Pathway Based Approach to Acute Coronary Syndrome

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Introduction

- In the United States approximately 8 million patients annually present to the emergency departments with chest pain or chest pain equivalent symptoms, which ultimately results in 2.3 million hospitalizations for Acute Coronary Syndrome (ACS).\(^1,^2\)

- Clinical guidelines for the management of ACS have consistently shown a major gap between the national guidelines and their application in the actual management of patients with ACS.\(^3\)

2. AHA Heart Disease and Stroke Statistics – 2006 Update. Circulation 2006;113:e85.3
In-hospital Mortality and Guideline Adherence

Improved Hospital Adherence

Hospital Composite Adherence Quartiles (by Quartiles)

Other Obstacles

- Cardiologists are not always the first physicians evaluating the ACS patients.
- Different specialists and even cardiologists may have different approaches to the management of ACS patients.
- Actual daily care of ACS patients may be dependent on medical residents/cardiology fellows/nursing staff.
- Guidelines often do not incorporate the latest data.
The PAIN
Pathway For The Management Of Acute Coronary Syndrome

1. Initial Assessment: 12-lead EKG within 10 minutes, Vital signs, H&P
2. Consider Non-ACS chest pain
3. Labs: CBC, Basic Metabolic Panel, Cardiac Markers, (CPK, CPK-MB, Troponin) PT, PTT, INR, MG, Lipid profile
4. Patient MUST fall into one letter of the acronym

Prioritization:
- Chest Pain >= 30 min with:
  - >= 1mm ST elevation in >= 2 contiguous leads or
  - New LBBB or
  - Acute Posterior wall MI (ST depression in leads VI-V3)

Give:
- IV
- O2
- Plavix 300mg PO x 1
- ASA 325mg PO crushed stat
- Heparin (unfractionated or enoxaparin)

Duration of Symptoms < 12 hours?

YES: Activate MI team
- Start Op IIb IIIa inhibitor and transfer immediately to the cath lab for revascularization
- Admit to CCU

NO: On site PCI capability and door to balloon time <= 90 min or Cardiogenic Shock?

YES: Admit to CCU
- Life Style Modification: Exercise, Weight and diet control, Smoking cessation

NO: Lysis (TNK)

YES: Admit to CCU
- Ecocardiogram
- Evaluate LV function

Intermediate Risk:
- Typical Anginal Symptoms
  - Prolonged symptoms (> 20 min) relieved by nitro or rest
  - Symptoms at rest
  - Accelerated chest pain in prior 48 hours

Is there evidence of:
- Dynamic ST shifts (> 0.5 mm) and / or
- Elevated troponin > 0.2 ng/ml

Give:
- ASA 325mg PO x 1
- Heparin (unfractionated or enoxaparin)
- Beta Blockers (if no contraindication)

Admit to CCU
- Early Catheterization (within 12-72 hours) and revascularization (PCI/CABG) if necessary

Admit to CCU
- Secondary Prevention
  - Aspirin
  - Plavix
  - Beta Blocker
  - Heparin (unfractionated or enoxaparin)

Admit to CCU
- Life Style Modification: Exercise, Weight and diet control, Smoking cessation

Admit to CCU
- Cardiology consult
- Refer for cardiac cath
- Discharge home and risk factor modification

Admit to medical floor or chest pain unit
- Imaging stress testing (echo, nuclear)
- Imaging stress testing (echocardiography)

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The **PAIN**
Pathway For The Management Of Acute Coronary Syndrome

**CHEST PAIN EQUIVALENT**
- Dyspnea
- Jaw or neck discomfort
- Epigastric discomfort

**CHEST PAIN** or **CHEST PAIN EQUIVALENT**
- Back (interscapular) discomfort
- Left shoulder, elbow or arm discomfort
1. Initial Assessment: 12-lead EKG within 10 minutes, Vital signs, H&P
2. Consider Non-ACS chest pain
3. Labs: CBC, Basic Metabolic Panel, Cardiac Markers, (CPK, CPK-MB, Troponin) PT, PTT, INR, MG, Lipid profile
4. Patient MUST fall into one letter of the acronym CPR (Chest Pain, Resuscitation)
Pathway

**PRIORITY**

Chest Pain ≥ 30 min with:
- ≥ 1mm ST elevation in ≥ 2 contiguous leads or
- New LBBB or
- Acute Posterior wall MI (ST depression in leads V1-V3)

