMC to PCI time of 81 minutes during that same timeframe.

**Conclusions**

Although each state is very different, rural areas often have many of the same barriers for an effective state STEMI system. As the projects have moved forward, each state has approached each component a little differently and adjusted based on needs. The learning experience across state borders has been effective way to make progress. The hospital data and 12-lead ECG transmission increase has proven that there is better STEMI system awareness and competence throughout the states resulting in a faster time from first medical contact to device. The collaboration of EMS and hospitals around state borders will also help with the sustainability of the projects and most importantly, the ability for better outcomes for STEMI patients, regardless of their location.

**Limitations**

Data was collected from ACTION Registry®-GWTG™, which is the registry used by all PCI applicable hospitals in SD, MN and ND. The first medical contact results captures patients that have presented directly to a PCI hospital via EMS or by walk-in. Transfers from other facilities are not included in this data. The ECG Transmissions were provided by LifeNet and includes the majority of transmissions.
ND Mission: Lifeline 7.1 Million August 2011-2014

- The Leona M. and Harry B. Helmsley Charitable Trust
- State of ND
- Otto Bremer
- Dakota Medical Foundation
- American Heart Association
- 6 PCI Receiving Hospitals
- Anonymous private donor
<table>
<thead>
<tr>
<th>STEMI Diagnosis</th>
<th>ND State</th>
<th>Nation</th>
</tr>
</thead>
<tbody>
<tr>
<td>First ECG obtained Pre-Hospital (EMS Arr.) Direct</td>
<td>89%</td>
<td>73%</td>
</tr>
<tr>
<td>- Transfer</td>
<td>51%</td>
<td>34%</td>
</tr>
<tr>
<td>STEMI Noted on first ECG Direct</td>
<td>87%</td>
<td>86%</td>
</tr>
<tr>
<td>- Transfer</td>
<td>90%</td>
<td>86%</td>
</tr>
<tr>
<td>Mode of Arrival</td>
<td>ND State</td>
<td>Nation</td>
</tr>
<tr>
<td>----------------------</td>
<td>----------</td>
<td>--------</td>
</tr>
<tr>
<td>Private Vehicle - Direct</td>
<td>50%</td>
<td>36%</td>
</tr>
<tr>
<td>– Transfer</td>
<td>73%</td>
<td>74%</td>
</tr>
<tr>
<td>EMS – Direct</td>
<td>49%</td>
<td>61%</td>
</tr>
<tr>
<td>– Transfer</td>
<td>27%</td>
<td>26%</td>
</tr>
</tbody>
</table>
## Median Time to Reperfusion

<table>
<thead>
<tr>
<th></th>
<th>ND State</th>
<th>Nation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary PCI – Direct Presentation in minutes</td>
<td>48</td>
<td>56</td>
</tr>
<tr>
<td>- Transfer</td>
<td>131</td>
<td>106</td>
</tr>
<tr>
<td>Fibrinolysis Administration (Ref. Hosp.) minutes</td>
<td>35</td>
<td>31</td>
</tr>
</tbody>
</table>

## Reperfusion Method

<table>
<thead>
<tr>
<th></th>
<th>ND State</th>
<th>Nation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary PCI Overall</td>
<td>70%</td>
<td>85%</td>
</tr>
<tr>
<td>- Direct Presentation</td>
<td>94%</td>
<td>90%</td>
</tr>
<tr>
<td>- Transfers</td>
<td>51%</td>
<td>74%</td>
</tr>
<tr>
<td>Fibrinolytics Transfer</td>
<td>47%</td>
<td>18%</td>
</tr>
</tbody>
</table>
2013 ACCF/AHA Guideline for the Management of ST-Elevation Myocardial Infarction

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

© American College of Cardiology Foundation and American Heart Association, Inc.
This slide set is adapted from the 2013 ACCF/AHA Guideline for the Management of ST-Elevation Myocardial Infarction (Journal of the American College of Cardiology). Published on December 17, 2012, available at: http://content.onlinejacc.org/cgi/content/full
http://content.onlinejacc.org/cgi/content/full/j.jacc.2011.08.023

The full-text guidelines are also available on the following Web sites: ACC (www.cardiosource.org) and AHA (my.americanheart.org)
The STEMI Writing Committee Members

Patrick T. O’Gara, MD, FACC, FAHA, Chair†
Frederick G. Kushner, MD, FACC, FAHA, FSCAI Vice Chair†

Deborah D. Ascheim, MD, FACC†
Donald E. Casey, Jr, MD, MPH, MBA, FACP, FAHA‡
Mina K. Chung, MD, FACC, FAHA*†
James A. de Lemos, MD, FACC*†
Steven M. Ettinger, MD, FACC* §
James C. Fang, MD, FACC, FAHA*†
Francis M. Fesmire, MD, FACEP*¶
Barry A. Franklin, PhD, FAHA†
Christopher B. Granger, MD, FACC, FAHA*†
Harlan M. Krumholz, MD, SM, FACC, FAHA*†

David X. Zhao, MD, FACC*†
Jane A. Linderbaum, MS, CNP-BC†
David A. Morrow, MD, MPH, FACC, FAHA*†
L. Kristin Newby, MD, MHS, FACC, FAHA*†
Joseph P. Ornato, MD, FACC, FAHA, FACP, FACEP*†
Narith Ou, PharmD†
Martha J. Radford, MD, FACC, FAHA†
Jacqueline E. Tamis-Holland, MD, FACC†
Carl L. Tommaso, MD, FACC, FAHA, FSCAI#
Cynthia M. Tracy, MD, FACC, FAHA†
Y. Joseph Woo, MD, FACC, FAHA†

