Establishing Reperfusion Eligibility in STEMI
Primary PCI vs. Fibrinolytics

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Disclosures:

NOTHING TO DISCLOSE
OVERVIEW

- REVIEW 2013 ACC/AHA GUIDELINES FOR STEMI: PPCI VS THROMBOLYTICS
- CASE STUDY FOR ILLUSTRATION
- SUMMARY
A 77 year old male presented to the ER in Dickinson with 30 minutes worth of chest pain and SOB. He is a lawnmower repairman and was working at home when he developed severe, sub-sternal chest pressure and SOB. His wife drove him to the hospital.

PMH was remarkable for HTN, HYPERLIPIDEMIA and TIA 5 years ago.

In the ER he was c/o 7/10 CP. BP 160/90, HR 90. An ECG demonstrated inferior ST elevations. His symptoms persisted.
Improving the System of Care for STEMI Patients
Acute Coronary Syndromes

- Unstable Angina
- Non-ST-Segment Elevation MI
- ST-Segment Elevation MI

Common Initial Presentation
Common Initial Treatment
Related Pathophysiology
Difficult Differential Diagnosis
1,360,000 Americans per year

- Unstable Angina
  - UA
  - 550,000 /year

- Non-ST-Segment Elevation MI
  - NSTEMI
  - 530,000 /year

- ST-Segment Elevation MI
  - STEMI
  - 280,000 /year
Figure Legend:

Age- and sex-adjusted incidence rates of acute MI, 1999 to 2008. I bars represent 95% confidence intervals. MI indicates myocardial infarction; STEMI, ST-elevation myocardial infarction.
Acute Coronary Syndromes
12 Lead ECGs 1-2-3

1. Ischemia *(Angina or NSTEMI)*
   a) lack of oxygenation
   b) ST depression or T inversion

2. Injury *(STEMI)*
   a) prolonged ischemia
   b) ST elevation

3. Infarct *(DEAD)*
   a) dead tissue
   b) may or may not show in Q wave
12 Lead ECGs 1-2-3

The Baseline of the ECG

Notice the baseline is elevated. This is seen on the ECG of someone suffering a "STEMI" heart attack.
Diagnostic Criteria for STEMI - ND Guideline

- ST elevation at the J point in at least 2 contiguous leads of $\geq 2$ mm (0.2 mV) in men or $\geq 1.5$ mm (0.15 mV) in women in leads V2-V3 and/or of $\geq 1$ mm (0.1 mV) in other contiguous chest leads or the limb leads.

- New or presumably new LBBB at presentation occurs infrequently, may interfere with ST-elevation analysis, and should not be considered diagnostic of acute myocardial infarction (MI) in isolation. If doubt persists, immediate referral for invasive angiography may be necessary. Consult with PCI receiving center.

- ECG demonstrates evidence of ST depression suspect of a Posterior MI consult with PCI receiving center.

- (If initial ECG is not diagnostic but suspicion is high for STEMI, obtain serial ECG at 5-10 minute intervals)
In this ECG, posterior MI is suggested by the presence of:

- ST depression in V2-3
- Tall, broad R waves (> 30ms) in V2-3
- Dominant R wave (R/S ratio > 1) in V2
- Upright terminal portions of the T waves in V2-3
The same patient, with posterior leads recorded:

*The degree of ST elevation seen in V7-9 is typically modest – note that only 0.5 mm of ST elevation is required to make the diagnosis of posterior MI.*
Reperfusion

Thrombolysis

Door to N: 30 min.

Sooner is Better

Angioplasty

FMC to Dev: 90 min.
PPCI and Lytics for AMI

STEMI occurs as a result of total occlusion of a coronary artery.

Tissue necrosis occurs in a wave front manner, the longer the occlusion time the more muscle is damaged and lost and ultimately worst outcomes for mortality and morbidity.

