Chest Pain / Acute Coronary Syndrome Protocol

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Disclosures

No financial disclosures

General – during training

• Clinical research:
  • Participation in trials:
    • TRITON-TIMI 38, ANTHEM – TIMI 32, ACUITY, CHAMPION-PCI (site co-primary investigator);
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    • St Jude Medical;
• Further research support:
  • Boston Scientific;
  • Abbott;
  • Terumo;
  • The Medicines Company.
A 62 year old man, smoking 5 cigarettes/day, had left anterior chest discomfort (CP) onset at 12:00AM, 4/10, not radiating. Arrived in ER at 2:00 AM, CP ongoing.

BP=150/93mmHg, HR=82bpm, BMI=33 kg/m2, afebrile, SaO2=94% room air, no JVD, no crackles on lung auscultation, no heart murmur.

Normal ECG. Normal i-STAT troponin.

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1. Every 6 hours from ER presentation for total of 3 sets;
2. Collect troponin #2 starting 3 hours after CP onset and if negative or ambiguous, collect troponin #3 starting 6 hours after CP onset;
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Same patient:
Correct troponin orders have been placed, aspirin 325 mg chewed, unfractionated heparin iv bolus+drip and nitroglycerin iv drip were immediately administered.

25 min have passed, CP ongoing 3/10.
BP=120/75mmHg, HR=79bpm, SaO2=95% room air, normal PEx.

Which is the best next step:

1. Give morphine 2g iv while waiting for next set of troponin;
2. Give NTG 0.4 mg sublingual;
3. Perform 12 lead standard ECG and if negative, add posterior lead ECG;
4. Call cardiology for immediate consultation;
Give morphine 2g iv while waiting for next set of troponin; Give NTG 0.4 mg sublingual; Perform 12 lead standard ECG and if negative, add posterior lead ECG; Call cardiology for immediate consultation;
About this lecture:

- Chest pain (CP) and Acute Coronary Syndrome (ACS)

  - Not including: suspicions of pulmonary embolism, aortic dissection, chest wall / overt musculoskeletal / non-coronary CP
I. Hospitalized Patients with Chest Pain?
Median Time in minutes to primary PCI for STEMI patients

<table>
<thead>
<tr>
<th>My Hospital R4Q</th>
<th>US Hospitals 50th Pctl</th>
<th>US Hospitals 90th Pctl</th>
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<tr>
<td>43.5</td>
<td>59.3</td>
<td>47.6</td>
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Issues...

- **Time delays** for in-house ACS / STEMI Tx.

In-house STEMI case

~ typical ER STEMI presentation case
Principles of new CP protocol

1. Fast recognition
   – Appropriate diagnostic approach

2. Fast treatment

3. Appropriate medications

Checklist approach
The new protocol works!

Code Heart Timing Q1-Q4 2014

- Chest Pain to Code Heart Page: Actual 2, Benchmark 5
- Code Heart Page to ECG: Actual 6, Benchmark 10
- ECG to MD Informed: Actual 4, Benchmark 5
- Chest Pain Onset to MD informed: Actual 14.5, Benchmark 20
The new protocol works!

In-house STEMI case

~ in-house STEMI – CP protocol - code heart team
II. The Chest Pain Treatment Protocol
I. New Chest pain / equivalent, suspicion of Acute coronary syndrome → inform MD

Classical angina / chest pain
Angina / chest pain equivalents

• Want to be all-inclusive – not to miss the unusual
  – Chest pain vs. “chest discomfort” / “chest press”
  – Discomfort may be solely in: jaw, neck, teeth, ear, stomach, back, arm(s)
  – Just unexplained shortness of breath (w/o discomfort/press/pain)
  – Unexplained fatigue
  – Diaphoresis
I. New Chest pain / equivalent, suspicion of Acute coronary syndrome → inform MD

Code Heart team: STAT standard 12 lead ECG (5-10 min from onset)/compare + symptom check; VS check (RN)

- if ST segment elevation call cardiologist STAT (STEMI protocol per cardiology); inform admitting /covering MD otherwise

AND MD proceed per below

• In emergency room - ER staff
  or
• On the floors (any) - “Code Heart” team
Recognize the storm / STEMI - you’re in the middle of it!

Get help!
The “Code Heart” protocol

Chest pain or equivalent

Vital signs STAT

If BPs ≥ 90 mmHg:
RN calls operator STAT (3333) for “Code Heart” & indicates room nr. ___

Operator:
- calls overhead “Code Heart”
- Pages “code heart” – dedicated pager

Code Heart Team comes STAT
- Day: MI Coordinator (8:00am – 5:00 pm) + assigned PCU RN (7:00am-7:00pm)
- Night: assigned PCU RN

If BPs <90 mmHg activate Rapid response team
The “Code Heart” protocol

Code Heart team does standard 12 lead ECG STAT (leaves electrodes in position)

ECG read by heart team and comparison made with prior ECG if available

If new ST elevation:
call cardiologist on call STAT (or cardiologist who consulted)

