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);
  - Research Grants:
    - St Jude Medical;
- Further research support:
  - Boston Scientific;
  - Abbott;
  - Terumo;
  - The Medicines Company.

QUIZ #1

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.

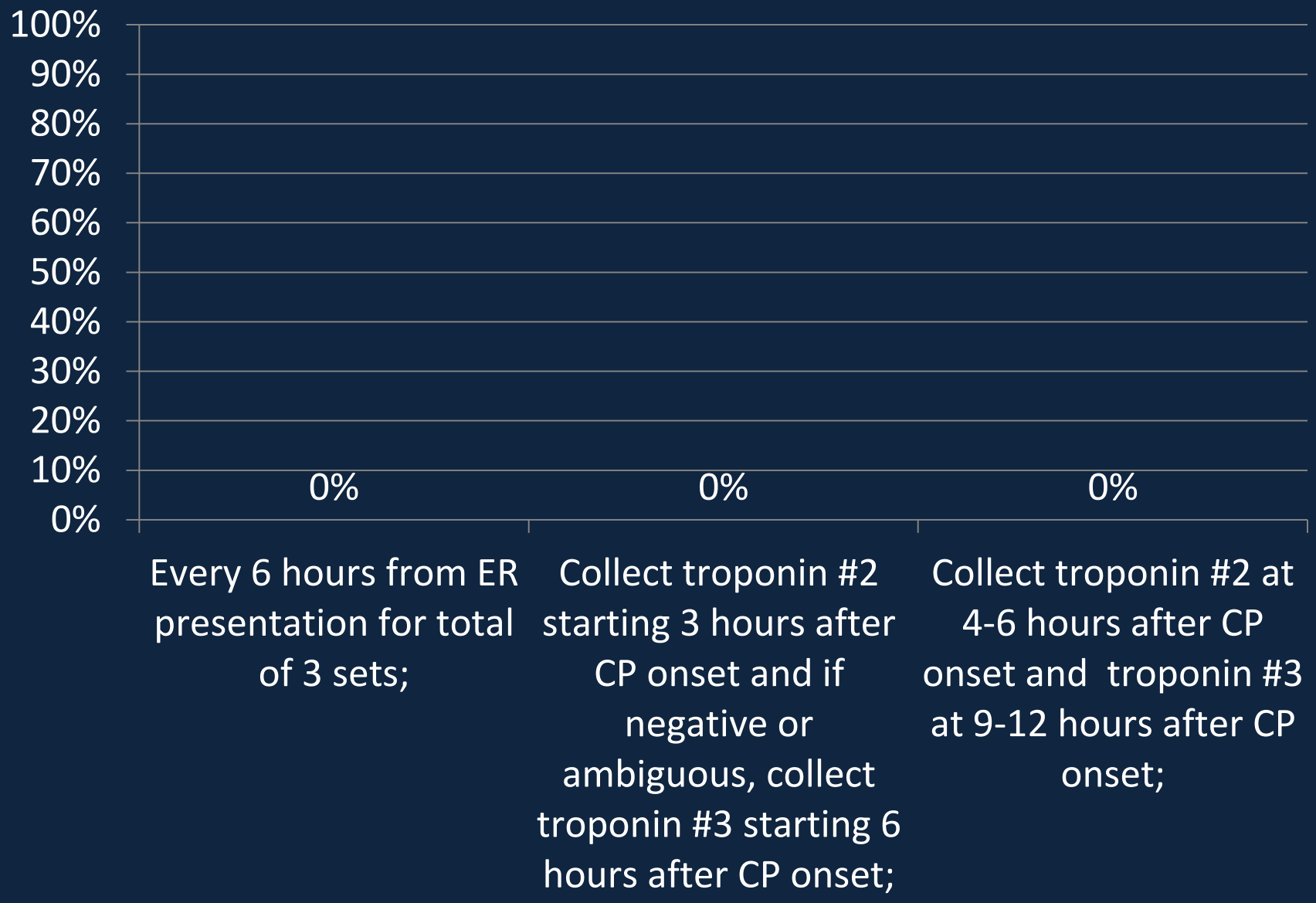
BP=150/93mmHg, HR=82bpm, BMI=33 kg/m2, afebrile, SaO2=94% room air, no JVD, no crackles on lung auscultation, no heart murmur.

Normal ECG. Normal i-STAT troponin.

Next troponin should be checked as follows:

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;
3. Collect troponin #2 at 4-6 hours after CP onset and troponin #3 at 9-12 hours after CP onset;

Results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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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QUIZ #2

10

Same patient:

Correct troponin orders have been placed, aspirin 325 mg chewed, unfractionated heparin iv bolus+drip and nitroglycerin iv drip were immediately administered.

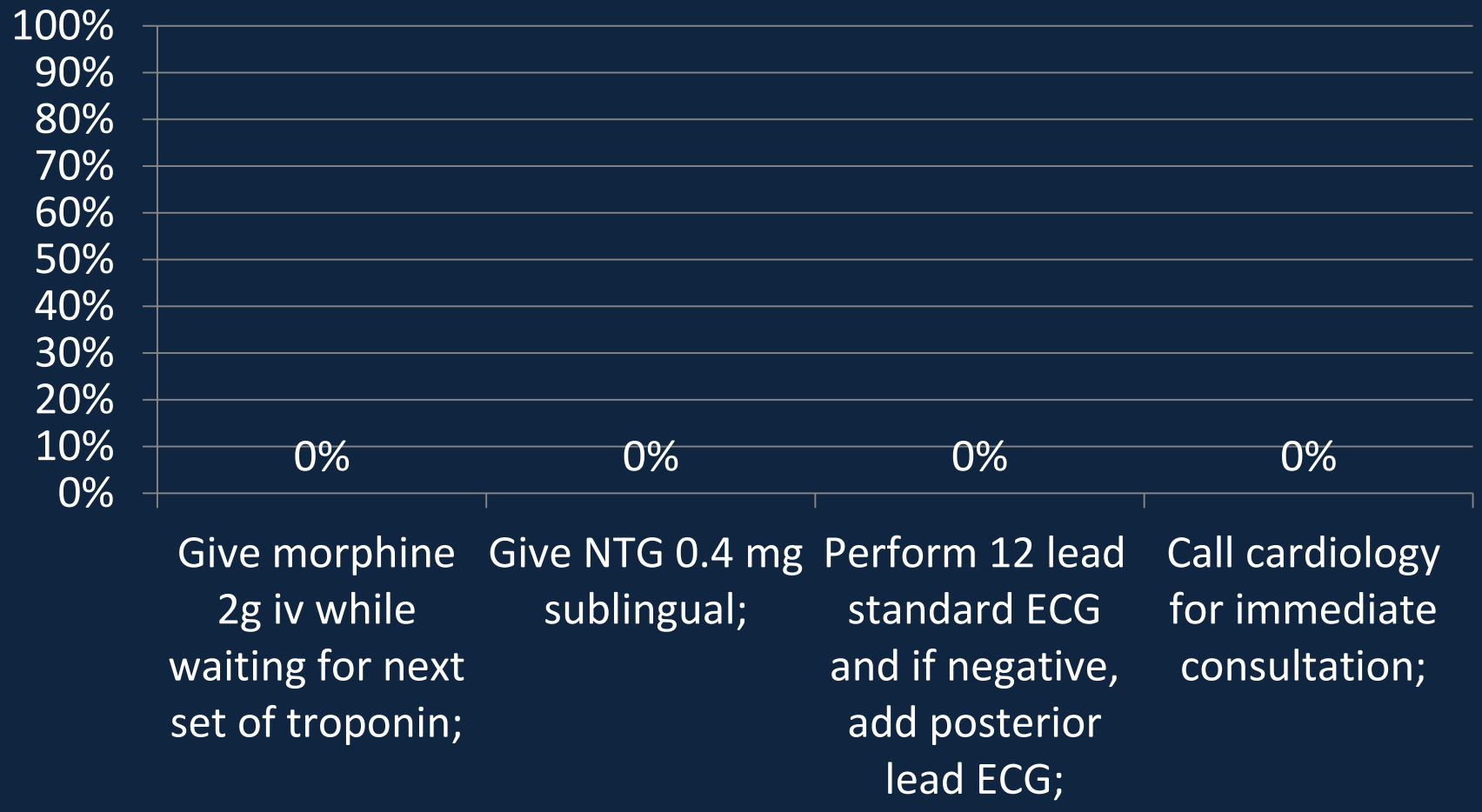
25 min have passed, CP ongoing 3/10.

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;

Results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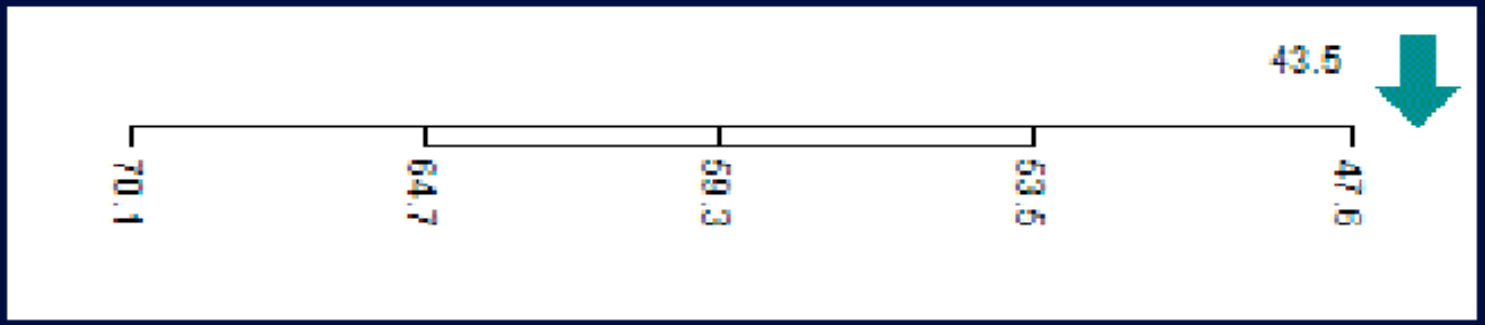
About this lecture:

- **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 ?