†ACCF/AHA representative; ‡ACP representative; § ACCF/AHA Task Force on Practice Guidelines liaison; ¶ACEP representative; #SCAI representative.
Classification of Recommendations and Levels of Evidence

**S I Z E  O F  T R E A T M E N T  E F F E C T**

<table>
<thead>
<tr>
<th>CLASS I</th>
<th>Benefit &gt;&gt; &gt; Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure/Treatment SHOULD be performed/administered</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CLASS IIa</th>
<th>Benefit &gt;&gt; Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional studies with focused objectives needed</td>
<td></td>
</tr>
<tr>
<td>IT IS REASONABLE to perform procedure/administer treatment</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CLASS IIb</th>
<th>Benefit &gt; Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional studies with broad objectives needed; additional registry data would be helpful</td>
<td></td>
</tr>
<tr>
<td>Procedure/Treatment MAY BE CONSIDERED</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CLASS III</th>
<th>No Benefit or CLASS III Harm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure/ Test</td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
<td></td>
</tr>
</tbody>
</table>

**LEVEL A**

- Multiple populations evaluated*
- Data derived from multiple randomized clinical trials or meta-analyses

| Suggestion that procedure or treatment is useful/effective |
| Sufficient evidence from multiple randomized trials or meta-analyses |

**LEVEL B**

- Limited populations evaluated*
- Data derived from a single randomized trial or nonrandomized studies

| Suggestion that procedure or treatment is useful/effective |
| Evidence from single randomized trial or nonrandomized studies |

**LEVEL C**

- Very limited populations evaluated*
- Only consensus opinion of experts, case studies, or standard of care

| Suggestion that procedure or treatment is useful/effective |
| Only expert opinion, case studies, or standard of care |

---

Suggested phrases for writing recommendations:

- Should be recommended
- Is recommended
- Is indicated
- Is useful/effective/beneficial
- Is reasonable
- May/might be considered
- Is probably recommended or indicated
- May/might be reasonable usefulness/effectiveness is unknown/unclear/certain or not well established
- May/might be considered
- Is not recommended
- Is not indicated
- Should not be performed/administered/other

**Comparative effectiveness phrases**

- Treatment/strategy A is recommended/indicated in preference to treatment B
- Treatment A should be chosen over treatment B
- Treatment/strategy A is probably recommended/indicated in preference to treatment B
- It is reasonable to choose treatment A over treatment B

---

A recommendation with Level of Evidence B or C does not imply that the recommendation is weak. Many important clinical questions addressed in the guidelines do not lend themselves to clinical trials. Although randomized trials are unavailable, there may be a very clear clinical consensus that a particular test or therapy is useful or effective.

*Data available from clinical trials or registries about the usefulness/efficacy in different subpopulations, such as sex, age, history of diabetes, history of prior myocardial infarction, history of heart failure, and prior aspirin use.

†For comparative effectiveness recommendations (Class I and IIa; Level of Evidence A and B only), studies that support the use of comparator verbs should involve direct comparisons of the treatments or strategies being evaluated.
Guideline for STEMI

Onset of Myocardial Infarction
Community Preparedness and System Goals for Reperfusion Therapy
Regional Systems of STEMI Care, Reperfusion Therapy, and Time-to-Treatment Goals
Reperfusion Therapy for Patients with STEMI

*Patients with cardiogenic shock or severe heart failure initially seen at a non–PCI-capable hospital should be transferred for cardiac catheterization and revascularization as soon as possible, irrespective of time delay from MI onset (Class I, LOE: B). †Angiography and revascularization should not be performed within the first 2 to 3 hours after administration of fibrinolytic therapy.
Regional Systems of STEMI Care, Reperfusion Therapy, and Time-to-Treatment Goals

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. Performance can be facilitated by participating in programs such as Mission: Lifeline and the D2B Alliance.

Performance of a 12-lead ECG by EMS personnel at the site of FMC is recommended in patients with symptoms consistent with STEMI.
Reperfusion therapy should be administered to all eligible patients with STEMI with symptom onset within the prior 12 hours.

Primary PCI is the recommended method of reperfusion when it can be performed in a timely fashion by experienced operators.

EMS transport directly to a PCI-capable hospital for primary PCI is the recommended triage strategy for patients with STEMI with an ideal FMC-to-device time system goal of 90 minutes or less.*

*The proposed time windows are system goals. For any individual patient, every effort should be made to provide reperfusion therapy as rapidly as possible.
Regional Systems of STEMI Care, Reperfusion Therapy, and Time-to-Treatment Goals

Immediate transfer to a PCI-capable hospital for primary PCI is the recommended triage strategy for patients with STEMI who initially arrive at or are transported to a non–PCI-capable hospital, with an FMC-to-device time system goal of 120 minutes or less.*

In the absence of contraindications, fibrinolytic therapy should be administered to patients with STEMI at non–PCI-capable hospitals when the anticipated FMC-to-device time at a PCI-capable hospital exceeds 120 minutes because of unavoidable delays.