If no new ST elevation:
A. Call MD in charge for patient and inform re
   1. CP type
   2. VS
   3. ECG appearance (“no change” or “new changes” …)
B. Leave phone call back number to floor RN

Code Heart team questionnaire:
1. CP location
2. Radiation
3. Quality of pain
4. Reproducible by palpation / deep breath
5. Heartburn/recent pill/food ingestion/ h/o GI issues

RN brings chart - latest ECG for comparison

1. Get ECG to cardiologist or fax it
2. Cardiologist see patient STAT (if in house)
3. call 2222 “Hospital code STEMI, room ___” (if appropriate)
4. Defibrillator pads on, connect to defibrillator, ready to transport; ascertain iv lines work; O2 4l NC if SaO2<90%
5. Cathlab nurse calls team when ready to accept patient
6. Roll patient to cathlab
7. in cathlab meet pharma, phlebo etc

Covering MD to see patient and proceed by CP algorithm

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No ST segment elevation – are we to calm down?

The storm may be coming your way (evolving STEMI, some NSTEMIs)
Initial ECG may be completely normal in any ACS
Troponin may also be normal upon arrival

Dynamics in MI

Troponin elevation: Up to 14 days
I. New Chest pain / equivalent, suspicion of Acute coronary syndrome → inform MD

Code Heart team: STAT standard 12 lead ECG (5-10 min from onset)/compare + symptom check; VS check (RN)

- if ST segment elevation call cardiologist STAT (STEMI protocol per cardiology); inform admitting /covering MD otherwise

**AND MD proceed per below**

**STAT Aspirin** 162-325 mg po x1 chewed (if not already given)

**STAT troponin** and page to ordering MD if result abnormal

**Heparin protocol** (unless contraindicated): 60 Units/kg bolus (*maximum 4000 Units*), drip 12 Units/kg/h iv (*maximum 1000 Units/h*) (then per protocol: target is R=1.5-2 or aPTT 50-70s)

**Medications:**
- Nitroglycerin sublingual prn, iv drip (per need);
- beta-blocker;
- statin;
- ACEI/ARB

Order **troponin check at 3-6h from significant CP onset** AND at **6-12h from significant CP**

Admission orders per need including:
- Fasting lipids
- Smoking cessation
How/when to check troponins?

“Every 6-8 (7) hours”

Clock/timing

ACS / symptom onset hypothetically - midnight

ER, trop #1 2:10am
How/when to check troponins?

“Every 6-8 (7) hours”

ACS / symptom onset hypothetically - midnight

Clock/timing

trop #2 10:00am
ER, trop #1 2:10am
How/when to check troponins?

“Every 6-8 (7) hours”

ACS / symptom onset hypothetically - midnight

Clock/timing

trop #2
10:00am

ER, trop #1
2:10am

trop #3 ...
5:00pm
How/when to check troponins?

“Every 6-8 (7) hours”

ACS / symptom onset hypothetically - midnight

Per guidelines 2014

ACS / symptom onset hypothetically - midnight

Clock/timing

ER, trop #1 2:00am

trop #2 10:00am

trop #3 ... 5:00pm

trop #3 for intermediate-high suspicion

ER, trop #1 2:10am

trop #2
How/when to check troponins?

“Every 6-8 (7) hours”

Per guidelines 2014

ACS / symptom onset hypothetically - midnight

Clock/timing

ER, trop #1 2:00am

trop #2 10:00am

trop #3 ... 5:00pm

Much faster

If + Early Tx !!

If - Early d/c !!!

trop #2 3:00am

trop #3 7:00am

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II. First troponin positive with suspected ACS

Cardiologist informed / consult

Consider second antiplatelet medication by cardiologist per his evaluation:

P2Y12 receptor inhibitor: clopidogrel (300-600mg po load, then 75 mg po daily) or prasugrel (60mg po, then 10 mg po daily) or ticagrelor (180 mg po, then 90 mg po bid) OR

Glycoprotein IIb/IIIa receptor antagonists: eptifibatide [180mcg bolus iv, then 2 mcg/kg/min if Cl Crea>50 (1mcg/kg/min if Cl Crea<50), second bolus per above in 10 min]
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III. Suggestive chest pain persisting / troponin negative or not yet available

RN check pt (in ~ 20 min) + call code heart team back: Standard 12 lead ECG @30 min from 1st ECG
-> if ST segment elevation call cardiologist STAT (STEMI protocol per cardiology); inform admitting /covering MD otherwise

AND MD proceed per below
New ECG changes
**II. First troponin positive with suspected ACS**

- Cardiologist informed / consult

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**III. Suggestive chest pain persisting / negative troponin**

- RN check pt (in ~ 20 min) and if pain still persisting - call code heart team back: Standard ECG @30 min from 1st ECG

  -> if ST segment elevation call cardiologist STAT (STEMI protocol per cardiology); inform admitting /covering MD otherwise

  AND MD proceed per below

- AND do posterior lead ECG (V7, V8, V9) after repeated standard ECG (if no new change)

  -> if ST segment elevation call cardiologist STAT (STEMI protocol per cardiology); inform admitting /covering MD otherwise