Treatment is to reestablish flow to the infarct related artery.
Guidelines - PCI

- Reperfusion therapy should be administered to all eligible patients with symptom onset within the prior 12 hours. (CLASS I)

- PCI in patients with STEMI and symptom onset within the prior 12 to 24 hours who have clinical and/or ECG evidence of ongoing ischemia. (CLASS II)

- Primary PCI is the recommended method of reperfusion when it can be performed in a timely fashion by experienced operators. (CLASS I)
Improving the System of Care for STEMI Patients

PPCI VS THROMBOLYTICS

- Death: PCI 7%, Lysis 9%
- Excluding shock: PCI 5%, Lysis 7%
- Non-fatal MI: PCI 3%, Lysis 7%
- CVA: PCI 1%, Lysis 2%
- Combined: PCI 8%, Lysis 14%
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.
Reperfusion Therapy for Patients with STEMI

Initially seen at a non-PCI-capable hospital*

DIDO time ≤ 30 min

- Transfer for primary PCI
  - FMC-device time as soon as possible and ≤ 120 min
    - (Class I, LOE: B)

- Administer fibrinolytic agent within 30 min of arrival when anticipated FMC-device > 120 min
  - (Class I, LOE: B)

Urgent transfer for PCI for patients with evidence of failed reperfusion or reocclusion
  - (Class IIa, LOE: B)

Transfer for angiography and revascularization within 3-24 h for other patients as part of an invasive strategy†
  - (Class IIa, LOE: B)

CABG
*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*).
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.* (YOUR door to THEIR balloon)

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.
Relationship Between PCI–Related Delay and In-Hospital Mortality (NRMI 2,3,4,5)

- PCI better
- Fibrinolysis better
CASE STUDY

- PRESENTED TO NON-PCI FACILITY
- SYMTPOM ONSET TO FMC: 30 MIN (<12 hrs)
- ESTIMATED TIME FROM FMC TO PPCI? (your door to their balloon)?
100 MILES
ESTIMATED TIME: FMC TO PCI

▸ TRAVEL TIME: 100 MILES AROUND 100 MINUTES

▸ PLUS:

▸ DIDO = DOOR IN DOOR OUT
  • LONGER THAN YOU THINK...

▸ PLUS CATH LAB TIME
Association of Door-In to Door-Out Time With Reperfusion Delays and Outcomes Among Patients Transferred for Primary Percutaneous Coronary Intervention

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*Author Affiliations*


NCDR ACTION REGISTRY

10% DIDO <10 min

60% DIDO 30-90 min

30% DIDO >90 min
<table>
<thead>
<tr>
<th>DIDO Time, min</th>
<th>Mortality, No. of Patients/Total (%)</th>
<th>Adjusted Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤30</td>
<td>43/1600 (2.7)</td>
<td>1.0 (Reference)</td>
</tr>
<tr>
<td>31-60</td>
<td>192/4841 (4.0)</td>
<td>1.34 (0.96-1.86)</td>
</tr>
<tr>
<td>61-90</td>
<td>146/3013 (4.9)</td>
<td>1.41 (0.96-2.06)</td>
</tr>
<tr>
<td>&gt;90</td>
<td>430/5176 (8.3)</td>
<td>1.86 (1.36-2.54)</td>
</tr>
</tbody>
</table>
Reperfusion at a Non–PCI-Capable Hospital

Fibrinolytic Therapy When There is an Anticipated Delay to Performing Primary PCI Within 120 Minutes of FMC
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.
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. Ischemic stroke within 3 months except acute ischemic stroke within 3 hours

5. Suspected aortic dissection

6. Active bleeding or bleeding diathesis (excluding menses)

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
   (SBP more than 180 or DBP more than 110 mmHg)
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 2-4 weeks)
7. Noncompressible vascular punctures
8. Streptokinase/anistreplase: prior exposure (more than 5 days ago) or prior allergic reaction to these agents
9. Pregnancy
10. Active peptic ulcer
11. Current use of anticoagulants: high INR per protocol
12. Symptom Onset > 6 hrs. prior to presentation consult Cardiology
ICH IN PTS >75 YO
Regional Systems of STEMI Care, Reperfusion Therapy, and Time-to-Treatment Goals

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.
THROMBOLYTIC OPTIONS

- Streptokinase

- Tissue plaminogen activator (tPA) (bolus/infusion)

- Recombinant tPA:
  - Tenecteplase (TNKase): weight-based SINGLE bolus
  - Reteplase (Retavase) 10 units x 2 BOLUSES, 30 min apart
  - Alteplase (Activase) BOLUS/INFUSION

- Recombinant agents have similar reperfusion rates and risk of ICH

- TNK has lower non-cerebral bleeding and transfusions
Adjunctive therapy with lytics

- Aspirin 325 mg. I
- Plavix 300 mg for age < 75 years, 75 mg only for older patients. I
- May use lower dose aspirin. Ila
- All patients receiving lytic therapy should receive anticoagulant therapy for at least 48 hours or until PCI. I
Adjunctive Fibrinolytic therapy anticoagulants

- UFH, weight-adjusted IV bolus and INFUSION to obtain aPTT of 1.5-2.0 times control for 48 hours or tell PCI.