*The proposed time windows are system goals. For any individual patient, every effort should be made to provide reperfusion therapy as rapidly as possible.
When fibrinolytic therapy is indicated or chosen as the primary reperfusion strategy, it should be administered within 30 minutes of hospital arrival.*

Reperfusion therapy is reasonable for patients with STEMI and symptom onset within the prior 12 to 24 hours who have clinical and/or ECG evidence of ongoing ischemia. Primary PCI is the preferred strategy in this population.

*The proposed time windows are system goals. For any individual patient, every effort should be made to provide reperfusion therapy as rapidly as possible.
Guideline for STEMI

Reperfusion at a Non–PCI-Capable Hospital
Fibrinolytic Therapy When There Is an Anticipated Delay to Performing Primary PCI Within 120 Minutes of FMC
In the absence of contraindications, fibrinolytic therapy should be given to patients with STEMI and onset of ischemic symptoms within the previous 12 hours when it is anticipated that primary PCI cannot be performed within 120 minutes of FMC.

In the absence of contraindications and when PCI is not available, fibrinolytic therapy is reasonable for patients with STEMI if there is clinical and/or ECG evidence of ongoing ischemia within 12 to 24 hours of symptom onset and a large area of myocardium at risk or hemodynamic instability.

Fibrinolytic therapy **should not be administered** to patients with ST depression except when a true posterior (inferobasal) MI is suspected or when associated with ST elevation in lead aVR.
### Indications for Fibrinolytic Therapy When There Is a >120-Minute Delay From FMC to Primary PCI

<table>
<thead>
<tr>
<th>Diagnoses</th>
<th>COR</th>
<th>LOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ischemic symptoms &lt;12 h</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Evidence of ongoing ischemia 12 to 24 h after symptom onset and a large area of myocardium at risk or hemodynamic instability</td>
<td>Ila</td>
<td>C</td>
</tr>
<tr>
<td>ST depression, except if true posterior (inferobasal) MI is suspected or when associated with ST elevation in lead aVR</td>
<td>III: Harm</td>
<td>B</td>
</tr>
</tbody>
</table>
Adjunctive Antithrombotic Therapy With Fibrinolysis
Aspirin (162- to 325-mg loading dose) and clopidogrel (300-mg loading dose for patients ≤75 years of age, 75-mg dose for patients >75 years of age) should be administered to patients with STEMI who receive fibrinolytic therapy.
In patients with STEMI who receive fibrinolytic therapy:

- aspirin should be continued indefinitely and

- clopidogrel (75 mg daily) for at least 14 days
  
  - and up to 1 year
It is reasonable to use aspirin 81 mg per day in preference to higher maintenance doses after fibrinolytic therapy.
Adjunctive Anticoagulant Therapy With Fibrinolysis
Patients with STEMI undergoing reperfusion with fibrinolytic therapy should receive anticoagulant therapy for a minimum of 48 hours, and preferably for the duration of the index hospitalization, up to 8 days or until revascularization if performed. Recommended regimens include:

a. UFH administered as a weight-adjusted intravenous bolus and infusion to obtain an activated partial thromboplastin time of 1.5 to 2.0 times control, for 48 hours or until revascularization;

b. Enoxaparin administered according to age, weight, and creatinine clearance, given as an intravenous bolus, followed in 15 minutes by subcutaneous injection for the duration of the index hospitalization, up to 8 days or until revascularization; or

c. Fondaparinux administered with initial intravenous dose, followed in 24 hours by daily subcutaneous injections if the estimated creatinine clearance is greater than 30 mL/min, for the duration of the index hospitalization, up to 8 days or until revascularization.
Adjunctive Antithrombotic Therapy to Support Reperfusion With Fibrinolytic Therapy

<table>
<thead>
<tr>
<th>Antiplatelet therapy</th>
<th>COR</th>
<th>LOE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aspirin</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 162- to 325-mg loading dose</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>• 81- to 325-mg daily maintenance dose (indefinite)</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>• 81 mg daily is the preferred maintenance dose</td>
<td>Ila</td>
<td>B</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>P2Y12 receptor inhibitors</th>
<th>COR</th>
<th>LOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Clopidogrel:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Age ≤75 y: 300-mg loading dose</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>• Followed by 75 mg daily for at least 14 d and up to 1 y in absence of bleeding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Age &gt;75 y: no loading dose, give 75 mg</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>• Followed by 75 mg daily for at least 14 d and up to 1 y in absence of bleeding</td>
<td>I</td>
<td>A (14 d)</td>
</tr>
<tr>
<td></td>
<td>I</td>
<td>C (up to 1 y)</td>
</tr>
</tbody>
</table>
Adjunctive Antithrombotic Therapy to Support Reperfusion With Fibrinolytic Therapy (cont.)

<table>
<thead>
<tr>
<th>Anticoagulant therapy</th>
<th>COR</th>
<th>LOE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UFH:</strong></td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>Weight-based IV bolus and infusion adjusted to obtain aPTT of 1.5 to 2.0 times control for 48 h or until revascularization. IV bolus of 60 U/kg (maximum 4000 U) followed by an infusion of 12 U/kg/h (maximum 1000 U) initially, adjusted to maintain aPTT at 1.5 to 2.0 times control (approximately 50 to 70 s) for 48 h or until revascularization</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Enoxaparin:</strong></td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>If age &lt;75 y: 30-mg IV bolus, followed in 15 min by 1 mg/kg subcutaneously every 12 h (maximum 100 mg for the first 2 doses)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If age ≥75 y: no bolus, 0.75 mg/kg subcutaneously every 12 h (maximum 75 mg for the first 2 doses)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regardless of age, if CrCl &lt;30 mL/min: 1 mg/kg subcutaneously every 24 h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration: For the index hospitalization, up to 8 d or until revascularization</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fondaparinux:</strong></td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>Initial dose 2.5 mg IV, then 2.5 mg subcutaneously daily starting the following day, for the index hospitalization up to 8 d or until revascularization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contraindicated if CrCl &lt;30 mL/min</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Reperfusion at a Non–PCI-Capable Hospital

