Chest Pain & Acute Coronary Syndromes (ACS) Clinical Pathway

AT THE FOREFRONT UChicago Medicine

Chest discomfort or other symptoms consistent with myocardial ischemia
- Vitals, IV, History, Exam, EKG
- Does EKG suggest STEMI?

Yes, possible STEMI

Cath Activation needed?
- ≥1 mm ST elevation in ≥2 contiguous leads or ≥1 mm ST depression in anterior precordium (confirmed by ER attending)?

No

- Pt's hx or EKG suggest STEMI without ≥1 mm STE in ≥2 contiguous leads
- Sxs of ACS assoc with unrelenting CP, hemodynamic instability, or VT
- Sxs of ACS assoc with a LBBB not known to be old
- Sxs of ACS assoc with ≥2 mm ST depression

Yes

Cath Activation
- Press MI Button or Dial 156 and tell operator "Cath Lab Activation"
- Give pt name, ER bed #, your name, your phone extension, and your pager #

STEMI Pathway
- Aspirin 325mg chewed
- Ticagrelor 180 mg PO (if contraindicated, clopidogrel 600 mg PO)[3,8]
- Heparin 5,000 units bolus (no infusion)
- Atorvastatin 80mg PO
- Morphine 2-4mg PRN[2]
  O2 if sat. <90%, start at 4L/min, titrate
- Cardiac monitor, 2 IV locks 18-20g
- Patient completely undressed and in gown
- Shave bilateral groins
- Diagnostic test: ER1, hs-cTnT, CBC, coags, other labs as appropriate, portable CXR may be obtained but not required and should not delay transport to the cath lab.
- Transport patient from ED to Cath Lab on monitor/defibrillator.

- Admit to Cath Lab, then transfer to CCU or floor at discretion of interventionalist
- High-Risk ACS ICU Order Set (#469)

Page Interventional Cardiology for consideration of immediate invasive strategy (within 24 hrs of presentation) if:
- Refractory ischemic chest discomfort
- Recurrent/persistent ST deviation
- Ventricular tachycardia
- Hemodynamic instability
- Signs of heart failure or dynamic valve dysfunction
- Recent bypass (6 months) or stent (1 month)

No STEMI

- Calculate HEART Score (Link)
- Check high-sensitivity troponin-T (hs-cTnT)

HEART Score 0-3, ***and***
1st hs-cTnT <14ng/L for women or <22ng/L for men

Repeat hs-TnT 2 hours from first

Both hs-cTnT's:
(<14 ng/L for women or <22 ng/L for men)
AND < 4 ng/L increase from 1st to 2nd

No

Yes

- Work up non-ischemic causes
- Consider nuclear stress or coronary CT Angiography as OPT

Likely non-ischemic cause

HEART Score ≥ 4, ***or***
hs-cTnT ≥ 14ng/L for women or ≥ 22ng/L for men

Consult Patient's UCM Attending Cardiologist (if any) or Covering Provider 24/7
- Obtain background context
- Discuss data
- Determine risk for acute myocardial injury (note #10 on next page)
- Confirm plan
- If patient does not have a UCM cardiologist, proceed with the pathway using best clinical judgement
- These calls should **NOT** go to the cardiology fellow on call

Likely cardiac ischemia

Cath Alert
- Dial 156 and tell the operator "Cath Lab Alert"
- Give patient name, ER bed #, your name, your phone extension, and your page #
- A "Cath Alert" gets the CCU resident/fellow/attending; if at any time the ER feels an emergent cath is needed, ER staff should ask the CCU fellow to page the interventionalist-on-call
- If it is decided that the pt needs cath, the CCU fellow organizes the case ASAP **without** Activation

Cath

No Cath

Definite or Likely NSTE-ACS
- **Aspirin 325mg if not given by EMS**
- **Ticagrelor 180 mg PO (if contraindicated, clopidogrel 600 mg PO)[3,8]** unless patient is already planned to undergo cardiac surgery during this admission
- Consider IV cangrelor or IIbIIIa inhibitor[5] if unable to tolerate PO DAPT (emesis, etc)
- If O2 sat. <90%, start NC O2 at 4L/min, titrate
- NTG PRN as tolerated by blood pressure[1]
- Morphine IV if pain not relieved by NTG[2]
- Admit to Cardiology resident service or hospitalist **with cards consult** if capped