- 60 U/kg max 4000 u IV bolus followed by infusion of 12U/kg/h with max 1000U/hr, adjusted for aPTT.
Improving the System of Care for STEMI Patients

Reperfusion at a Non-PCI-Capable Hospital

COMMIT: Clopidogrel in AMI
45,851 Patients p/w AMI w/in 24 hrs; ASA; lytic therapy (~1/2)

- Placebo (10.1%)
- Clopidogrel (9.3%)

9% relative risk reduction (P=.002)

- Placebo (8.1%)
- Clopidogrel (7.5%)

7% relative risk reduction (P=.03)
URGENT TRANSFER : FAILED THROMBOLYSIS

Immediate transfer for suitable patients with STEMI who develop cardiogenic shock or acute severe HF, irrespective of the time of delay from MI onset. CLASS I

Urgent transfer for angiography is reasonable for patients with STEMI who failed reperfusion or reocclusion after lytic therapy. CLASS IIa.
URGENT TRANSFER: SUCCESSFUL THROMBOLYSIS

EARLY INVASIVE

- Is reasonable for patients with STEMI after successful lysis and hemodynamically stable and with clinical evidence of successful reperfusion. CLASS IIa

- Angiography should be performed between 7 to 23 hours after successful lysis. CLASS IIa
Goal Times

• Door to ECG acquisition <10 min
• PCI capable hospital, FMC-device time<90 min.
• Non-PCI capable hospital, DIDO <30 min.
• Transfer for primary PCI only if FMC-device time<120 min. Otherwise lytics within 30 min of arrival time followed by urgent transfer.
CASE STUDY

- ASA and TNK were administered.
- DTN TIME 7 MINUTES!
- Heparin bolus and infusion were given and he was transferred to SMC via ambulance for further management.
  - (oops. no plavix?)
- DIDO 85 MINUTES
- TRANSFER TIME 103 MINUTES
- Upon arrival to SMC, CP and STE persisted.
- TIME FROM FMC: 188 MINUTES (3 HR 8 MIN)
LYTICS AND REPERFUSION

🎉 SUCCESSFUL REPERFUSION:
- >70% RESOLUTION OF ST ELEVATION
- REPERFUSION ARRYRTHMIAS
- RESOLUTION OF CHEST PAIN

 treeNode:failureOfReperfusion

🎉 FAILURE OF REPERFUSION:
- <50% RESOLUTION OF ST ELEVATION AND LACK OF REPERFUSION ARRYRTHMIAS
- BY 60-90 MINUTES PREDICTIVE OF FAILED THROMBOLYSIS
## Table 3. Patency Trials

<table>
<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td>r-PA  ( n=169 )</td>
<td>rt-PA  ( n=154 )</td>
</tr>
<tr>
<td>Dose</td>
<td>Two 10-U bolus doses over 30 min</td>
<td>100 mg over 90 min</td>
</tr>
<tr>
<td>Grade 3 flow (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60 min</td>
<td>51.2</td>
<td>37.4(^a)</td>
</tr>
<tr>
<td>90 min</td>
<td>59.9</td>
<td>45.2(^a)</td>
</tr>
<tr>
<td>Grade 2 flow (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60 min</td>
<td>81.8</td>
<td>66.1(^a)</td>
</tr>
<tr>
<td>90 min</td>
<td>83.4</td>
<td>73.3(^a)</td>
</tr>
</tbody>
</table>

\(^a\) p < 0.05.
"Rescue" PCI

427 STEMI Pts receiving lytic (60% SK, 26% RPA, 12% TPA, 2% TNK) & UFH and with <50% ST Res by 90 min
Median ~7 h after lytic, stents in ~2/3, GP 2b/3a in ~1/2

Rescue PCI 84.6%
95% CI, 78.7-90.5
P=0.004

Conservative therapy 70.1%
95% CI, 62.5-77.7

Repeated thrombolysis 68.7%
95% CI, 61.1-76.4
TRANSFER-AMI: Efficacy
Kaplan Meier Curves for Primary Endpoint
Composite of death, re-infarction, recurrent ischemia, new or worsening HF, or shock within 30 days