  AND MD proceed per below
Correct ECG leads positioning

- **Posterior leads:**
  - V4→V7 – post axillary line
  - V5→V8 – mid scapular line
  - V6→V9 – paravertebral line
Abnormal posterior lead ECG

Finding ST segment elevations otherwise not detected (comments on this particular ECG – limb leads – accepted)

= occluded coronary artery (LCx)
= STEMI
Abnormal posterior lead ECG

Finding ST segment elevations otherwise not detected (comments on this particular ECG – limb leads – accepted)

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RN check pt (in ~ 20 min) and if pain still persisting - call code heart team back: do 3rd ECG at 20-30 min from 2nd ECG
-> if ST segment elevation call cardiologist STAT (STEMI protocol per cardiology); inform admitting /covering MD otherwise AND MD proceed per below

Cardiology consult for: increased suspicion, positive troponin, significant ECG changes, hemodynamic or electrical instability
IV. Initial negative / equivocal with suspected ACS

A. New / worsening abnormal troponin
   - Immediate cardiology consult
   - Consider second antiplatelet medication by cardiologist per prior

B. Troponin negative x 3
   - D/C anticoagulation

Stress test – (if low clinical suspicion, low risk factor profile normal ECG, may do within 48-72 h as outpatient.) Otherwise do in-house:

1. Treadmill/ECG if: No ST segment depressions; no LBBB, no pacemaker, no WPW, able to go on treadmill and no prior revascularization;
2. Treadmill/nuclear if: ST segment depressions, if prior revascularization, no LBBB, no pacemaker, if able to go on treadmill;
3. Lexiscan/nuclear if: unable to go on treadmill, LBBB, pacemaker, WPW, on flecaainde
4. Alternatively: Dobutamine/nuclear - only for severe obstructive airway dysfunction or severe brady-dysrhythmia;

Call cardiology for any questions

If stress test negative, D/C all unnecessary medications
V. If conservative management chosen

Unless pt on comfort care, deemed to hospice or having contraindications needs to have:

Aspirin 81 mg po daily
Clopidogrel 300mg po loading, then 75 mg po daily
Anticoagulation: enoxaparin 1mg/kg subQ q12h (if Cl crea<30, daily) or fondaparinux 2.5 mg subQ daily, for hospitalization duration or 8 days maximum (or heparin protocol x 48h – try to avoid switching anticoagulant treatments)
Beta-blocker
ACEI/ARB (if LVEF<40%)
Statin
LVEF assessments (echocardiography if nuclear stress test not done)
Fasting lipids
Smoking cessation
Rehab - order given to patient if applicable
Acute Coronary Syndrome D/C Checklist - Essential Orders

- **Aspirin 81 mg po daily (specify duration)**
  Reason not given (pls. document in chart): allergy; aortic dissection; bleeding disorder; brain/CNS cancer; extensive, metastatic CA; hemorrhage of any type; hemorrhagic stroke; intracranial surgery/biopsy; active peptic ulcer; planned surgery within 7 days from d/c (make plans to start after surgery); risk of bleeding; unrepaired cranial aneurysm; coumadin prescribed at d/c; patient or family refusal;

- **Clopidogrel 75 mg po daily or Effient 10 mg po daily or Brilinta 90 mg po bid (specify duration)**
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- **Beta-blocker**
  Reason not given (pls. document in chart): allergy / intolerance; hypotension (<90mmHg / symptomatic); bradycardia (<50bpm / symptomatic); AV block grd. II or III (and no pacemaker); severe bronchospastic disease; patient or family refusal;

- **ACEI/ARB (if LVEF<40%)**
  Reason not given (pls. document in chart): angioedema; hyperkalemia; hypotension; renal artery stenosis (bilateral); worsening renal function / renal disease / dysfunction; documented severe aortic stenosis; pregnancy; patient or family refusal;

- **Statin**
  Reason not given (pls. document in chart): allergy / intolerance; hepatic dysfunction; no atherosclerosis documented by cardiologist; known myopathy; pregnancy; patient or family refusal;

- **Spironolactone for STEMI with EF<40% and CHF or DM (may need BMP f/u)**
  Reason not given (pls. document in chart): allergy / intolerance; Creatinine >2.0 mg/dl in woman or >2.5 mg/dl in man; hyperkalemia; hyponatremia; patient or family refusal;

- **LVEF assessments (need echocardiography if nuclear stress test not done)**
  Reason not done (pls. document in chart): patient refusal

- **Fasting lipids assessment during admission (and at 6 -8 weeks after d/c if new medication change)**

- **Smoking cessation**
  Reason not done (pls. document in chart): patient refusal

- **Rehab - order given to patient if applicable:**
  Reason not given (pls. document in chart): patient refusal; unavailability
What have we learned?
A 62 year old man, smoking 5 cigarettes/day, had left anterior chest dyscomfort (CP) onset at 12:00AM, 4/10, not radiating. Arrived in ER at 2:00 AM, CP ongoing.

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Thank You for Listening!