SE REGION
STEMI CASE STUDIES

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STEMI PROGRAM COORDINATOR
ESSENTIA HEALTH - FARGO
CASE #1

- 63 y.o. female
- Hx: tobacco use and HLD
- Became nauseated and syncopal while working at a local technical college
- Bystanders called 9-1-1
CASE #1
Pre-Hospital 12-Lead ECG:

Name: 12-Lead 1  HR 48 bpm
ID: 021314125543 13:00:23
Patient ID: PR 0.278s QRS 0.100s
Incident ID: QT/QTc: 0.468s/0.447s
Age: 63 Sex: F
P-QRS-T Axes: -104° 87° 94°

Anteroseptal ST depression is probably reciprocal to inferior infarct

ST measurements are measured at the J point and are expressed in mm.

<table>
<thead>
<tr>
<th></th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>aVR</th>
<th>aVL</th>
<th>aVF</th>
<th>V1</th>
<th>V2</th>
<th>V3</th>
<th>V4</th>
<th>V5</th>
<th>V6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.87</td>
<td>2.82</td>
<td>3.69</td>
<td>-0.97</td>
<td>-2.27</td>
<td>3.25</td>
<td>-0.04</td>
<td>-1.44</td>
<td>0.44</td>
<td>1.37</td>
<td>0.92</td>
<td>0.82</td>
</tr>
</tbody>
</table>
CASE #1

Pre PCI

Post PCI
# CASE #1

<table>
<thead>
<tr>
<th>EMS En Route to Med Contact (min)</th>
<th>EMS 1st Contact to 12-Lead ECG (Goal 10 min)</th>
<th>First EMS (+) ECG to Call for STEMI Activation</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>11</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ACS Alert to Arrival in Cath Lab</th>
<th>Cath Lab Arrival to Cath Lab Start (min)</th>
<th>Cath Lab Start Time to Device (min)</th>
<th>EH Fargo Door to Device time</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>6</td>
<td>8</td>
<td>15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EMS FMC to Device (Goal ≤ 90 min)</th>
<th>Symptom Onset to Device time</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>44</td>
</tr>
</tbody>
</table>
Performance of a 12-lead ECG by EMS personnel at the site of FMC is recommended in patients with symptoms consistent with STEMI.
CASE #2

• 33 y.o. male
• Hx: smoking
• Presented by private vehicle to PCI center ED with c/o chest pain x 2.5 hours
CASE #2

Initial ECG - 01:39
CASE #2

Repeat ECG - 01:59

[ECG waveform with annotations]
### CASE #2

<table>
<thead>
<tr>
<th>Symptom Onset to Device Time</th>
<th>EH Fargo Door to ECG time (Goal ≤ 10 min)</th>
<th>(+) ECG to Activation (ACS ALERT)</th>
<th>Time spent in EH Fargo ED (DIDO)</th>
<th>Cath Lab Start Time to Device (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>228</td>
<td>8</td>
<td>4</td>
<td>57</td>
<td>15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(+) ECG to Cath Lab Activation (ACS Alert)</th>
<th>ACS Alert to Arrival in Cath Lab</th>
<th>Cath Lab Arrival to Cath Lab Start (min)</th>
<th>Cath Lab Start Time to Device (min)</th>
<th>(+) ECG to Device/PCI (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>26</td>
<td>4</td>
<td>15</td>
<td>49</td>
</tr>
</tbody>
</table>
CASE #3

- 87 y.o. female
- Hx: CAD, CABG, HTN, PVD, and recent NSTEMI with stenting to bypass graft
- Presented by private vehicle to referring hospital ED after sudden onset of 10/10 chest pain, nausea, and diaphoresis while eating lunch at McDonald’s
CASE #3
## CASE #3

<table>
<thead>
<tr>
<th>Referral Facility Door to ECG Goal ≤ 10 min</th>
<th>Call for ALS Transport to Arrive</th>
<th>Patient Door-in - Door-out (DIDO) Goal ≤ 45 min</th>
<th>EMS Turnaround (DIDO) Goal ≤ 10 min</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>5</td>
<td>108</td>
<td>37</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cath Lab Arrival to Cath Lab Start (min)</th>
<th>Cath Lab Start Time to Device (min)</th>
<th>Symptom Onset to Device Time</th>
<th>Referral Facility Door to Balloon/Device Goal ≤ 90-120 min</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>20</td>
<td>235</td>
<td>182</td>
</tr>
</tbody>
</table>
CASE #4