Cumulative Incidence

Standard treatment
Routine early PCI

p=0.004, RR 0.64
CASE STUDY

- PATIENT WITH PERSISTENT STE AND CHEST PAIN
- BROUGHT TO THE CATH LAB
Improving the System of Care for STEMI Patients
Improving the System of Care for STEMI Patients
CASE STUDY

- PATIENT DID WELL
- NO BLEEDING COMPLICATIONS
- EF 50%
- SENT HOME HOSPITAL DAY # 3
- DOING WELL AT 1 YEAR.
SUMMARY

- PPCI IS THE PREFERRED TREATMENT FOR STEMI WHEN PRESENTING TO PCI-CAPABLE HOSPITAL

- WHEN PRESENTING TO NON-PCI CAPABLE HOSPITAL, PPCI IS PREFERRED WHEN ANTICIPATED FMC TO BALLOON IS <120 MINUTES
  - DIDO < 30 MIN GOAL
  - 10% FACILITIES MEET THIS GOAL
  - TRANSFER TAKES LONGER THAN YOU THINK

- WHEN ANTICIPATED FMC TO BALLOON > 120 MINUTES ADMINISTER THROMBOLYTICS AND TRANSFER TO PCI-CAPABLE HOSPITAL
  - TRANSFER TAKES LONGER THAN YOU THINK
  - ERR ON THE SIDE OF LYRICS
  - TNK PROBABLY PREFERRED
  - GOAL DTN <30 MINUTES
  - DON’T FORGET ASA, PLAVIX AND HEPARIN
Choose A Reperfusion Pathway

- PRIMARY PCI - Direct to CATH LAB for PCI
  
  **Goal:** First Medical Contact to PCI LESS THAN < 120 minutes

  - Aspirin 324 mg chewed
  - Ticagrelor (Brilinta) 180 mg PO  OR
  - Clopidogrel (Plavix) 600 mg PO  (*do not give both Plavix & Brilinta)
  - Heparin IV Bolus (70 Units/kg, max 5,000 Units)
  - Heparin IV Drip  (15 Units/kg/hr, max 1,000 Units/hr)
  - Transport patient directly to Cath Lab for Percutaneous Coronary Intervention. Do not give Fibrinolytics (TNKase, rPA, or TPA)
  - Administer Oxygen as needed to keep SpO2 > 92%
Primary PCI

- Immediate angiography and PCI should be performed in resuscitated out-of-hospital cardiac arrest patients whose initial ECG shows STEMI.

- PPCI for patients with STEMI and ischemic symptoms of less than 12 hours duration who have C/I to lytic therapy, irrespective of the time delay from FMC.

- PPCI in STEMI with cardiogenic shock or acute severe CHF, irrespective of time delay from MI onset.
### Evaluation and Management of Patients With STEMI and Out-of-Hospital Cardiac Arrest

<table>
<thead>
<tr>
<th>Grade</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIa</td>
<td>Therapeutic hypothermia should be started as soon as possible in comatose patients with STEMI and out-of-hospital cardiac arrest caused by VF or pulseless VT, including patients who undergo primary PCI.</td>
</tr>
<tr>
<td>IIb</td>
<td>Immediate angiography and PCI when indicated should be performed in resuscitated out-of-hospital cardiac arrest patients whose initial ECG shows STEMI.</td>
</tr>
</tbody>
</table>
Primary PCI

Reasonable in patients with STEMI if there is clinical and/or ECG evidence of ongoing ischemia between 12 and 24 hours after symptom onset. II

Aspiration Thrombectomy. II

Stents, BMS or DES. I

Aspirin, Plavix, Prasugrel or Brillinta. I

Use of GPI precath is reasonable. IIb

Anticoagulant therapy should be started immediately prior to transfer for PPCI.
Admission/Discharge treatment goals:

- 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 whom smoke receive smoking cessation counseling at discharge
Thank you

Questions?
Regional Systems of STEMI Care
Reperfusion Therapy, and Time-to-Treatment Goals

Evidence Level: Ia Iib III

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.