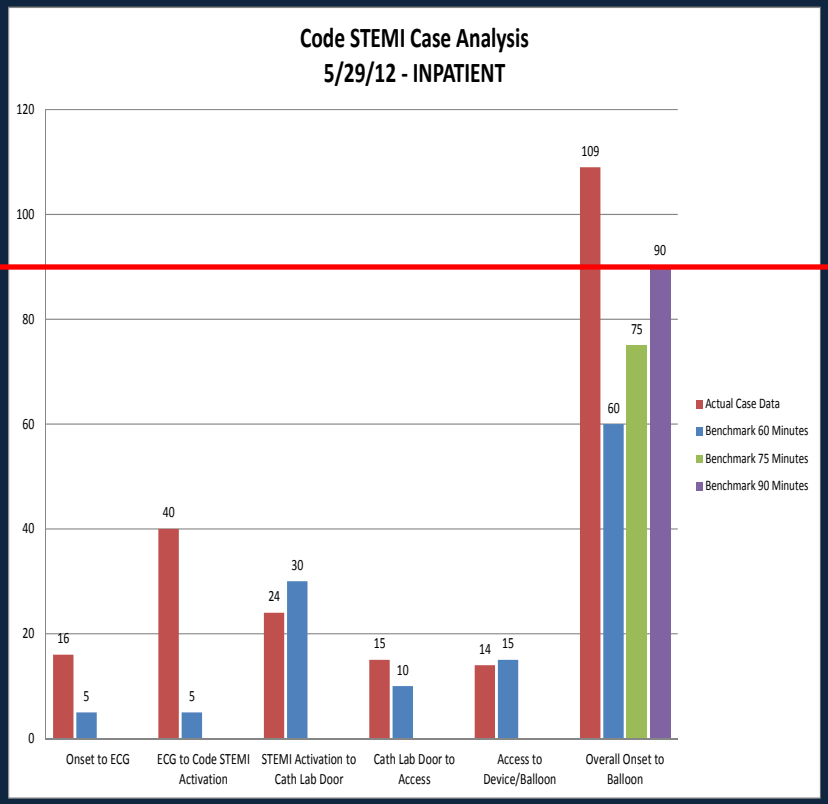
Median Time in minutes to primary PCI for STEMI patients

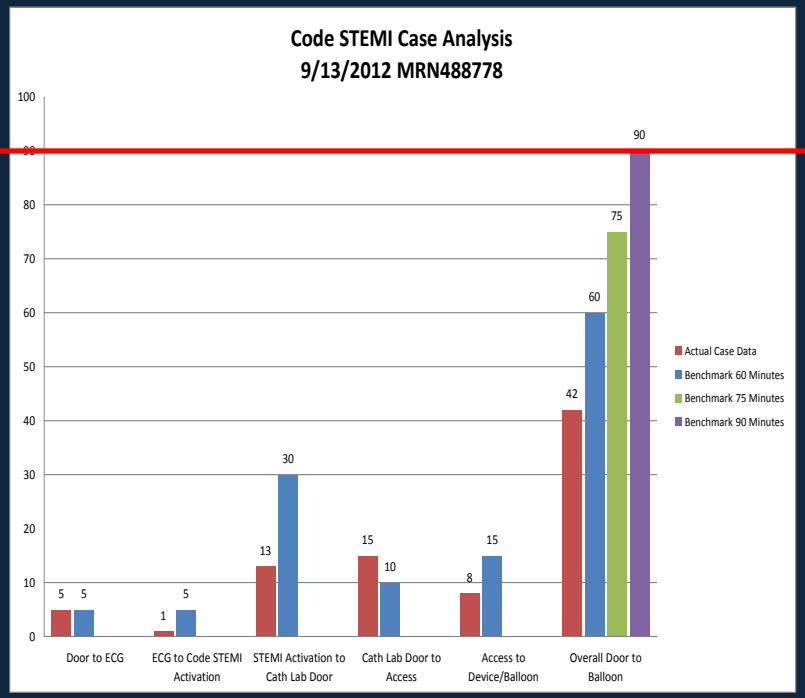


My Hospital R4Q	US Hospitals 50th Pctl	US Hospitals 90th Pctl
43.5	59.3	47.6

Issues…

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





In-house STEMI case

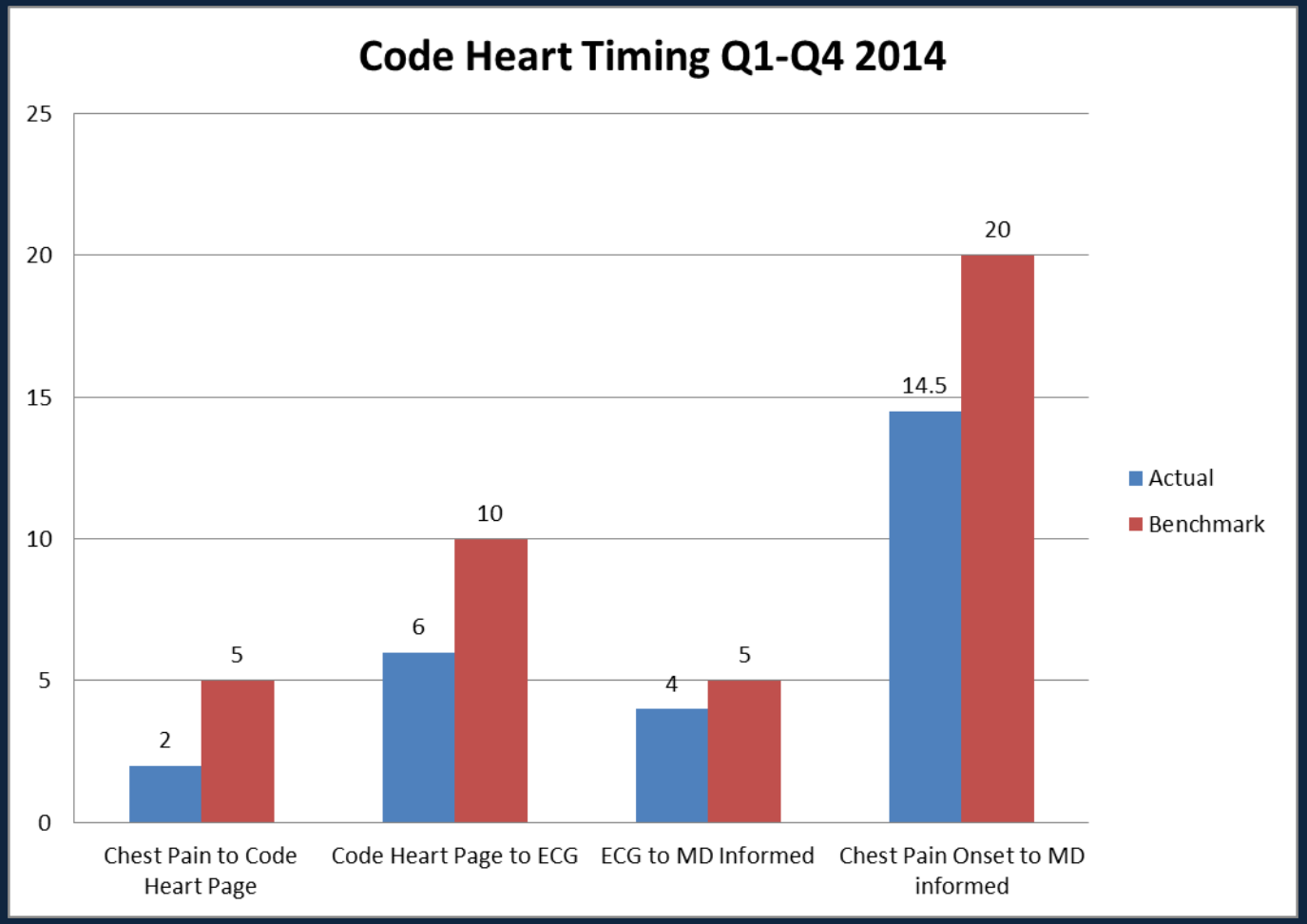
~ typical ER STEMI presentation case

Principles of new CP protocol

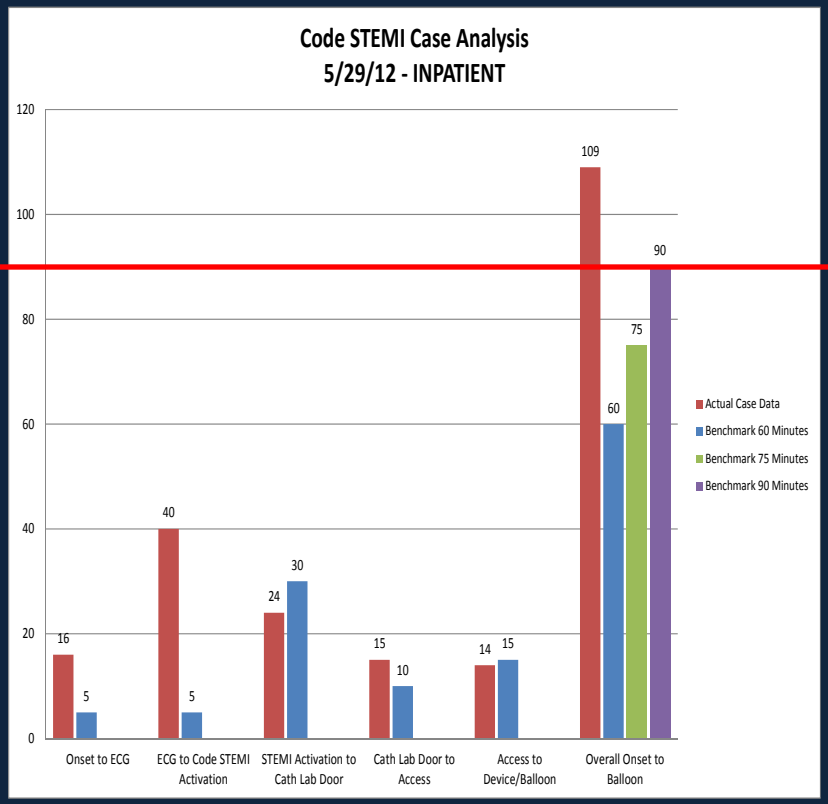
1. **Fast recognition**
   - **Appropriate diagnostic approach**
2. **Fast treatment**
3. **Appropriate medications**