Transfer to a PCI-Capable Hospital After Fibrinolytic Therapy
Transfer of Patients With STEMI to a PCI-Capable Hospital for Coronary Angiography After Fibrinolytic Therapy
Immediate transfer to a PCI-capable hospital for coronary angiography is recommended for suitable patients with STEMI who develop cardiogenic shock or acute severe HF, irrespective of the time delay from MI onset.

Urgent transfer to a PCI-capable hospital for coronary angiography is reasonable for patients with STEMI who demonstrate evidence of failed reperfusion or reocclusion after fibrinolytic therapy.
Transfer to a PCI-capable hospital for coronary angiography is reasonable for patients with STEMI who have received fibrinolytic therapy even when hemodynamically stable* and with clinical evidence of successful reperfusion. Angiography can be performed as soon as logistically feasible at the receiving hospital, and ideally within 24 hours, but should not be performed within the first 2 to 3 hours after administration of fibrinolytic therapy.

*Although individual circumstances will vary, clinical stability is defined by the absence of low output, hypotension, persistent tachycardia, apparent shock, high-grade ventricular or symptomatic supraventricular tachyarrhythmias, and spontaneous recurrent ischemia.
**Indications for Transfer for Angiography After Fibrinolytic Therapy**

<table>
<thead>
<tr>
<th>COR</th>
<th>LOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediate transfer for cardiogenic shock or severe acute HF irrespective of time delay from MI onset</td>
<td>I</td>
</tr>
<tr>
<td>Urgent transfer for failed reperfusion or reocclusion</td>
<td>IIa</td>
</tr>
<tr>
<td>As part of an invasive strategy in stable* patients with PCI between 3 and 24 h after successful fibrinolysis</td>
<td>IIa</td>
</tr>
</tbody>
</table>

*Although individual circumstances will vary, clinical stability is defined by the absence of low output, hypotension, persistent tachycardia, apparent shock, high-grade ventricular or symptomatic supraventricular tachyarrhythmias, and spontaneous recurrent ischemia.*
North Dakota Mission: Lifeline EMS STEMI Transport Guideline

**North Dakota Mission: Lifeline EMS STEMI Transport Guideline**

**Obtain 12L ECG with Initial Vital Signs:**
- Goal: First Medical contact to ECG <10 min. Scene time < 15 minutes
- *To provide early identification and pre-hospital arrival notification for suspected myocardial infarction or STEMI*
  - Chest pain, pressure, tightness or persistent discomfort above the waist in pts. ≥ 35 yrs. of age
  - "Heartburn" or epigastric pain
  - Complaints of "heart racing" (HR > 150 or irregular and > 120) or "heart too slow" (HR < 50 and symptomatic)
  - A syncopal episode, severe weakness, or unexplained fatigue
  - New onset stroke symptoms (< 24 hours old)
  - Difficulty breathing or shortness of breath (with no obvious non-cardiac cause)
  - ROSC (return of spontaneous circulation) post cardiac arrest
  - Recent Cocaine or illicit drug use

**PH (Pre-Hospital) STEMI ALERT Activation Criteria:**
- **Goal:** Identify STEMI, Alert receiving facility - do not delay transport
- **Activate STEMI Alert when any one of the criteria met & signs & symptoms suspect of (AMI) acute myocardial infarction including chest discomfort as described with a duration of >15 minutes <24 hours
- 12 L trained ALS EMS recognize ST segment elevation of ≥ 1 mm in 2 contiguous leads with
- Confirmed Interpretation of STEMI by a Practitioner (Physician, NP, PA) by transmission
- ECG Monitor interpretative statement reads: "Acute Myocardial Infarction & signs & symptoms suspect of AMI including chest discomfort"
- **Remainder:** For persistent symptoms obtain serial 12 L ECG’s every 10 minutes during transport

**Determine Transport Destination**

- Transport time < 75 minutes and total time from first medical contact (EMS at patient’s side) to PCI (Percutaneous Coronary Intervention) FMC to PCI < 120 minutes. Notify medical control and consider transport directly to PCI Capable Receiving Hospital for Primary PCI
- Activate STEMI Alert, transmit 12 L ECG as able, provide report to receiving hospital

- Transport time > 75 minutes and estimated time from first medical contact (EMS at patient’s side) FMC to PCI > 120 minutes. Notify medical control and consider transport to the closest appropriate non-PCI capable referring hospital for possible fibrinolytic therapy and urgent transfer to a PCI Capable Receiving Facility for reperfusion.
- Activate STEMI Alert, transmit 12 L ECG as able, provide report to receiving hospital
- Consider Air Transport

**Division Criteria:** If patient demonstrates instability and/or has any one of the following Division Criteria requiring ED evaluation proceed to closest appropriate hospital:
- Possible need of head CT or neurological intervention / Confusion
- Emergent intubation immediate circulatory stabilization
- Chest trauma or MVC victim
- DNR Status
- Left bundle branch block