Evidence Level: Ia Iib III

Performance of a 12-lead ECG by EMS personnel at the site of FMC is recommended in patients with symptoms consistent with STEMI.
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: 701-530-7005

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 whom smoke receive smoking cessation counseling at discharge
## Mission: Lifeline ND STEMI (ST-Segment Elevation Myocardial Infarction) Guideline

### PHYSICIAN ORDERS

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

#### PHYSICIAN'S ORDERS

**Regional Hospital:**

**Regional Hospital City:**

**Regional ED Phone:**

**Fac:**

**ED Physician** (print name):

Revised 2-13-14

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### Diagnostic Criteria for STEMI

- **ST elevation at the J point in at least 2 contiguous leads of ≥ 0.2 mm (0.2 mV) in men or ≥ 0.5 mm (0.5 mV) in women in leads V2-V3 and/or of ≥ 1 mm (0.1 mV) in other contiguous chest leads or the limb leads.**

- New or presumably new LBBB at presentation occurs infrequently, may interfere with ST-elevation analysis, and should not be considered diagnostic of acute myocardial infarction (MI) in isolation. If doubt persists, immediate referral for invasive angiography may be necessary. Consult with PCI receiving center.

- ECG demonstrates evidence of ST depression suspect of a Posterior MI consult with PCI receiving center

- If initial ECG is not diagnostic but suspicion is high for STEMI, obtain serial ECG at 5-10 minute intervals

### ACTIVATE TRANSPORT and Estimate Time to STEMI Receiving Center

**Notify STEMI Receiving Hospital and Activate STEMI Alert**

- **Call:** Request Activation of STEMI Alert
- **Fax:** records after transfer

**STANDARD ORDERS & LABS**

- **Apply Continuous Cardiac Monitor.**
- **Insert (2) peripheral large bore IV’s (0.9% NaCl TKO or Saline lock.**
- **OK, OK-IM:** Glucose, INR
- **Standard Panel:** Magnesium, dPT
- **CBC:** Troponin

**Interventional Guidelines**

- **Do not delay transfer for results**

**Choose a STEMI treatment strategy of PRIMARY PCI or FIBRINOLYSIS pathway, considering:**

- Estimated transport time from First Medical Contact to PCI facility minutes by:
  - Air:
  - Ground:
- Persistent Symptom onset to Presentation Time: __________hours ago
- Contain exacerbations or Precautions to Lytics: Y N

### Optional Medications

- **Nitroglycerin IV or 0.4 mg SL**
- ** Morphine Sulfate 1 - 5 mg IV**
- **Ondansetron (Zofran) 4 mg oral or IV**
- **Metoprolol**: 25 mg oral
- **Contraindication for METOPROLOL:** Do not give if any of the following: Signs of heart failure or shock, heart rate less than 60 or more than 100, systolic blood pressure less than 100, second or third degree heart block, severe asthma or reactive airway disease
- **Episodicate (Integrillin) per standard (Consult with Cardiologist before starting)**

### Choose One Pathway

**PRIMARY PCI – Direct to CATH Lab for PCI**

**Goal:** First Medical Contact to PCI LESS than 120 minutes

- **Aspirin 324 mg chewed**
- **Ticagrelor** (Brilliant) 180 mg PO
- **Clopidogrel (Plavix) 600 mg PO** (do not give both Plavix & Brillinta)
- **Heparin IV Bolus** (70 Units/kg, max 5,000 Units)
- **Heparin IV Drip** (15 Units/kg/hr, max 1,000 Units/hr)
- **Transport patient directly** to Cath Lab for Percutaneous Coronary Intervention
- **Oxygen as needed** to keep SpO2 > 92%

**OTHER ORDERS**

**FIBRINOLYSIS**

**Goal:** When First Medical Contact to PCI anticipated > 120 min, Door to lytic administration goal LESS than 30 minutes

- **Aspirin 324 mg chewed**
- **Tenecteplase IV (TNKase) per attached protocol**
- **Plavix 300 mg PO** (If patient > 70 yrs. consult with cardiologist and consider reducing dosage to 75 mg PO)
- **Heparin IV Bolus** (60 Units/kg, max 4,000 Units)
- **Heparin IV Drip** (12 Units/kg/hr, max 1,000 Units/hr)
- **Transport patient directly** to PCI capable hospital
- **Administer Oxygen as needed** to keep SpO2 > 92%