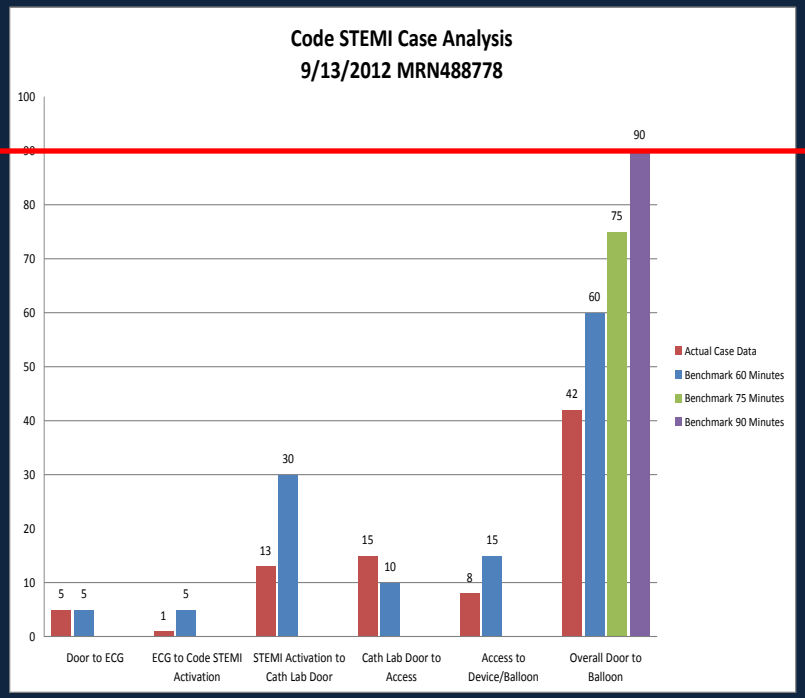
Checklist approach

The new protocol works !



The new protocol works !





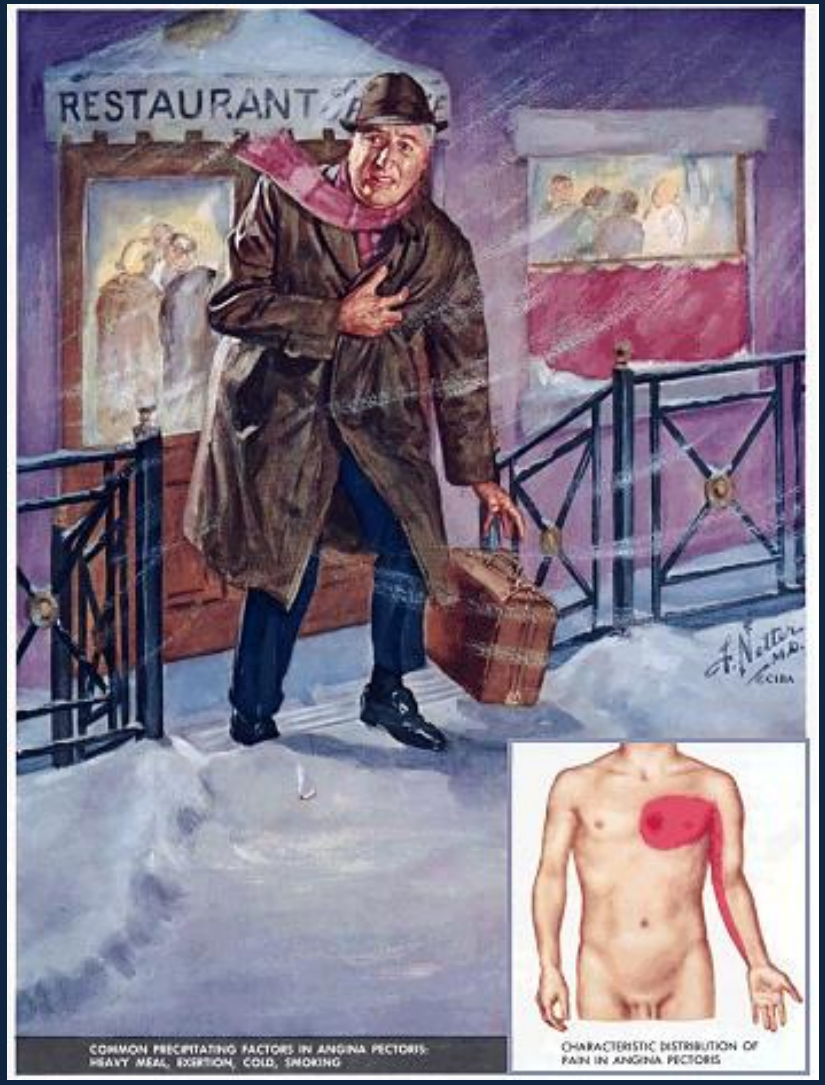
In-house STEMI case

~ in-house STEMI – CP protocol - code heart team

II. The Chest Pain Treatment Protocol

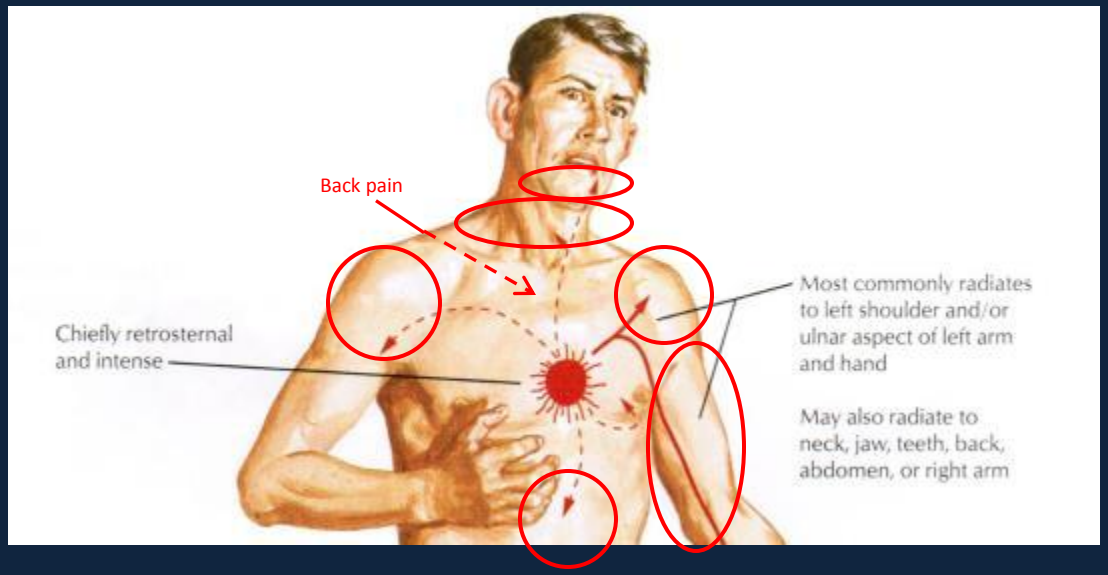
I. New Chest pain / equivalent, suspicion of Acute coronary syndrome → inform MD

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 !

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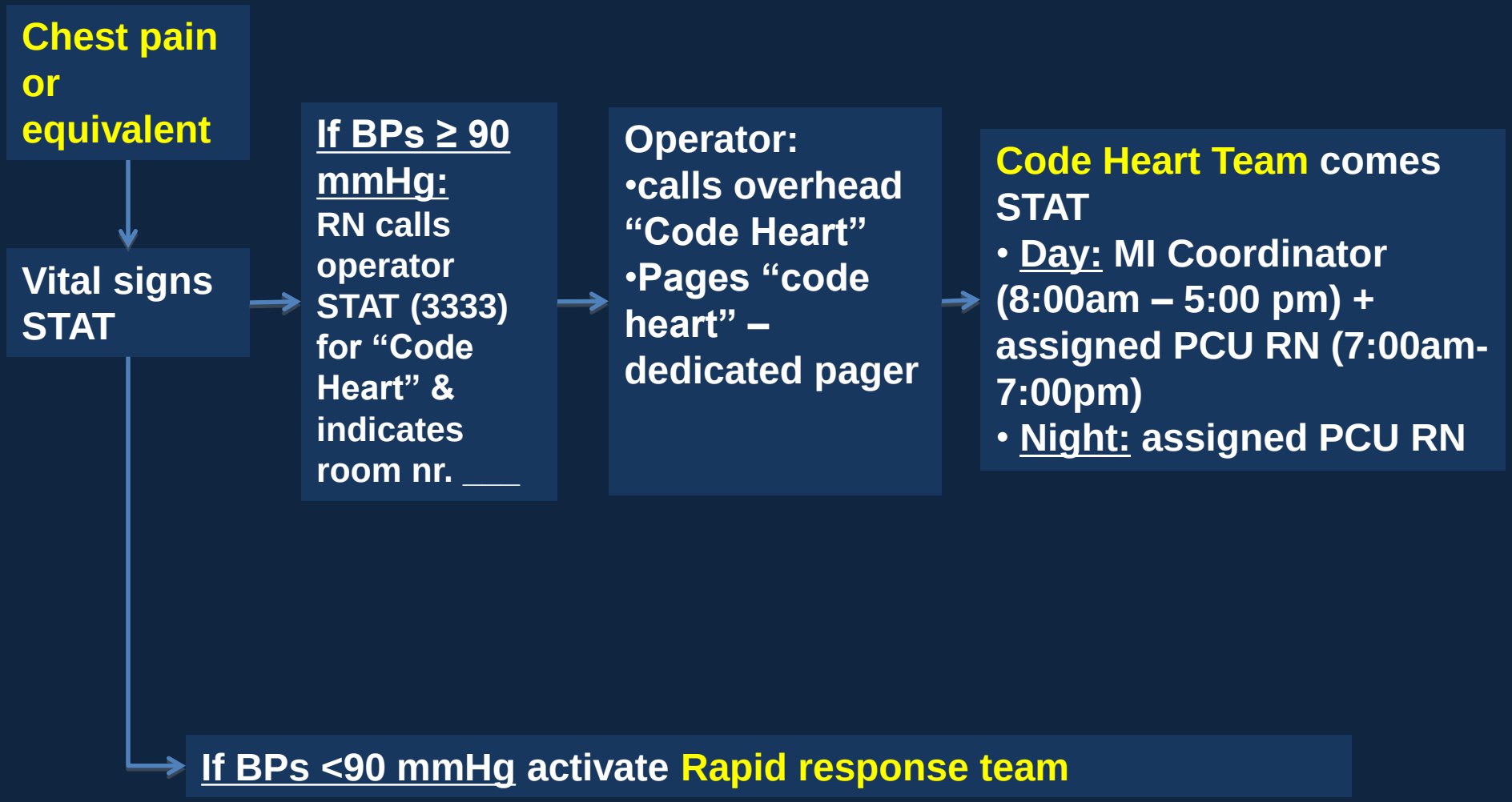
The "Code Heart" protocol