**BLS & ALS:**
- Administer O2 starting at 2 L/min per nasal cannula, titrate as needed to maintain SpO2 > 92%
- Obtain Systolic/Diastolic blood pressure (BP) in both arms
- Administer Chewable Aspirin 324 mg by mouth
- Administer Nitroglycerin Sublingual 0.4 mg every 5 minutes up to 3 doses if chest discomfort present and SBP > 100. Check BP prior to each administering dose. Hold if SBP < 100 mm HG. Hold All Nitrates if Echocardiography medication taken within 30 hours.
- BLS only; Request ALS Intersect per local protocol

**ALS Only:**
- Establish large bore IV access - Normal Saline 500ml KVO, Establish a second IV Line as time allows.
- Clopidogrel (Plavix) 600 mg by mouth if transferring for PCI at PCI Capable Receiving Facility
- Heparin IV Bolus 70 Units/kg IV, max 5000 Units if transferring for PCI at PCI Capable Receiving Facility
- Establish a Nitroglycerine IV drip if chest discomfort is relieved, initiate at 5 mcg/min, titrate increments of 5mcg/min to maintain a systolic BP of 100 mm HG or greater. Hold Heparin if Echocardiography medication taken within 30 hours.
- Administer analgesia as needed for discomfort per protocol

**Documentation Reminders:**
- Provide Copy of EMS Run Sheet with Report to RN or MD
- If STEMI/AMI alert is provided to the hospital, document time
- Provide a printed Copy of Pre-Hospital 12 L ECG with Report to RN or MD

**Patient Care Goals:**
- Provide early identification of patients and early notification of the hospital for suspected AMI or STEMI.
- Utilize an assessment tool that may reduce the time from onset of symptoms to receiving definitive care.
- Prepare patient for immediate transport with indicated medications administered en route to hospital. Attempt to limit the scene time to the shortest time possible.

**AHA Mission: Lifeline EMS Best Practice Goals**
1. All patients with non-traumatic chest pain, ≥35 years, treated and transported by EMS who get a pre-hospital 12-lead electrocardiogram
2. All STEMI patients transported directly to a STEMI receiving center, with first (pre-hospital) medical contact to PCI time ≤ 90 minutes or ≤120 minutes for transfers
3. All lytic eligible STEMI patients treated and transported to a referring hospital for fibrinolytic therapy with a door to needle time ≤ 30 minutes

**AHA Mission: Lifeline EMS Reporting Measures**
1. Time from symptom onset to EMS dispatch
2. Time from EMS dispatch to vehicle arrival at hospital door
3. All STEMI patients treated and transported to a referring hospital for fibrinolytic therapy should have a Fibrinolytic Checklist completed to identify concomitant medications to lytic therapy.
4. All suspected AMI/STEMI patients treated and transported by EMS should receive a 12-lead ECG
5. All STEMI patients with a pre-hospital identified STEMI call for field activation of a STEMI Alert at receiving hospital
Mission: Lifeline ND STEMI Inter-Hospital Transfer Guideline

Mission: Lifeline

ND STEMI Inter-Hospital Transfer Guideline

R.U.S.H. Rural United STEMI (ST-Segment Elevation Myocardial Infarction) Hospitals

Altru Health System – Grand Forks
Phone: 701-780-5206 or 1-855-425-8781
Fax: 701-780-1097

Essentia Health System - Fargo
Phone: 701-364-8401
Fax: 701-364-8405

Sanford Health System- Bismarck
Phone: 1-855-550-1225
Fax: 701-323-5751

Sanford Health System- Fargo
Phone: 701-234-6304 or 1-877-647-1225
Fax: 701-234-7203

St. Alexius Medical Center - Bismarck
Phone: 701-530-7699 or 1-877-735-7699
Fax: 701-530-7065

Trinity Health System - Minot
Phone: 701-857-3000 or 1-800-223-1596
Fax: 701-857-3260

AHA Mission: Lifeline Ideal STEMI Treatment Goals:
- First Medical Contact-to-First ECG time ≤10 minutes unless pre-hospital ECG obtained
- All eligible patients receiving any Reperfusion (PCI or fibrinolysis) therapy
- Fibrinolytic–eligible patients with Door-to-Needle time ≤ 30 minutes
- Reperfusion – eligible patients transferred to a PCI receiving center with referring center Door In–Door out time (Length of Stay) ≤ 45 minutes
- Referring Center ED Door-to-PCI device time ≤ 120 minutes (includes transport time)
- All STEMI patients without a contraindication receiving aspirin before ED discharge

Patients with a contraindication to transfer or PCI:
- Aspirin within 24 hours of hospital arrival, and aspirin at discharge
- Beta blocker at discharge
- LDL >100 who receive statins or lipid lowering drugs
- STEMI patients with left ventricular systolic dysfunction on ACEI/ARB at discharge
- STEMI patients that smoke with smoking cessation counseling at discharge

Upon Transfer Fax the following documents to the accepting facility: 12 L ECG, ED Record, Lab Results, Current Medication Record, ND M.L. STEMI RUSH documentation
Improving the System of Care for STEMI Patients
### Mission: Lifeline ND STEMI (ST-Segment Elevation Myocardial Infarction) Guideline

