CHEST PAIN

CDU INCLUSION CRITERIA

- No clinical criteria for ACS
- Stable vital signs
- Initial ECG and cardiac biomarkers not consistent with ACS
- Low to intermediate ACS risk (HEART score 0-6) **[Ref 1, 2]**
- Plan of care established

CDU EXCLUSION CRITERIA

- Clinical/ECG/cardiac biomarkers suggestive of ACS
- Unstable vital signs
- Requiring IV titrated medication (i.e. heparin, nitroglycerin)
- Patients that are high risk (HEART 7-10)

CDU INTERVENTIONS AS INDICATED

- Oxygen, cardiac and pulse oximetry monitoring
- ECGs, laboratory studies, imaging studies
- Medications (ex. ASA, Nitrates PRN,)
- Cardiac evaluation (ex. stress test, echo) **[Ref 3]**
- NPO before stress testing as per stress testing protocol **[Ref 4]**
- Smoking cessation counseling
- Consultation (ex. Cardiology)
- Patient education and discharge planning
- Adjunctive integrative healing arts therapy

DISPOSITION FROM THE CDU **[Ref 1]**

Home
- Acceptable vital signs
- Serial cardiac biomarkers not suggestive of ACS
- Serial ECGs without significant new changes
- Unremarkable stress test if ordered
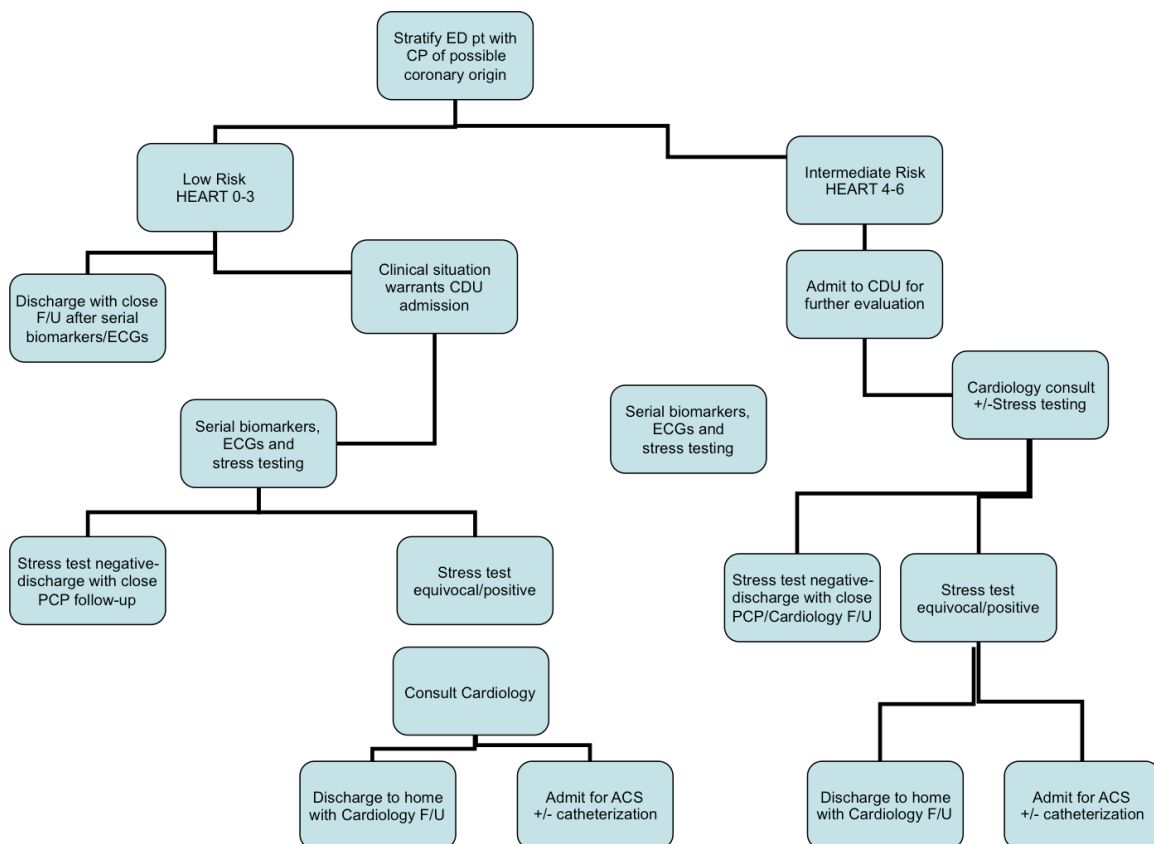- Adequate follow-up plan established

Admit
- Unstable VS, worsening condition/positive findings requiring hospitalization
- Clinical/ECG/cardiac biomarkers suggestive of ACS
- Physician discretion

REFERENCES
Amsterdam EA et al. 2014 AHA/ACC Guideline for the Management of Patients With Non–ST-Elevation Acute Coronary Syndromes, A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Circulation* 2014;130:e344-e426.

Sun BC et al. Comparison of the HEART and TIMI Risk Scores for Suspected Acute Coronary Syndrome in the Emergency Department. *Crit Pathways Cardiol* 2016;15:1–5.