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The "Code Heart" protocol

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

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

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)

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

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

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)

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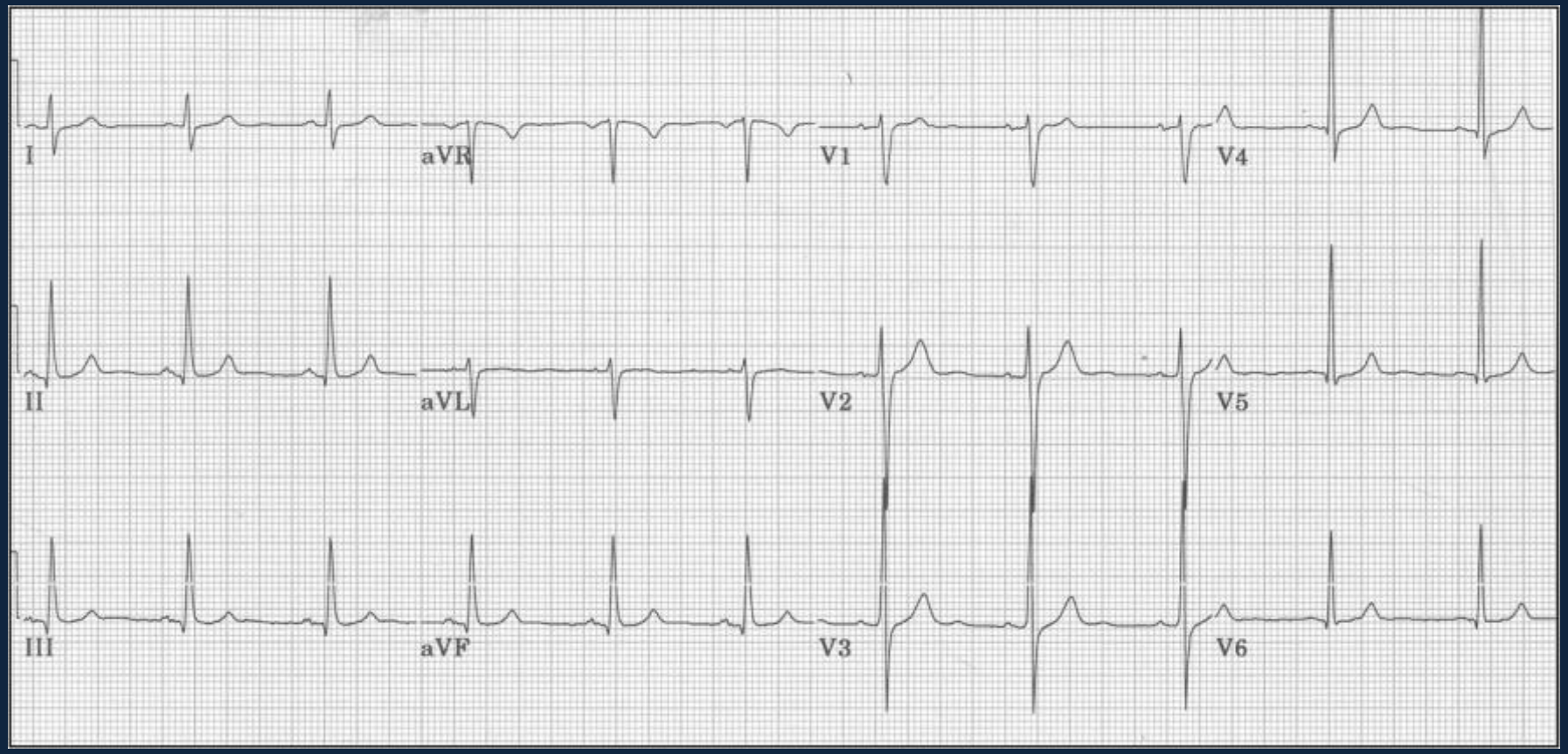
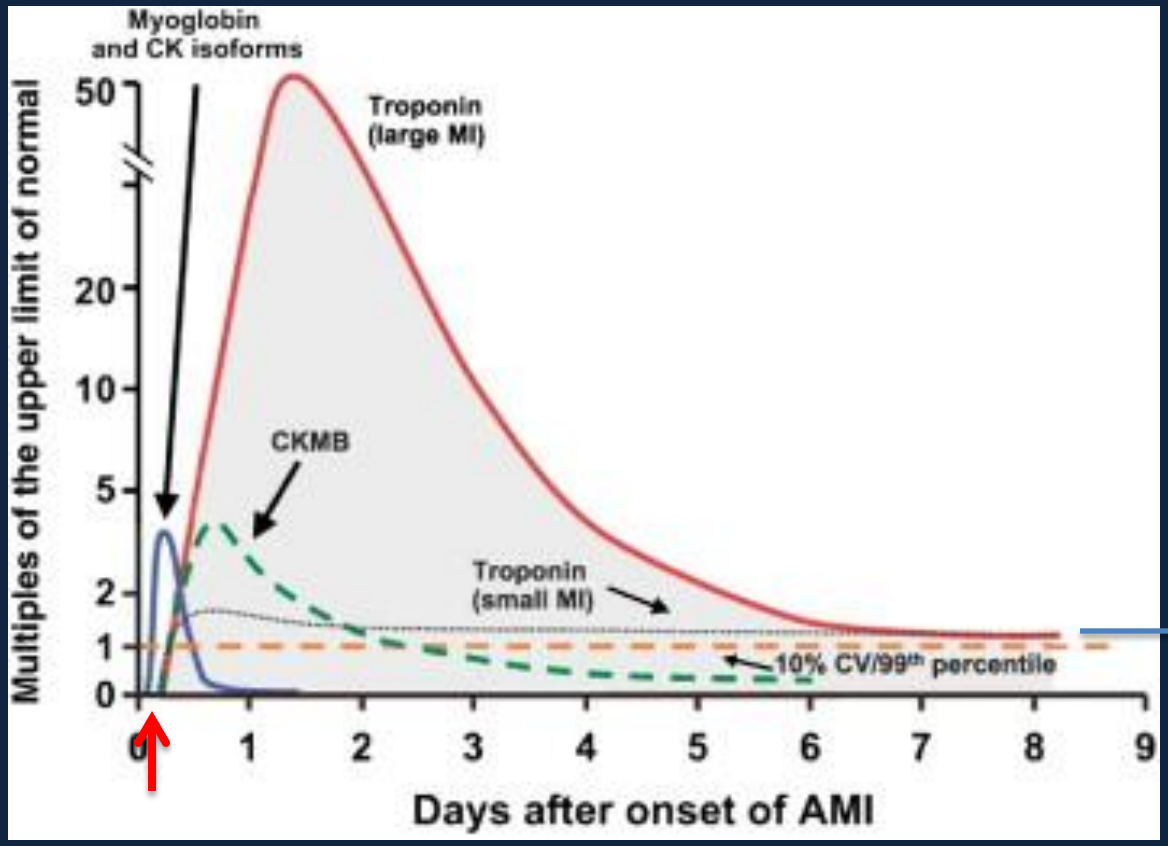
Initial ECG may be completely normal in any ACS



Troponin may also be normal upon arrival

Dynamics in MI



2011 ACC/AHA Guidelines UA/NSTEMI, JACC 2011;57:e215

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-> 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*

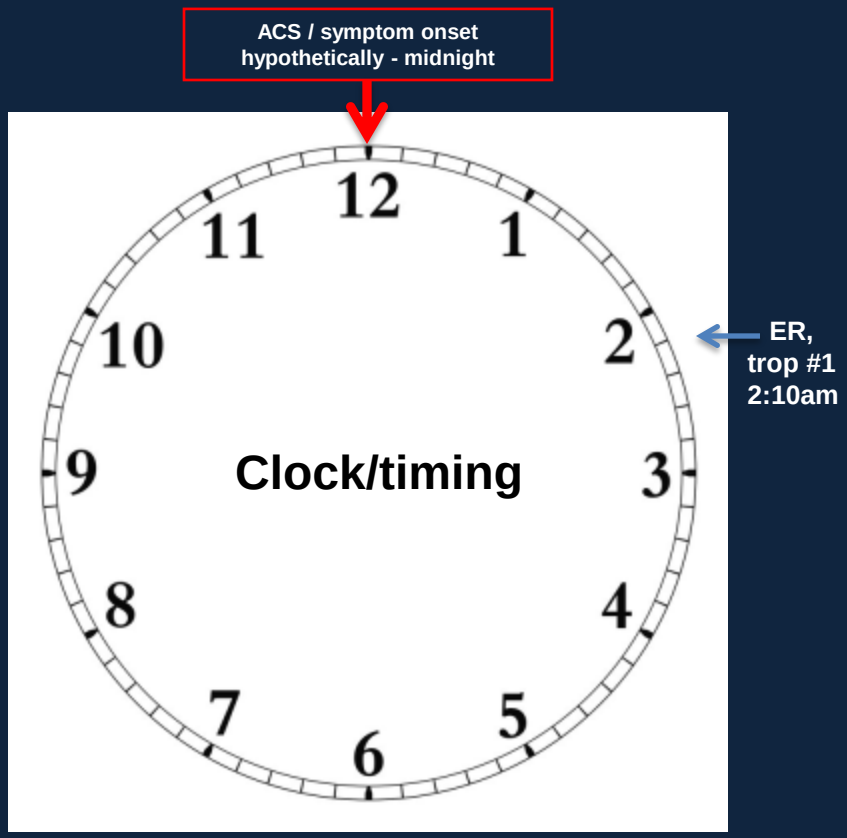
Admission orders per need including:

Fasting lipids

Smoking cessation

How/when to check troponins ?