**MD Signature:**

**Date:**

**Time:**

**Physician:**

**Patient Name:**
Reperfusion: PCI vs Fibrinolysis for STEMI
Short Term Clinical Outcomes

- PCI
- Fibrinolysis

Frequency (%)

- Death: 7 PCI, 9 Fibrinolysis (P=0.0002)
- Death, no SHOCK data: 4.5 PCI, 7 Fibrinolysis (P=0.0003)
- Recurr. MI: 2.2 PCI, 7 Fibrinolysis (P=0.0001)
- Recurr. Ischemia: 6 PCI, 21 Fibrinolysis (P < 0.0001)
- Total Stroke: 1 PCI, 2 Fibrinolysis (P=0.0004)
- Hemorrh. Stroke: 0 PCI, 1 Fibrinolysis (P < 0.0001)
- Major Bleed: 7 PCI, 5 Fibrinolysis (P=0.032)
- Death MI: 8 PCI, 13 Fibrinolysis (P < 0.0001)

N = 7739
Improving the System of Care for STEMI Patients

![Graph showing 30-Day Mortality for different treatments in various studies.

- **GUSTO**: STK 7.4%, tPA 6.3%
- **INJECT**: rPA 9.0%, STK 9.5%
- **GUSTO-III**: rPA 7.5%, tPA 7.2%
- **ASSENT-2**: TNK 6.2%, tPA 6.2%
- **InTIME-2**: nPA 6.7%, tPA 6.6%

Source: Am J Geriatr Cardiol © 2003 Le Jacq Communications, Inc.]
Choose A Reperfusion Pathway

☐ FIBRINOLYSIS

Goal: When First Medical Contact to PCI anticipated > 120 min, Door to lytic administration goal LESS THAN < 30 minutes

☐ Aspirin 324 mg chewed

☐ Tenecteplase IV (TNKase) per attached protocol

☐ Plavix 300 mg PO (If patient > 75 yrs. consult with cardiologist and consider reducing dosage to 75 mg PO)

☐ Heparin IV Bolus (60 Units/kg, max 4,000 Units)

☐ Heparin IV Drip (12 Units/kg/hr, max 1,000 Units/hr)

☐ Transport patient directly to PCI capable hospital

☐ Administer Oxygen as needed to keep SpO2 > 92%
EARLY CATH VS DELAYED CATH POST-LYTICS

Graph showing the time (median or average) from Fibrinolysis to PCI for different studies:
- **SIAM-3**: 50.6%, 3.5 h
- **GRACIA-1**: 21%, 16.7 h
- **CAPITAL-AMI**: 24.9%, 1.6 h
- **CARESS-in-AMI**: 10.7%, 2.2 h
- **WEST**: 24%, 4.9 h
- **TRANSFER-AMI**: 17.2%, 3.9 h
- **NORDI-STEMI**: 27%, 2.7 h

The table below provides the number of patients (N) for each study:

<table>
<thead>
<tr>
<th>Study</th>
<th>N Risk</th>
<th>Follow-up</th>
<th>Composite</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIAM-3</td>
<td>163 All</td>
<td>6 mo</td>
<td>D, MI, RI, TLR</td>
</tr>
<tr>
<td>GRACIA-1</td>
<td>500 All</td>
<td>12 mo</td>
<td>D, MI, RI, revasc</td>
</tr>
<tr>
<td>CAPITAL-AMI</td>
<td>170 High</td>
<td>6 mo</td>
<td>D, MI, RI, stroke</td>
</tr>
<tr>
<td>CARESS-in-AMI</td>
<td>600 High</td>
<td>30 d</td>
<td>D, MI, RI</td>
</tr>
<tr>
<td>WEST</td>
<td>204 All</td>
<td>30 d</td>
<td>D, MI, RI, CHF, shock, arrhy shock</td>
</tr>
<tr>
<td>TRANSFER-AMI</td>
<td>1059 High</td>
<td>30 d</td>
<td>D, MI, RI, CHF, shock, arrhy shock</td>
</tr>
<tr>
<td>NORDI-STEMI</td>
<td>266 All</td>
<td>12 mo</td>
<td>D, MI, RI, stroke</td>
</tr>
</tbody>
</table>
Angiography and revascularization should not be performed within the first 2 to 3 hours after administration of fibrinolytic therapy.

- Bleeding risk <2 to 3 hrs
- Time for lytics to work