**Give:**
- IV
- O2
- Plavix 300mg PO x1
- ASA 325mg PO - chewed stat
- NTG IV or SL
- Beta Blocker IV (if no contraindication)
- High dose statin (Lipitor 80 mg PO)
- Heparin (unfractionated or enoxaparin)
PRIORITY

Chest Pain ≥ 30 min with:
- ≥ 1mm ST elevation in ≥ 2 contiguous leads or
- New LBBB or
- Acute Posterior wall MI (ST depression in leads V1-V3)

Give:
- IV
- O2
- Flavix 300mg PO x1
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- NTG IV or SL
- Beta Blocker IV (if no contraindication)
- High dose statin (Lipitor 80 mg PO)
- Heparin (unfractionated or enoxaparin)

Prasugrel
Duration of Symptoms < 12 hours?

On site PCI capability and door to balloon time < 90 min or Cardiogenic Shock?

Ongoing chest pain?

Meets Thrombolytic eligibility? (no contraindication)

Activate MI team

Start Gp IIb-IIIa inhibitor and transfer immediately to the cath lab for revascularization
Duration of Symptoms < 12 hours?

- YES
  - On site PCI capability and door to balloon time < 90 min or Cardiogenic Shock?
    - NO
      - Ongoing chest pain?
        - NO
    - YES
      - Lytic (TNK)

- NO
  - Meets Thrombolytic eligibility? (no contraindication)
    - NO
      - Activate MI team
        - Start GP IIb/IIIa inhibitor and transfer immediately to the cath lab for revascularization
        - Bivalirudin
Admit to CCU

- Echocardiogram
  - Evaluate LV function

Life Style Modification:
- Exercise
- Weight and diet control
- Smoking cessation

Secondary Prevention:
- ASA
- Plavix
- High dose statin
- ACE inhibitors/ARB’s
- Beta Blocker
Typical Anginal Symptoms

- Prolonged symptoms (> 20 min) relieved by nitro or rest
- Symptoms at rest
- Accelerated chest pain in prior 48 hours

Is there evidence of:

- Dynamic ST shifts (> 0.5 mm) and / or
- Elevated troponin > 0.2 ng/ml
Give:
- ASA 325mg PO x1
- Plavix 300mg PO x1
- Heparin (unfractionated or enoxaparin)
- Beta Blockers (if no contraindication)
- NTG IV or SL
- GP IIb-IIIa inhibitors
- Statin

Admit to CCU

Early Catheterization (within 12-72 hours) and revascularization (PCI/ CABG) if necessary
Give:
- ASA 325mg PO x1
- Heparin (unfractionated or enoxaparin)
- Beta Blockers (if no contraindication)

Admit to telemetry

Is there evidence of evolving ST changes or positive cardiac markers?

NO

Is there evidence of any of the following high risk features?
- New or worsening CHF symptoms
- Malignant ventricular arrhythmias
- Hemodynamic instability
- Recent PCI or CABG
NEGATIVE or LOW RISK

- Atypical syndrome with limited CP (< 20 min)
- ECG normal or without ischemic changes during pain
- Cardiac markers not elevated

Admit to medical floor or chest pain unit

• ASA
• NTG prn

• F/U EKG
• F/U cardiac markers
Is there evidence of evolving ST changes or positive cardiac markers?

- **NO**
  - Imaging stress testing (echo, nuclear)
    - Is there evidence of significant ischemia on stress test?
      - **YES** Cardiology consult Refer for cardiac cath
      - **NO** Discharge home and risk factor modification
- **Primary Prevention:**
  - Consider:
    - ASA
    - Statin
    - Beta Blocker
    - ACE inhibitors/ARB's

- **Life Style Modification:**
  - Exercise
  - Weight and diet control
  - Smoking cessation
Initial treatment plan according to the PAIN letters

**Plan**

- **Heparins:**
  - √ UFH (Unfractionated Heparin)
  - □ Enoxaparin (1mg/kg SQ q12h)
  - □ Can't use Heparin Because

- **Antiplatelet Agents:**
  - √ Aspirin (For acute MI first dose 325 mg non enteric coated STAT followed by 75-325 mg po enteric coated daily)
    - □ 81mg
    - □ 162 mg
    - □ 325 mg
    - □ Cannot take aspirin because
  - √ Clopidogrel (300 mg po STAT then 75 mg po daily)
  - □ GP IIb/IIIa (Given in conjunction with heparin)
  - √ Integrillin
  - □ Abciximab (prior PCI only)
  - □ Can't take IIb/IIIa because