“Every 6-8 (7) hours”



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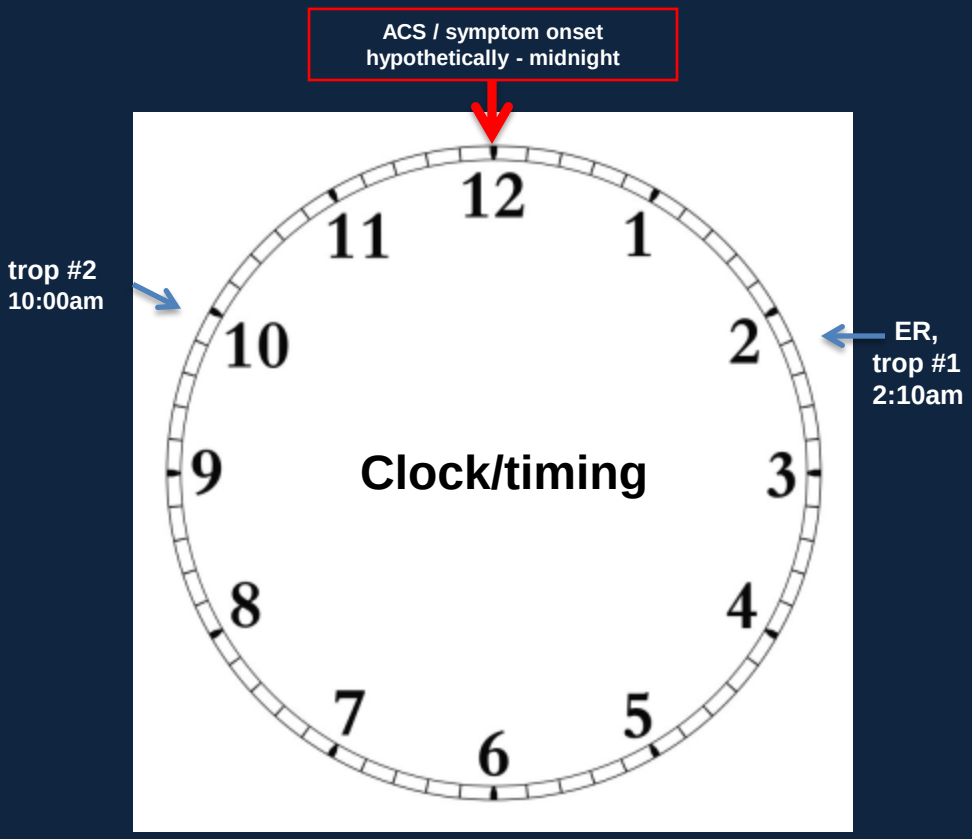

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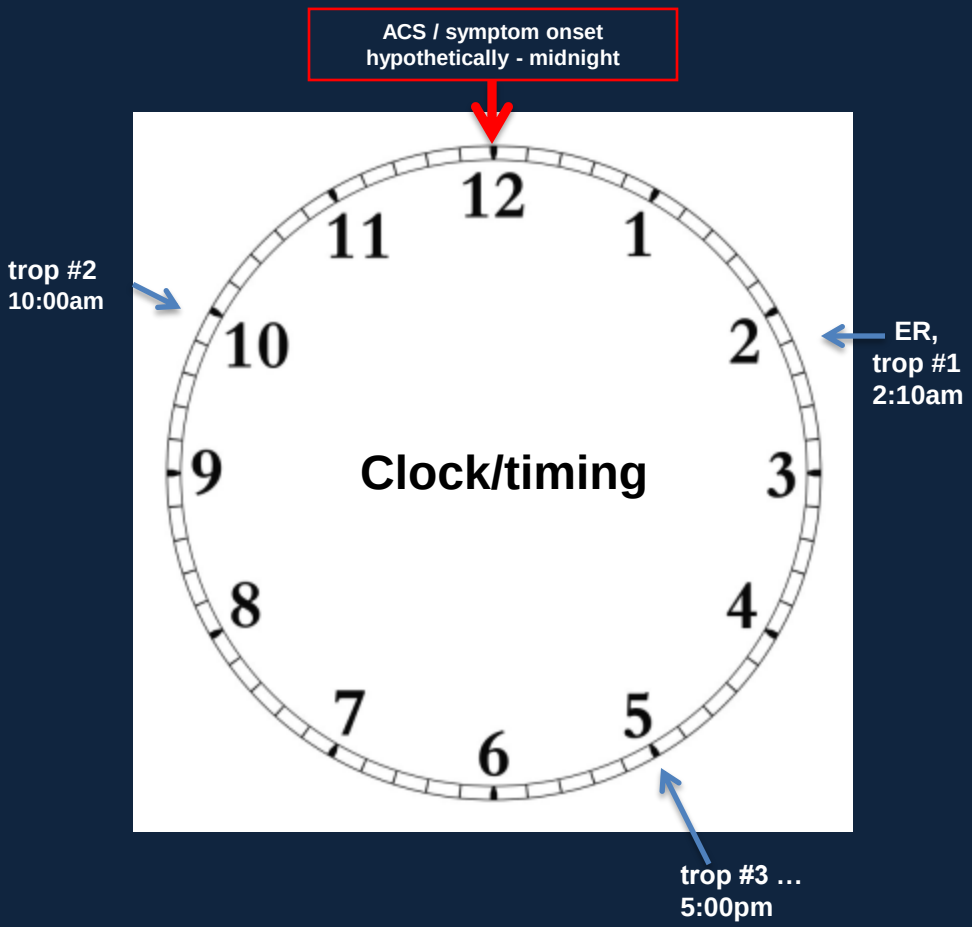

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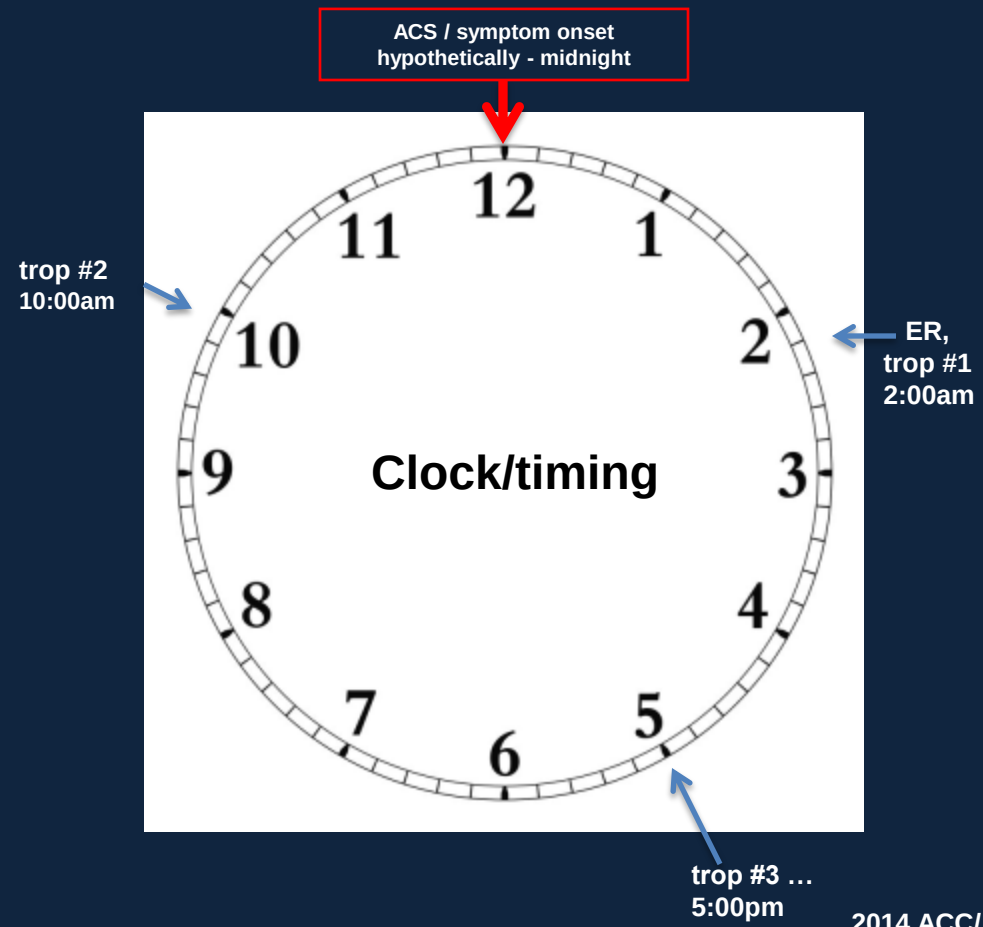
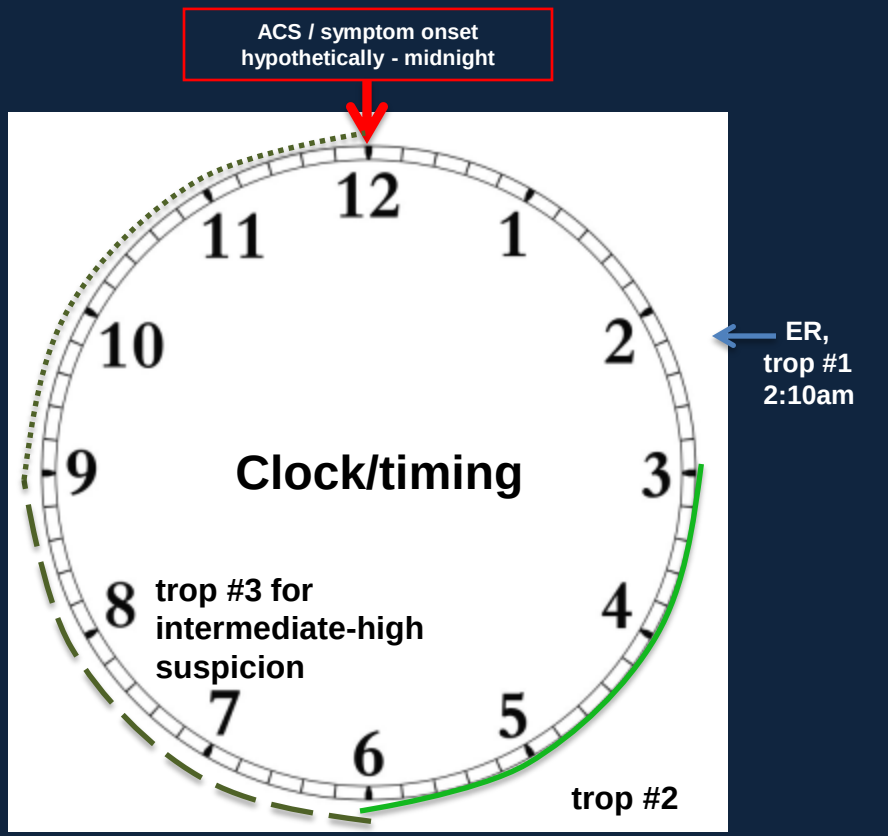