#### R.U.S.H. (Rural United STEMI Hospitals) Inter-Hospital Transfer

**NURSING DOCUMENTATION Tool**

<table>
<thead>
<tr>
<th>Patient weight (kg)</th>
<th>TNK (mg)</th>
<th>TNK (mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 50 kg</td>
<td>50 mg</td>
<td>6 mL</td>
</tr>
<tr>
<td>60 or more but less than 70</td>
<td>35 mg</td>
<td>7 mL</td>
</tr>
<tr>
<td>70 or more but less than 80</td>
<td>40 mg</td>
<td>8 mL</td>
</tr>
<tr>
<td>80 or more but less than 90</td>
<td>45 mg</td>
<td>9 mL</td>
</tr>
<tr>
<td>90 or more</td>
<td>50 mg</td>
<td>10 mL</td>
</tr>
</tbody>
</table>

**ABSOLUTE CONTRAINDICATIONS FOR FIBRINOLYSIS (TNK) IN STEMI**

1. Any prior intracranial hemorrhage
2. Known structural cerebral vascular lesion (e.g., arteriovenous malformation)
3. Known malignant intracranial neoplasm (primary or metastatic)
4. Televascular stroke within 3 months except acute ischemic stroke within 3 hours
5. Suspected aortic dissection
6. Active bleeding or bleeding diathesis (excluding ICH)
7. Significant closed-head or facial trauma within 3 months

**RELATIVE CONTRAINDICATIONS FOR FIBRINOLYSIS (TNK) IN STEMI**

1. History of chronic, severe, poorly controlled hypertension
2. Severe uncontrolled hypertension on presentation
3. History of prior ischemic stroke more than 3 months, dementia, or known intracranial pathology not covered in contraindications
4. Traumatic or prolonged CPR (over 10 minutes)
5. Major surgery (within last 3 weeks)
6. Recent internal bleeding (within last 2 weeks)
7. Noncompressible vascular punctures
8. Disseminated intravascular coagulation (DIC) prior exposure (more than 3 days ago) or prior embolization to these agents
9. Pregnancy
10. Active peptic ulcer
11. Current use of anticoagulants
12. Symptomatic or recent (<24 hours) gastrointestinal bleeds

**NURSE DOCUMENTATION**

**Hospital**

- **Patient Name:**

**Copy ECG, ED physician and Nurses documentation and send with patient – do not delay transport**

**Fax All paperwork to referring hospital (ECG, Labs, Orders, Physician Order, Notes, Medication administration record)**

**Please Document Times:**

1. **Initial Chest Pain Onset Time** 0-10 (10 being severe)
2. **Pre-Hospital ECG time** if available
3. **Referring Hospital Arrival (Door-In)**
4. **Referring Hospital 1st ECG Time** 2nd ECG Time
5. **Time Transport Activated**
6. **STEMI Alert Activation (STEMI Receiving Hospital contacted)**
7. **EMS Transport Arrival Time**
8. **Referring Hospital Departure (Door-Out)**

**RN Name (Print):**

**RN Signature:**

**Date:**

**Time:**

**Allergies:**

**Emergency Contact Name:**

**Phone:**

---

**Improving the System of Care for STEMI Patients**
Improving the System of Care for STEMI Patients

6 STEMI Physician Champion’s sign on behalf of all 6 ND PCI Receiving
### STEMI Feedback Report

**Referring Hospital:** 100 miles by ground from PCI Receiving Facility

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Actual Time</th>
<th>Goal</th>
<th>Goal Met</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door to 1st ECG</td>
<td>2</td>
<td>≤5 minutes</td>
<td>Goal met</td>
</tr>
<tr>
<td>Door to One Call</td>
<td>17</td>
<td>≤10 minutes</td>
<td>Goal not met</td>
</tr>
<tr>
<td>Door to Lytic administration</td>
<td>32</td>
<td>≤30 minutes</td>
<td>Goal met</td>
</tr>
<tr>
<td>Door-in to Door-out</td>
<td>117</td>
<td>≤115 minutes</td>
<td>Goal met</td>
</tr>
<tr>
<td>Transport time</td>
<td>56</td>
<td>≤55 minutes</td>
<td>Goal met</td>
</tr>
<tr>
<td>Sanford Health Door to PCI</td>
<td>16</td>
<td>≤20 minutes</td>
<td>Goal met</td>
</tr>
<tr>
<td>JRMC Door to PCI</td>
<td>189</td>
<td>≤190 minutes</td>
<td>Goal met</td>
</tr>
</tbody>
</table>

**STEMI Medications given prior to CCL:** Aspirin, Heparin, TNKase

**Feedback/Follow-up:**

This 54 year old female presented to the ED at 0558 with c/o chest pain x 1 ½ hours. A 12L ECG was performed at 0600 and showed anterior ST elevation. The on-call cardiologist was consulted via One Call at 0615. The decision was made to administer lytic therapy, and TNKase was given at 0632. Plans were made to transfer the patient via helicopter, and they were dispatched at 0616. The helicopter was unable to fly, so fixed wing was used. Fixed wing arrived at the patient’s beside at 0746 and departed at 0755. The patient continued to have slight chest discomfort and ST elevation en route to Sanford, and was therefore admitted directly to the cath lab at 0851. Coronary angiography was performed at 0900. This revealed a 90% LAD lesion. Thanks to the use of lytic therapy the vessel had TIMI 3 flow (normal) despite the 90% blockage. A PCI was performed at 0907 with good angiographic results. The patient’s EF was 50% per an echo performed that same day. The patient did well post PCI and was discharged home on 3-25-13.