Does the patient meet any of these criteria?
- HS-cTnT ≥ 100ng/L, or ≥ 10ng/L increase from first to second, or
- GRACE 2.0 Score >140, or
- GRACE 2.0 Score >108 with ST-depression/dynamic T-wave changes or other findings strongly suspicious of ischemia

Yes

No

High-Risk UA/NSTEMI Pathway
- High-Risk ACS Non-ICU Order Set (#7034)
- Heparin (UFH vs. LMWH)[4,9]
- Consider adding IV eptifibatide[5] if ongoing CP, rising troponin, or ongoing ST deviation (after anticoagulation + oral DAPT) - discussion with interventional cardiology is recommended
- Q8h hs-cTnT until peak or until after PCI
- Serial EKG
- Meds2Beds order placed on first day of admission
- Attending cardiologist determines need for further workup

Low-Intermediate Risk ACS Pathway
- Low-Risk ACS Order Set (#7035)
- Repeat hs-TnT once 8 hours from first
- Attending cardiologist to consider further diagnostic testing

Patient develops 1 or more?
- Clinical high-risk features
- Dynamic EKG changes consistent with ischemia
- HS-cTnT ≥ 100ng/L or ≥ 12ng/L increase
- Markedly abnormal testing

Yes

No

- Continue DAPT
- PO beta blockers,[6] avoid in hypotension or shock
- ACE/ARB if MI, avoid in hypotension or shock
- High intensity statin
- Mineralocorticoid receptor antagonist if STEMI and LVEF <40%[7]
- Echo if MI
- Risk Factor Modification (smoking cessation)
- Education (nursing)

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Day of Discharge & Follow-up
- Meds2Beds
- Cardiac Rehab if MI or PCI
- Discharge checklist review
- Discharge Summary completed & transmitted
- Phone Call 2 days post-discharge
- Cardiology Clinic (14 days), PCP (30 days)

Day of Discharge & Follow-up
- DC checklist review
- DC Summary completed & transmitted
- PCP Follow-up (14 days)

Emergency Department

Inpatient

Discharge/Follow-up

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1. Omit nitrates if history of recent PDE use; use NTG with caution if RV ischemia is suspected.
2. Morphine and other IV opioids may reduce absorption and/or efficacy of oral antiplatelet therapy.
3. Ticagrelor exclusions include h/o major bleed or bleeding diathesis, prior CVA/TIA, known hepatic insufficiency, bradycardia (HR<50) or h/o bradydysrhythmia, active wheezing or h/o COPD.
4. UFH preferred if renal dysfunction – use ACS protocol; If LMWH, use 1mg/kg q12h.
5. Eptifibatide is contraindicated in patients on dialysis.
6. If LVEF <40, guidelines recommend carvedilol, bisoprolol, or long-acting metoprolol succinate.
7. Avoid if Cr>2, or K>5.
8. If patient is already on Clopidogrel, load with Ticagrelor 180mg PO unless contraindicated. If patient is already on Ticagrelor or Prasugrel, continue with same, no need to load again unless non-compliance is suspected.
9. If patient is on DOAC or therapeutic warfarin, do not start heparin without discussing with interventional cardiology.
10. **General guidance for the use of high-sensitivity troponin-T (hs-cTnT)**
    - No algorithm completely replaces clinical judgement.
    - Traditional confounders of troponin interpretation (renal failure, sepsis, etc.) also apply to hs-cTnT.
    - **RULE IN:** In patients with hs-cTnT ≥ 100ng/L or ≥ 10ng/L increase over 2 hours, acute myocardial injury is present. These patients should be admitted after discussion with the patient's cardiologist (if any).
    - **INTERMEDIATE – HIGH PROBABILITY:** In patients with hs-cTnT (≥ 42ng/L for women or ≥ 66ng/L for men - 3x the gender-specific upper limit of normal) or new ischemic EKG changes, acute myocardial injury is likely. These patients typically should be admitted after discussion with the patient's cardiologist (if any).
    - **INTERMEDIATE – LOW PROBABILITY:** In patients with hs-cTnT (14-41 ng/L for women or 22-65 ng/L for men), HEART Score 0-3, and a non-ischemic EKG, discuss with the patient's cardiologist (if any). Consider a repeat hs-cTnT in the ED 4 hours from the first. If < 12ng/L rise from 1st hs-cTnT, acute myocardial injury is unlikely (stable angina or previous MI are not excluded). In discussion with the patient's cardiologist (if any), consider discharge with OPT ischemic workup and clinic follow up for risk factor control.
    - **RULE OUT:** In patients with HEART Score 0-3 and hs-cTnT (< 14 ng/L for women or < 22 ng/L for men) **AND** < 4 ng/L increase from 1st to 2nd, acute myocardial injury is very unlikely (>99% negative predictive value for MI). Consider non-ischemic causes of chest pain. Generally, these patients can be discharged safely after discussion with their cardiologist (if any), if there are no remaining indications for admission.
    - For patients not meeting the above criteria, discuss with the patient's cardiologist (if any). Consider observation admission.
    - Coronary CT angiography or nuclear stress testing can also be obtained in the ED 8am-3pm M-F.