Per guidelines 2014



2014 ACC/AHA Guidelines UA/NSTEMI: JACC 2014 doi: 10.1016/j.jacc.2014.09.017

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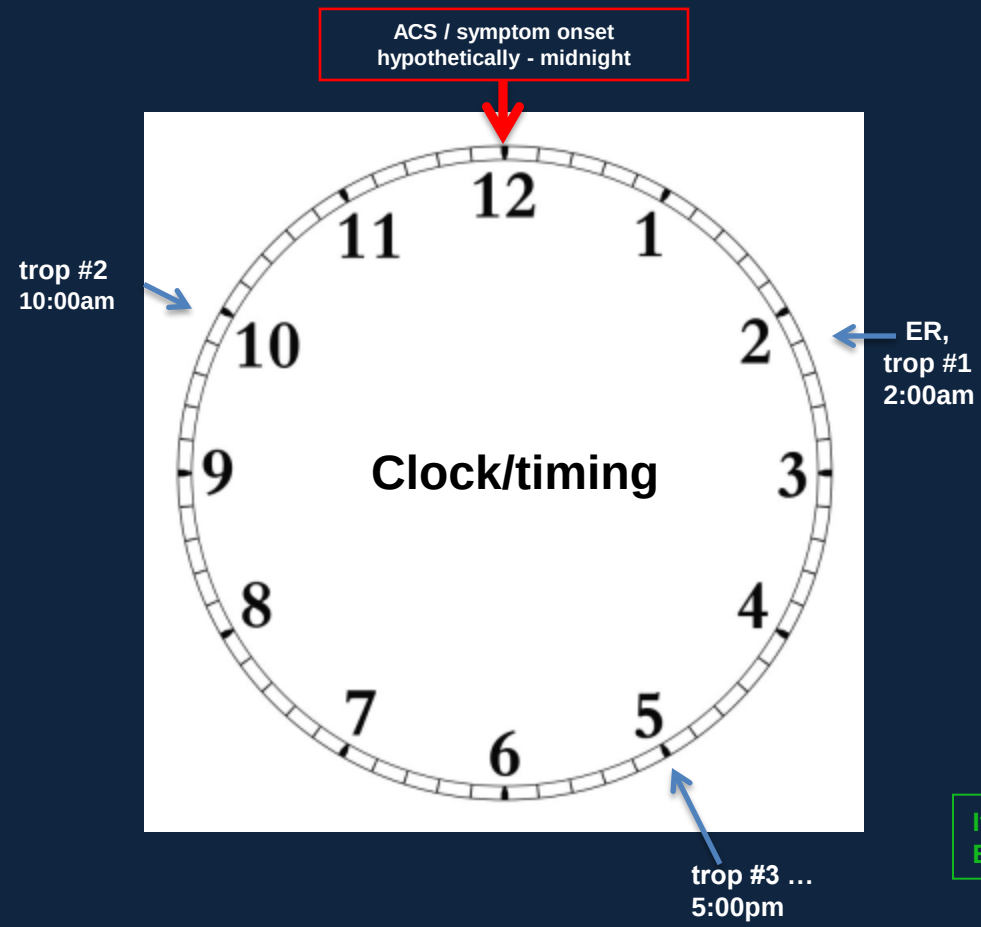

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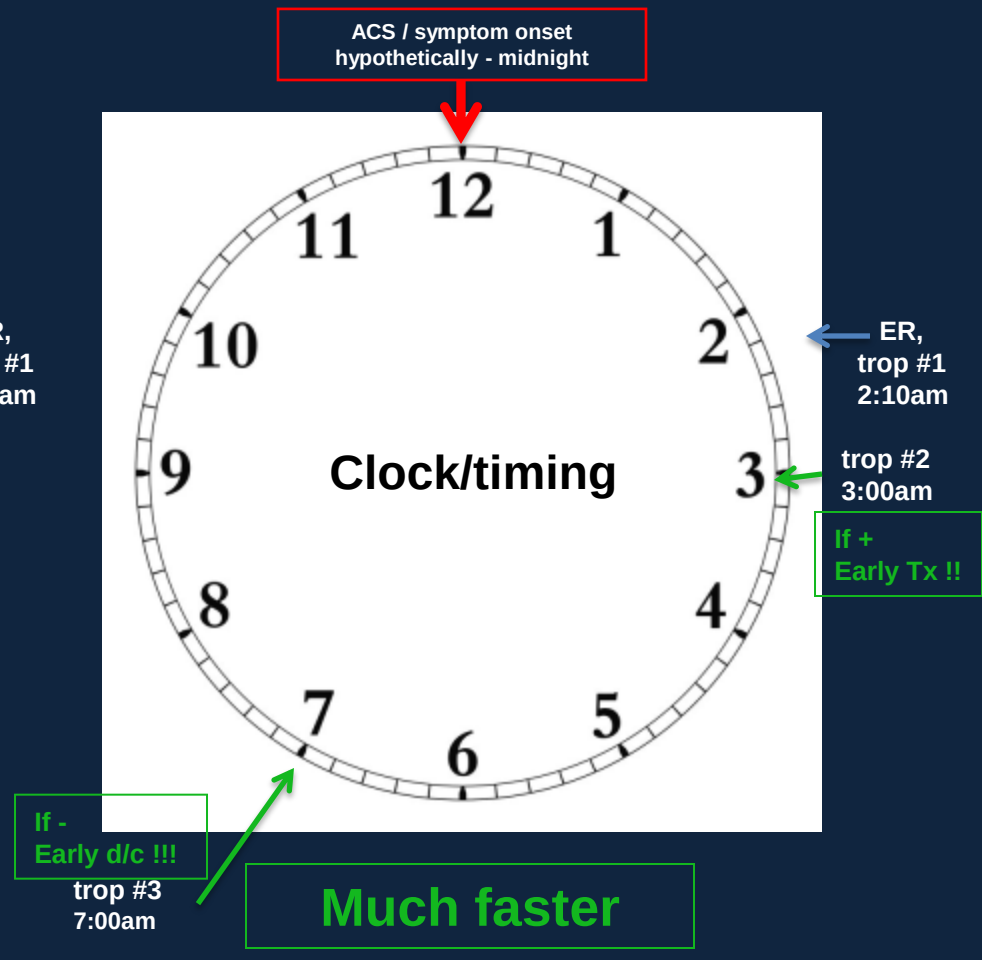

II. First troponin positive with suspected ACS

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, then10 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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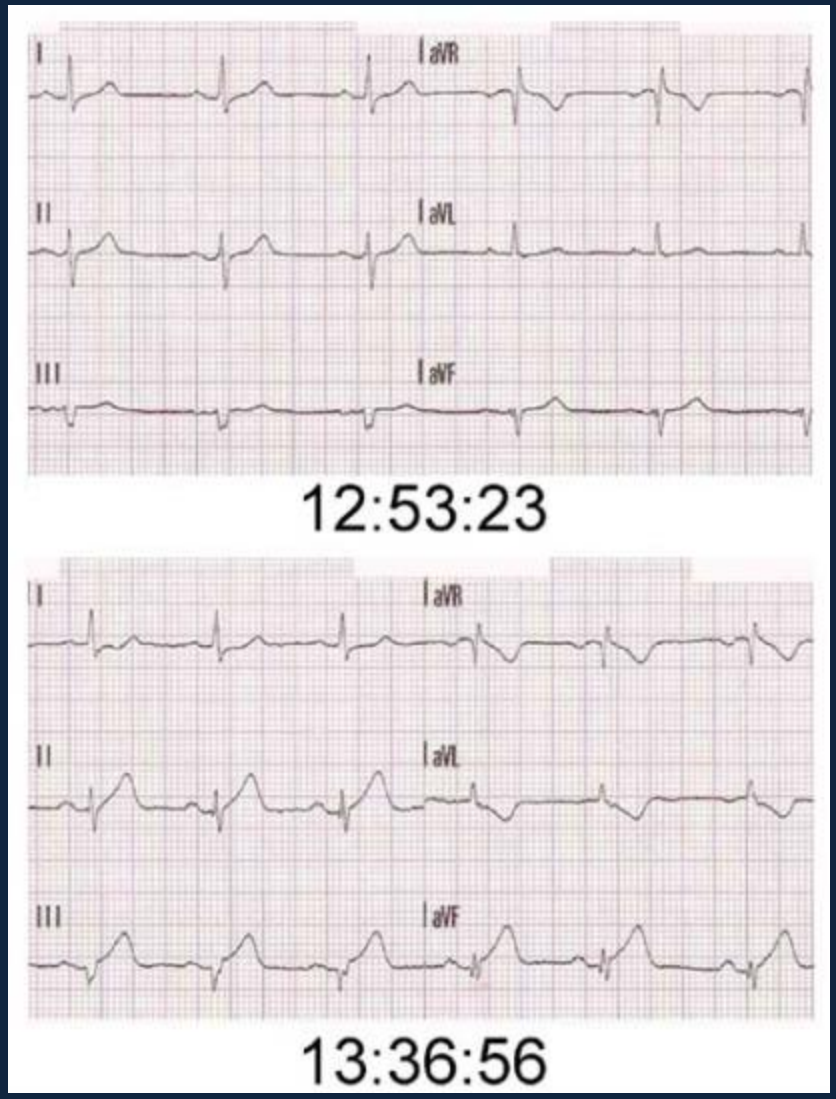
III. Suggestive chest pain persisting / troponin negative or not yet available