Excellent work ED staff in quickly performing a 12L ECG and recognizing ST elevation. Also, this patient’s young age and relatively quick presentation made her a great candidate for lytic therapy. The benefits of lytics were very clear in this case given the fact that she had TIMI 3 flow in the vessel when she arrived in the cath lab. The ED staff administered lytics within 32 minutes after arrival which is great. Unfortunately the Life Flight helicopter was not able to fly and fixed wing had to be used. This results in significantly longer DIDO and transfer times, and makes the use of lytic therapy that much more important!

*See below for images

<table>
<thead>
<tr>
<th>Goal met</th>
<th>Goal not met</th>
</tr>
</thead>
</table>
after stent,
STEMI Feedback Report

Referring Hospital: central ND 100 miles from PCI receiving facility

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Actual Time</th>
<th>Goal</th>
<th>Goal Met</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door-in to 1st ECG</td>
<td>unk</td>
<td>≤ 5 minutes</td>
<td>unk</td>
</tr>
<tr>
<td>Door-in to One Call</td>
<td>14</td>
<td>≤ 10 minutes</td>
<td>✔️</td>
</tr>
<tr>
<td>Door-in to Lytic</td>
<td>30</td>
<td>&lt; 30 minutes</td>
<td>✔️</td>
</tr>
<tr>
<td>Door-in to Door-out</td>
<td>103</td>
<td>≤ 100 minutes</td>
<td>✔️</td>
</tr>
<tr>
<td>Transport time</td>
<td>55</td>
<td>≤ 55 minutes</td>
<td>✔️</td>
</tr>
</tbody>
</table>

STEMI Medications given prior to CCL: Aspirin, Heparin, Plavix

Feedback/Follow-up:

This 70 year old female started experiencing left arm pain at approximately 1200. She presented to the CAH Hospital ED at 1327. A 12L ECG was performed shortly after her arrival which showed anterolateral ST elevation. The on-call cardiologist was consulted via One Call at 1341. The decision was made to administer lytic therapy per the ACC/AHA guidelines, as the expected Door to PCI time was greater than 120 minutes, and the patient did not have any obvious contraindications. The helicopter was also dispatched at this time. They arrived at the patient’s bedside at 1500 and departed at 1510. On route to PCI receiving hospital, the patient experienced a significant mental status change and required intubation. It was also noted that she had concerning pupillary changes. The patient arrived at Sanford at 1605, and was taken immediately to CT scanning. The CT scan revealed severe intracranial hemorrhage involving the brain stem and mid brain. Cryoprecipitate and FFP were given in an attempt to reverse the thrombotics. Neurosurgery was consulted for a possible surgical intervention, however, it was determined that this was a non-salvageable injury. The decision was made per the family to withdraw treatment and provide comfort cares only. The patient currently remains on comfort measures.

It is very unfortunate that thrombolytics carry the risk of intracranial hemorrhage. The likelihood of this happening is actually very low, at approximately 1%. It is much more likely that lytics will result in a favorable outcome for STEMI patients. Given the patient’s relatively early presentation to the ED and lack of contraindications, she appeared to be a good candidate for lytic therapy. Sadly, we can’t always know what will be the outcome for patients, and have to do make choices based on what is most likely to produce the best results.
**Patient:**
**D.O.B.:** 02/10/1943 70 YEARS
**Gender:** FEMALE

**Medical Information:**
- **Systolic BP:** 88 mm Hg
- **Diastolic BP:** 60 mm Hg
- **Heart Rate:** 67 bpm
- **Respiratory Rate:** 16
- **Temperature:** 98.6°F

**ECG Findings:**
- Sinus rhythm
- Left axis deviation
- Inferior infarct - age undetermined
- Anterior infarct - age undetermined

**Abnormal ECG:**
- Unconfirmed Analysis

**Technique:**
- **Dr:** Strand
- **Tech:** Rm

**Report Date:** 11/11/2012 14:20:28
### STEMI Feedback Report

**PCI Referring Facility 110 miles from PCI Receiving Facility**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Actual Time in minutes</th>
<th>Goal</th>
<th>Goal Met</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door to ECG</td>
<td>0</td>
<td>≤5 minutes</td>
<td>Green</td>
</tr>
<tr>
<td>Door to One Call</td>
<td>3</td>
<td>≤10 minutes</td>
<td>Green</td>
</tr>
<tr>
<td>Door to transport dispatch</td>
<td>28</td>
<td>≤5 minutes</td>
<td>Red</td>
</tr>
<tr>
<td>Door-in to Door-out (includes transfer time to airport and transfer of care to NM Helicopter)</td>
<td>129</td>
<td>≤60 minutes</td>
<td>Red</td>
</tr>
<tr>
<td>Transport time</td>
<td>43</td>
<td>≤45 minutes</td>
<td>Green</td>
</tr>
<tr>
<td>Sanford Health Door to PCI</td>
<td>25</td>
<td>≤20 minutes</td>
<td>Red</td>
</tr>
<tr>
<td>Referral Door to PCI</td>
<td>197</td>
<td>≤105 minutes</td>
<td>Red</td>
</tr>
</tbody>
</table>

**STEMI Medications given prior to CCL:** Aspirin, Heparin, Lopressor, Heparin

**Feedback/Follow-up:**

This 52 year old male started experiencing chest pain and SOB at approximately 1800 while doing dishes. He presented to the ED at 1807, where a 12L ECG was performed immediately. The ECG showed anterior ST elevation, and One Call was notified at 1810 regarding the need to transfer a STEMI patient. A Helicopter was dispatched at 1839 to transfer the patient. The patient was transferred to the local airport by ground ambulance to meet the helicopter. The helicopter departed the airport at 2016, and the patient arrived in the cath lab at 2059. Coronary angiography revealed a 100% occluded proximal LAD. Thrombectomy and stenting was performed on this vessel. The patient’s EF was decreased to 35% at the time of the angiogram.