**Beta Blockers:**
- √ Metoprolol (25-100 mg) __________ mg po q 12h
- □ Carvedilol (3.125-25 mg) __________ mg po q 12h
- □ Cannot take beta blocker because
  - □ Advanced Heart Block
  - □ Hypotension
  - □ Severe Bradycardia
  - □ Bronchospastic disease

**ACE Inhibitors:**
- √ Drug ________mg po (daily q12h/q8h)
- □ Cannot take ACEI because

**Statins:**
- √ Drug ________statin, 40 mg po daily
- □ Cannot take statins because

**Other Medications:**
- ________________________________
- ________________________________
- ________________________________
- ________________________________
- ________________________________
- ________________________________
- ________________________________

**Notes:**
Guided Discharge summaries

Patient discharge instructions
Including Smoking cessation
And exercise advise and
Referral for cardiac rehab if Required.

Chest Pain Pathway Discharge Summary

Discharge Category:
☐ Priority    ☑ Advance    ☐ Intermediate    ☐ Negative

Antiplatelet Agents:
☑ Aspirin (75-325 mg po enteric coated daily)
  ☐ 81 mg    ☐ 162 mg    ☑ 325 mg
  ☐ Cannot take aspirin because__________________________
  ☐ Clopidogrel (75 mg po daily)

Beta Blockers:
☑ Metoprolol (25-100 mg)  50
  ☐ Carvedilol (3.125-25 mg)  ____________ mg po q 12 h
  ☐ Toprol XL (50-200 mg)  ____________ mg po daily
  ☐ Cannot take beta blocker because
    ☐ Advanced Heart Block    ☐ Hypotension    ☐ Decompensated CHF
    ☐ Severe Bradycardia    ☐ Bronchospastic disease

ACE Inhibitors:
☑ Drug _______pril, 20 mg po (daily q12h q8h)
  ☐ Cannot take ACEI because__________________________

Statins:
☑ Drug _______statin, 40 mg po daily
  ☐ Cannot take statins because__________________________
Effect on Admission Orders

- **Antiplatelets**: PRE (n=215) 50% → POST (n=269) 75% (P = 0.007)
- **B-Blockers**: PRE (n=215) 45% → POST (n=269) 54% (P = 0.19)
- **ACEi/ARBs**: PRE (n=215) 32% → POST (n=269) 54% (P < 0.0001)
- **Statins**: PRE (n=215) 35% → POST (n=269) 62% (P < 0.0001)
Effect on Discharge Orders

- **Antiplatelets**: PRE (n=215) 34%, POST (n=269) 91%
- **B-Blockers**: PRE (n=215) 30%, POST (n=269) 61%
- **ACEi/ARBS**: PRE (n=215) 32%, POST (n=269) 68%
- **Statins**: PRE (n=215) 37%, POST (n=269) 70%

All differences are significant with P < 0.0001.
Effect on Discharge Orders

\[ P < 0.0001 \]
Treatment rates at One-Year Follow-up

<table>
<thead>
<tr>
<th>12-month follow-up:</th>
<th>Pre-ACAP (n=215)</th>
<th>Post-ACAP (n=269)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statin</td>
<td>20%</td>
<td>84%</td>
<td>0.0001</td>
</tr>
<tr>
<td>LDL &lt; 100 mg/dL</td>
<td>9%</td>
<td>47%</td>
<td>0.001</td>
</tr>
<tr>
<td>Beta-Blocker</td>
<td>21%</td>
<td>51%</td>
<td>0.001</td>
</tr>
<tr>
<td>Aspirin</td>
<td>36%</td>
<td>86%</td>
<td>0.001</td>
</tr>
</tbody>
</table>
Clinical Events for the First Year After Discharge

Event Rates (%)

- Recurrent Angina: PRE 28.5, POST 13*, P < 0.05
- PCI/CABG: PRE 15, POST 5*, P < 0.05
- Hospitalization: PRE 16, POST 22
- Total Mortality: PRE 5, POST 1
- ALL Events: PRE 36, POST 19*, P < 0.05

* P < 0.05
Long-term Effect on Composite Endpoints

Survival probability (%)

Follow-up Period

GROUP
- PRE
- POST

HR = 0.42, (95% CI 0.19-0.84), P = 0.015

RRR = 60%
Conclusions

- Pathway-based approach to acute coronary syndrome can provide a uniform management of patients and significantly improve the adherence to guidelines.

- This increased adherence to the guidelines can improve the outcomes of patients with acute coronary syndrome.