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



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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

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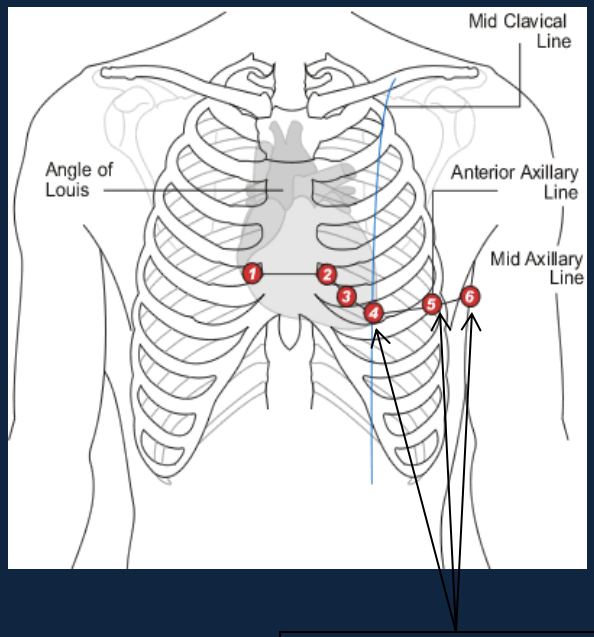
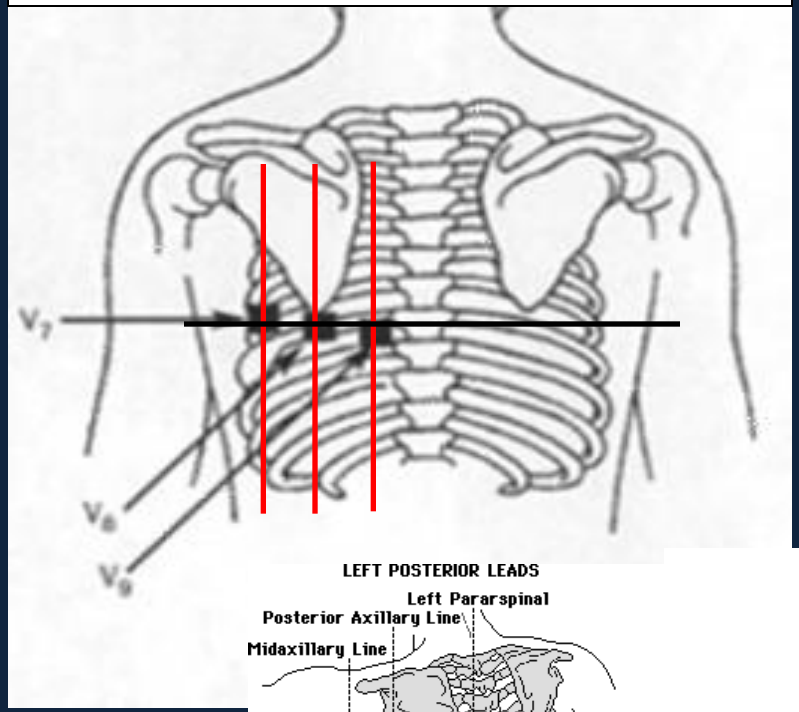
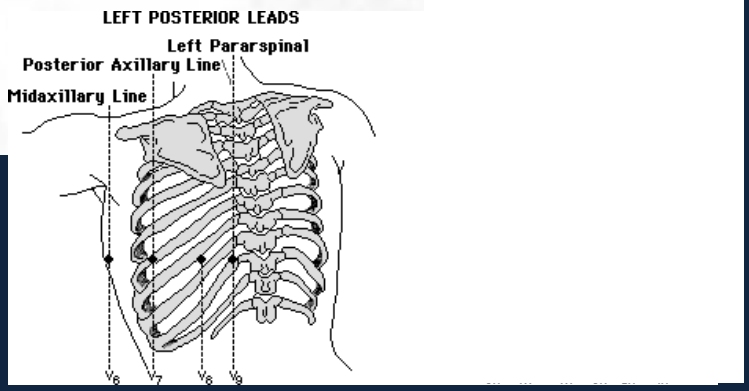
Correct ECG leads positioning

- **Posterior leads:**

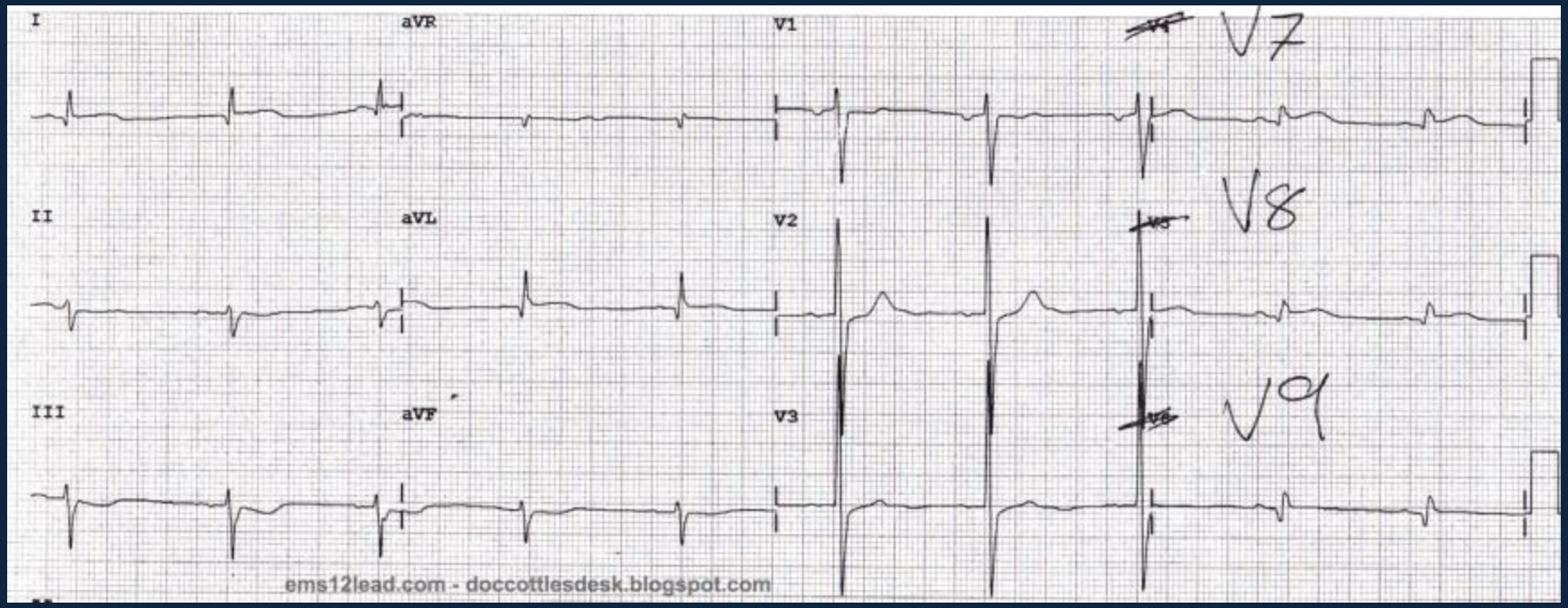
V4->V7 – post axillary line
V5->V8 – mid scapular line
V6->V9 – paravertebral line