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Chest Pain & Acute Coronary Syndromes (ACS) Discharge Checklist

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STEMI and High-Risk NSTE-ACS

□ Aspirin
- □ Yes
- □ No, bleeding
- □ No, allergy (consider desensitization)
- □ No, other (with attending cardiologist approval only)

□ P_2Y_{12} Inhibitor
- □ Yes
- □ No, bleeding
- □ No, allergy (consider alternate agent)
- □ No, other (with attending cardiologist approval only)

□ High-intensity Statin
- □ Atorvastatin 40-80mg or Rosuvastatin 20-40mg
- □ No, allergy or prior intolerance (consider alternate agent)
- □ No, other (with attending cardiologist approval only)

□ Beta-blocker
- □ Yes
- □ No, bradycardia (HR<50 and no pacemaker)
- □ No, hypotension
- □ No, allergy (consider alternate agent)
- □ No, other (with attending cardiologist approval only)

□ ACE/ARB if pt. diagnosed with MI during this admission or prior
- □ Yes
- □ No, advanced renal disease
- □ No, hyperkalemia
- □ No, hypotension
- □ No, allergy (consider alternate agent)
- □ No, other (with attending cardiologist approval only)

□ Mineralocorticoid Receptor Antagonist (MRA) if LVEF <40%
- □ Yes
- □ No, advanced renal disease
- □ No, hyperkalemia
- □ No, allergy (consider alternate agent)
- □ No, other (with attending cardiologist approval only)

□ Triple therapy (If concurrent aspirin, P_2Y_{12} inhibitor, and anticoagulation are needed, specify indication, planned duration, plan for discontinuation, and responsible provider) – **this is rarely appropriate**

□ Echo if MI

□ Outpatient Cardiac Rehab (phase 2) referral if MI or PCI
- □ Referred to UCM
- □ Referred to outside facility (paper prescription provided stating "Cardiac rehab phase 2" with appropriate diagnosis listed)

□ Disease-Specific Education completed by nursing

□ Nutrition education completed

□ Smoking cessation counseling completed

□ Meds2Beds completed
- □ Yes
- □ No, patient refuses
- □ No, patient does not qualify
- □ No, night/weekend/holiday discharge
- □ Other

□ 90-day prescription of all cardiac meds provided (consider paper script for 1 year if patient does not have a pharmacy)

□ Follow-up (Tune-up appointments) scheduled
- □ If UCM
  - □ Cardiology (within 7 days)
  - □ PCP (within 30 days)
- □ If non-UCM
  - □ PCP (within 14 days)

□ Discharge summary completed and transmitted before patient leaves the hospital

Low-Risk ACS

□ Risk-appropriate Statin therapy (link to ASCVD risk calculator)

□ Disease-Specific Education completed by nursing

□ Nutrition education completed

□ Smoking cessation counseling completed

□ 90-day prescription of all cardiac meds provided (consider paper script for 1 year if patient does not have a pharmacy)

□ PCP follow up (within 14 days) scheduled

□ Discharge summary completed and transmitted before patient leaves the hospital

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