- 58 y.o. male
- Hx: smoking, HTN
- Presented by private vehicle to referring hospital ED with progressive, stabbing chest pain that began 4.5 hours prior
CASE #4

Minutes after arrival (and prior to ECG), patient became unresponsive and went into ventricular fibrillation/respiratory arrest.
CASE #4

Patient received compressions via the LUCAS device!!
CASE #4

ECG was completed after ROSC…
CASE #4
CASE #4
## CASE #4

### Symptom Onset to Device Time

<table>
<thead>
<tr>
<th></th>
<th>1st Med Contact to Ref. Facility to Balloon / Device Goal ≤ 120 min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptom Onset to Device Time</td>
<td>324</td>
</tr>
<tr>
<td>1st Med Contact to Ref. Facility to Balloon / Device Goal ≤ 120 min</td>
<td>127</td>
</tr>
</tbody>
</table>

### Referral Facility Door to ECG Transport to Arrive

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<th>Referral Facility Door to ECG (Goal ≤ 10 min)</th>
<th>Call for ALS Transport to Arrive (Goal ≤ 45 min)</th>
<th>Patient Door-in-Door-out (DIDO) (Goal ≤ 45 min)</th>
<th>EMS Turnaround (DIDO) (Goal ≤ 10 min)</th>
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<tbody>
<tr>
<td>19</td>
<td>26</td>
<td>68</td>
<td>23</td>
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### ACS Alert to Arrival in Cath Lab

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</table>
NOT A LYTIC CANDIDATE OR EVIDENCE OF CARDIOGENIC SHOCK??

- These patients are at extremely high risk.
- Fibrinolytic agents work best with adequate blood pressure and flow to the coronaries.
- Primary PCI is preferred as soon as possible. Transfer ASAP to PCI-capable center!!
Primary PCI in STEMI

Primary PCI should be performed in patients with STEMI and ischemic symptoms of less than 12 hours’ duration who have contraindications to fibrinolytic therapy, irrespective of the time delay from FMC.

Primary PCI should be performed in patients with STEMI and cardiogenic shock or acute severe HF, irrespective of time delay from MI onset.
DOCUMENTATION
REMINDERS
Complete and accurate documentation along all steps of the STEMI system of care is essential!!
# HOSPITAL DOCUMENTATION GUIDELINES

Please Document Times:

1. ________________ Initial Chest Pain Onset Pain Scale 0-10 (10 being severe)

2. ________________ Pre-Hospital ECG time (if available)

3. ________________ Referring Hospital Arrival (Door – In)

4. ________________ Referring Hospital 1\textsuperscript{st} ECG Time  

   ________________  2\textsuperscript{nd} 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)
HOSPITAL DOCUMENTATION GUIDELINES

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
HOSPITAL DOCUMENTATION TIPS

• Use RUSH Protocol to quickly document all important times during the STEMI alert (may add to EMR later)

• Copy RUSH Protocol and fax to receiving facility (will be used to create feedback form and track metric performance)

• Verify that all clocks/computers are synced to the same time
**EMS TRANSPORT GUIDELINES**

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

**Obtain 12 L 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 age 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 syncope 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)
  - POS (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"
- **Reminder:** For persistent symptoms obtain serial 12 L ECG 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
- Transport 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.
- Initiate fibrinolytic checklist per protocol
- Activate STEMI Alert, transmit 12 L ECG as able, provide report to receiving hospital

**Diversion Criteria:** If patient demonstrates Instability and/or has any one of the following Diversion 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 victims
- DNR Status
- Left Bundle Branch Block

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**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 Erectile Dysfunction medication taken within 36 hours.
- BLS only: Request ALS Intercept per local protocol

**ALS Only**
- Establish large bore IV access. Normal Saline 500 ml 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 Nitroglycerin IV Drip if chest discomfort is unrelieved. Initiate at 5 mcg/min & titrate in increments of 5 mcg/min to maintain a systolic BP of 100 mm Hg or greater. Hold Nitrates if Erectile Dysfunction medication taken within 36 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 the 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 cardiac interventions at the receiving hospital.
- 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 ≤ 90 minutes or ≤120 minutes for transfer
3. All 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 contraindications 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

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(revised 3/2014)
EMS DOCUMENTATION GUIDELINES

Documentation Reminders:

✓ Provide copy of EMS run sheet (including run times) with report to RN or MD
✓ If STEMI/AMI alert is provided to the hospital, document the time
✓ Provide a printed copy of pre-hospital 12 L ECG with report to RN or MD
QUESTIONS?

Thank you for your time and your commitment to providing excellent STEMI care!!