*Excellent work ED staff in obtaining a 12L ECG without delay and notifying One Call within 3 minutes! There was a delay in dispatching transport. Perhaps this had to do with difficulty arranging a flight service? Also, NM Helicopter arrived at the airport at 1927, however they didn’t depart until 2016. Presumably this time was spent waiting for the patient to arrive via ground ambulance. Timing out the arrival time of NM Helicopter and the patient at the airport could potentially have saved >40 minutes of infarct time for this patient. Lastly, the AHA/ACC guidelines suggest administering lytic therapy if the expected Door to PCI is >120 minutes. It is virtually impossible for TRF to meet the 120 minute timeframe when transferring to Fargo. Therefore TNKase should always be used if contraindications are not present.*

*See below for images*
88-OCT-2012 18:22:03
SANFORD HEALTH SYSTEM

Technical:
Turn log ACUTE IMI

Reviewed by: FULL

Sioux headscarr
Low voltage QRS, consider pulmonary disease, pericardial effusion, or central variant
Anterior infarct Acute
*** ACUTE IMI**
Abnormal ECG
After
- SINUS RHYTHM

Rate 96
PR 156
QRS 86
QT 348
QTc 440

- AXIS -
P 93
QRS 43
T 121

- ABNORMAL ECG -

Requested by:
Unconfirmed Diagnosis
COPT

Dev:
Speed: 25 mm/sec
Limb: 10 mm/mV
Chest: 10.0 mm/mV

F 60-0.50-150 Hz W PH08QD P2
Case Study #1 - Short DIDO

- 45 yo male CP onset at 1200.
- PMH: No Hx, No meds, current smoker
- Employed as truck driver in Oil industry
- Arrival 1819
- EKG 1826 (7 min) Anterior
- Lytics 1844 (25 minutes)
- Transport Dispatched 1837 (18 min)
- Door in Door out (39 min)
- Arrival PCI Center 2004
- Cath lab 2004
- Wire Cross 2034
- 90% LAD Occlusion- DES
12-Lead ECG

HR 99 bpm
PR 0.126 s
QRS 0.114 s
QT/QTc: 0.348s/0.416s

Abnormal ECG **Unconfirmed**
*** MEETS ST ELEVATION-M CRITERIA ***
Sinus rhythm with PVCs
Possible inferior infarct - age undetermined
Septal ST elevation, CONSIDER ACUTE INFARCT
Lateral ST-T abnormality may be due to myocardial ischemia
Low QRS voltages in precordial leads

P-QRS-T Axes: 80° ± 10° ± 90°

-Physio-Control, Inc! Comments:
Case Study #2 - EMS Bypass 60 miles from PCI

37 yo Male, symptom onset 1200

PMH: CAD (previous Inf. Wall MI), Obesity, HTN, Family hx

No medications

Quit smoking after earlier AMI

Location from PCI

EMS Dispatch: 1356

Contact: 1407

EKG: 1424 (28 min) Anterior

Arrival to PCI Center: 1512

CL: 1530

Wire: 1602

FMC to Reperfusion: 115 minutes
Warning: age not available, assumed 35 years
Warning: sex not available, assumed male
Sinus rhythm
Possible LVH
Age-corrected Sokolow index (SV1+RV5 or V6) = 3.6 mV
Age-corrected vectorial R in extremity leads = 2.1 mV
Moderate high-lateral repolarization disturbance secondary to LVH, consider also ischemia
Large negative T in aVL
With regadenoson 1 mg
Abnormal ECG
Unconfirmed Report
Case Study #3 - Female/Inferior

- 72 yo Female, onset of CP 2245
- PMH: HTN, IDDM, CVA
- Medications: Insulin, Statin, ASA, Verapamil, Dipyridamole
- Arrival CAH: 2322
- EKG: 2336 (14 min) Inferior
- Thrombolytics: 0020 (58 min)
- Transport Dispatch: 0013
- DIDO: 0058 (96 min)
- Arrival PCI Center: 0141
- CL 0141
- Wire 0228 (100% RCA)
- Patient coded upon arrival to cath lab and expired
Case Study #4 TNKase no Heparin

- 48 yo Male CP onset 0130
- PMH: MI X 2, Dyslipidemia, current smoker
- Non-compliant, not taking medications

- Arrival CAH: 0238
- EKG: 0246 (8 min)
- Thrombolytics: 0321 (43 min)
- Transport Dispatch: 0257 (19 min)
- DIDO: 0401 (83 min)
- Coded enroute Vfib, multiple shocks
- Arrival PCI Center: 0456
- CL: 0520
- Wire: 0538 (RCA 100%)
Questions??

Mindy Cook, RN BSN
Director Mission: Lifeline North Dakota, Minnesota
American Heart Association, Midwest Affiliate

Contact Information:
4701 W. 77th St.
Minneapolis, MN  55435
Office: 952-278-7934
Fax: 952.835.5828
E-mail: Mindy.Cook@heart.org

www.heart.org/NDMissionLifeline