Abnormal posterior lead ECG

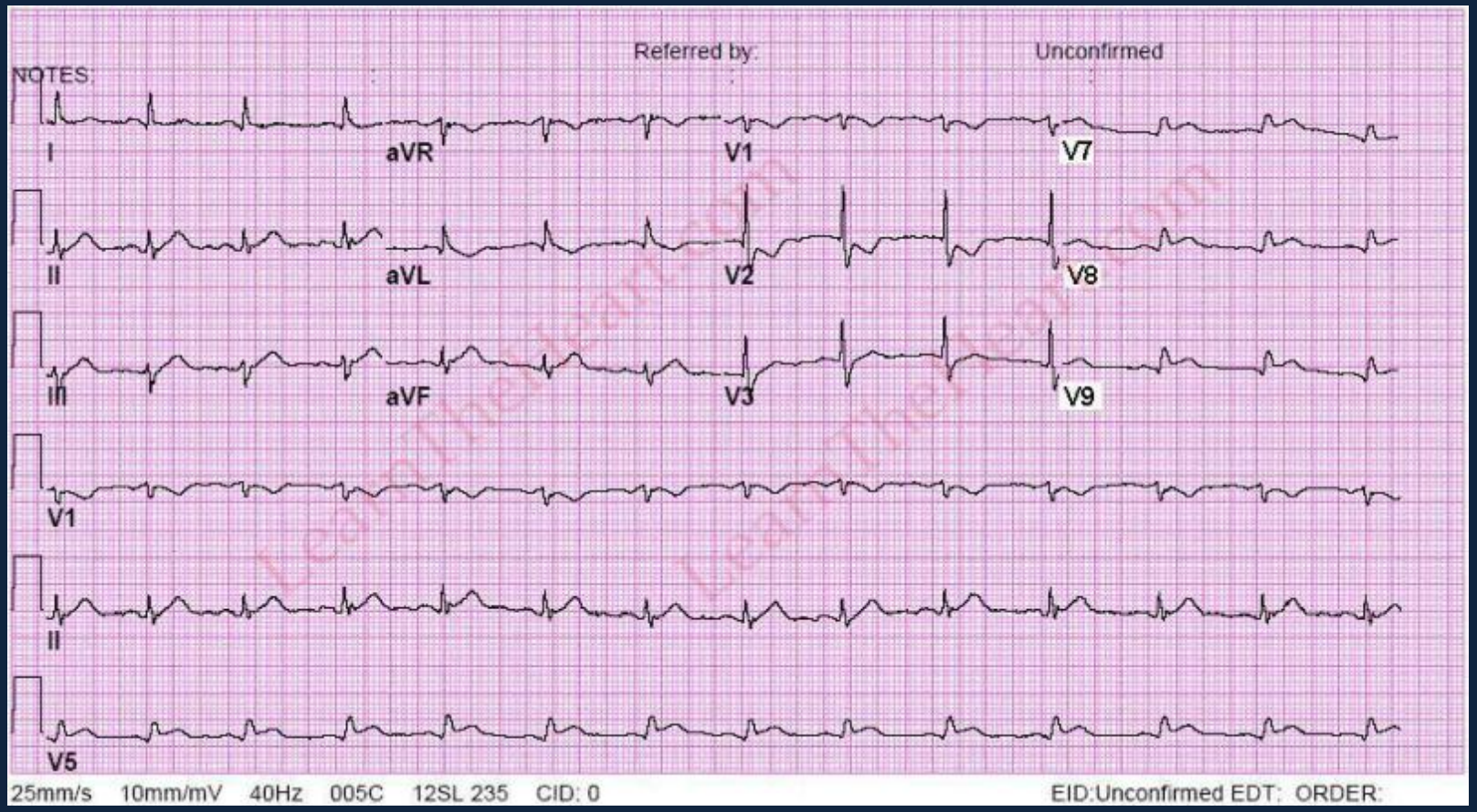


Finding ST segment elevations otherwise not detected (comments on this particular ECG – limb leads – accepted)

= occluded coronary artery (LCx)

= STEMI

Abnormal posterior lead ECG



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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

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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 flecainide
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

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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)**

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; patient or family refusal;*

□ **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 ?

QUIZ #1

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.

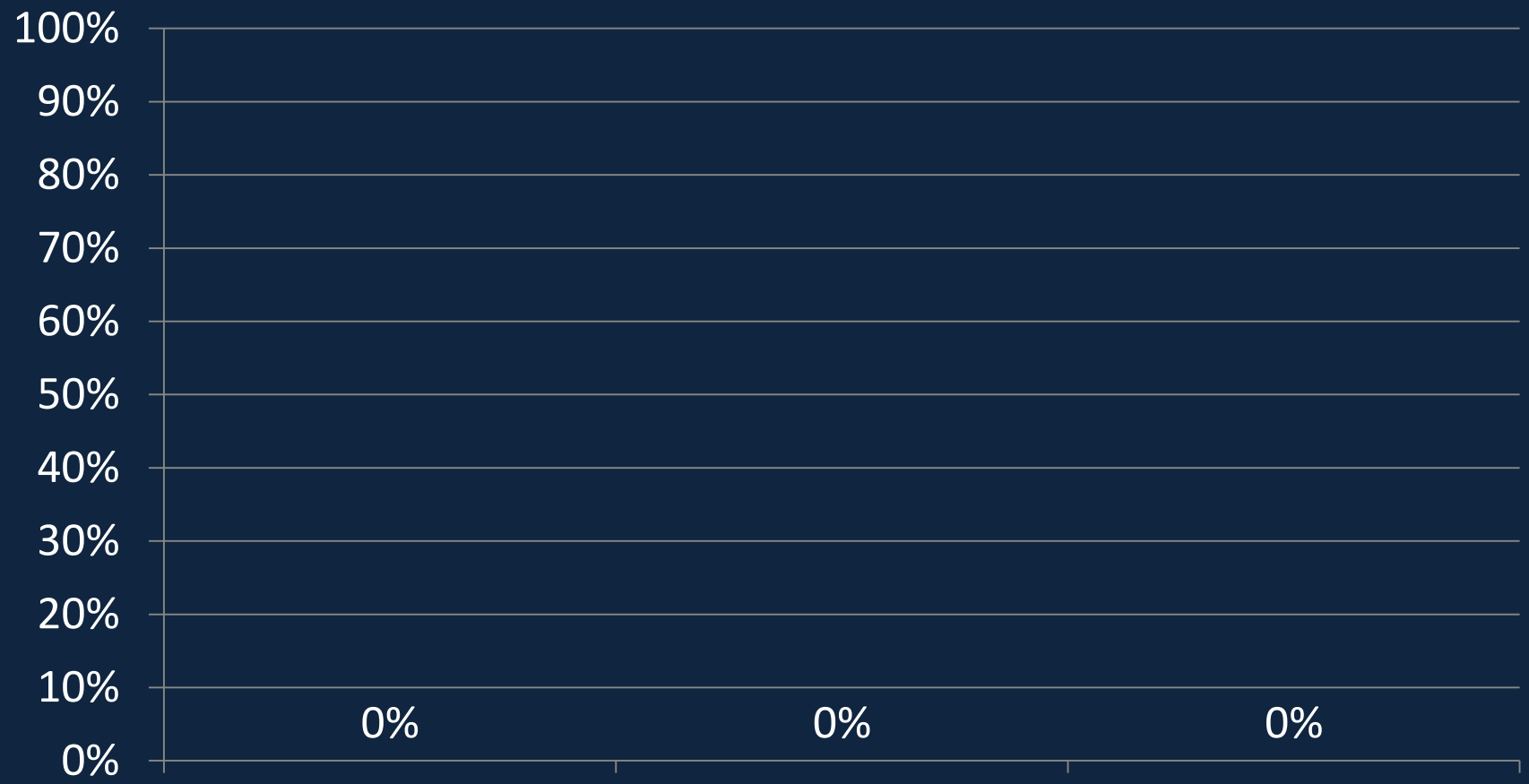
BP=150/93mmHg, HR=82bpm, BMI=33 kg/m2, afebrile, SaO2=94% room air, no JVD, no crackles on lung auscultation, no heart murmur.

Normal ECG. Normal i-STAT troponin.

Next troponin should be checked as follows:

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;
3. Collect troponin #2 at 4-6 hours after CP onset and troponin #3 at 9-12 hours after CP onset;

Results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QUIZ #2

Same patient:

Correct troponin orders have been placed, aspirin 325 mg chewed, unfractionated heparin iv bolus+drip and nitroglycerin iv drip were immediately administered.

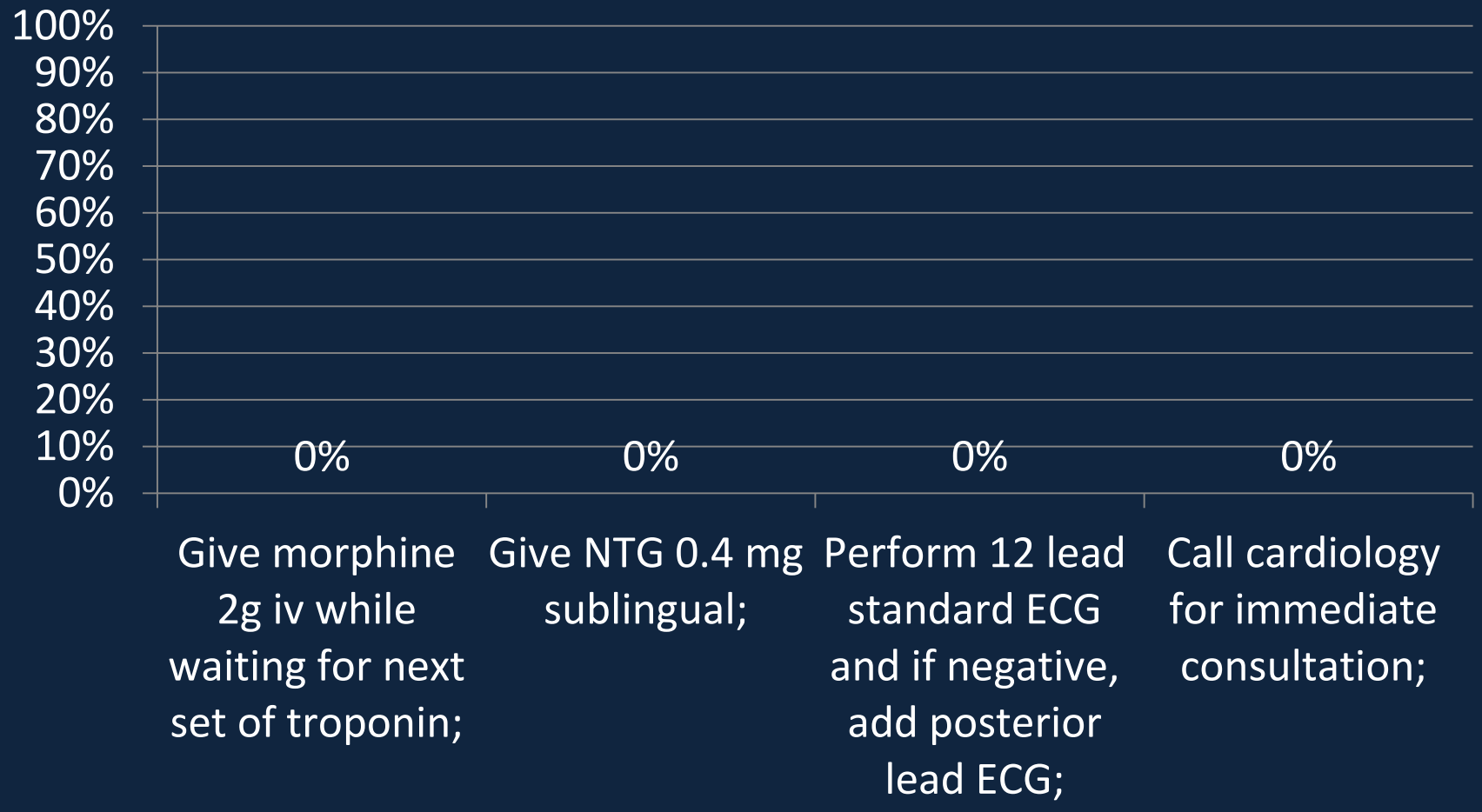
25 min have passed, CP ongoing 3/10.

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;

Results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Thank You for Listening!