[1] Algorithm for Low/Intermediate Risk Chest Pain

Stratify ED pt with CP of possible coronary origin

Low Risk HEART 0-3

Intermediate Risk HEART 4-6

Discharge with close F/U after serial biomarkers/ECGs

Clinical situation warrants CDU admission

Admit to CDU for further evaluation

Serial biomarkers, ECGs and stress testing

Cardiology consult +/-Stress testing

Serial biomarkers, ECGs and stress testing

Stress test negative-discharge with close PCP follow-up

Stress test equivocal/positive

Stress test negative-discharge with close PCP/Cardiology F/U

Stress test equivocal/positive

Consult Cardiology

Discharge to home with Cardiology F/U

Admit for ACS +/- catheterization

Discharge to home with Cardiology F/U

Admit for ACS +/- catheterization

HEART ❤️

HEART score for chest pain patients			
History	Highly suspicious	2	
	Moderately suspicious	1	
	Slightly suspicious	0	
ECG	Significant ST-deviation	2	
	Non specific repolarisation disturbance / LBTB / PM	1	
	Normal	0	
Age	≥ 65 years	2	
	> 45 and < 65 years	1	
	≤ 45 years	0	
Risk factors	≥ 3 risk factors or history of atherosclerotic disease*	2	
	1 or 2 risk factors	1	
	No risk factors known	0	
Troponin	≥ 3x normal limit	2	
	> 1 and < 3x normal limit	1	
	≤ 1x normal limit	0	
		Total	

*Risk factors for atherosclerotic disease:

Hypercholesterolemia   Cigarette smoking
Hypertension   Positive family history
Diabetes Mellitus   Obesity

3] Choosing the Appropriate Stress Test

Rybicki FJ et al. 2015 ACR/ACC/AHA/AATS/ACEP/ASNC/NASCI/SAEM/SCCT/ SCMR/SCPC/SNMMI/STR/STS Appropriate Utilization of Cardiovascular Imaging in Emergency Department Patients With Chest Pain: A Joint Document of the American College of Radiology Appropriateness Criteria Committee and the American College of Cardiology Appropriate Use Criteria Task Force. *J Am Coll Radiol* 2016;13(2):e1-e29.

Pena ME et al. Reduction in Radiation Exposure Through a Stress Test Algorithm in an Emergency Department Observation Unit. *West J Emerg Med* 2016;17(2):97-103.

CDU Stress Test Algorithm
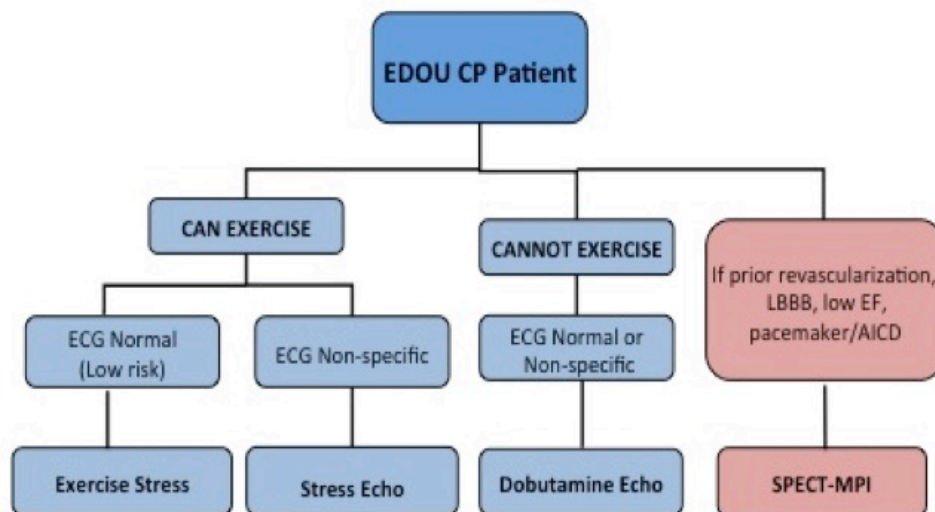
Guidelines for Ordering Stress Tests

1) Patient Assessment for Decision-making
Following information needed: Risk assessment with HEART score; current ECG; PMH; meds; allergies; *ability to exercise (jog on upsloping treadmill for 10 min); prior cardiac echo results (if available), time pt last ate

2) Cardiology Consultant
If a Cardiology consult ordered, discuss with Cardiologist need for/type of stress test

3) Stress Testing Modalities

I. For Patients ABLE To Exercise – (see 'C. Contraindications' below)

A. EXERCISE STRESS TEST

Good Candidate:
- Low ACS risk [HEART 0-3], Normal ECG

Poor Candidate:
- ECG with non-specific/baseline abnormalities, uncontrolled HTN, LBBB, paced /AICD, prior revascularization (stent, CABG, PTCA), EF <50%

B. EXERCISE STRESS ECHO

Good Candidate:
- Low/Intermediate ACS risk [HEART 0-6], acceptable for pts with non-specific or baseline ECG abnormalities

Poor Candidate:
- ECG with non-specific/baseline abnormalities, uncontrolled HTN, LBBB, paced /AICD, prior revascularization (stent, CABG, PTCA), EF <50%

Things to Consider:
- Faster results compared with nuclear tests as test time shorter and only Cardiology read needed, also lower cost
- Assesses global and regional ventricular function, chamber size, wall thickness, and valvular function

C. CONTRAINDICATIONS TO ALL EXERCISE STRESS TESTS
- High ACS risk [HEART 7-10], acute MI within 48 hrs
- Uncontrolled HTN (resting SBP >160mmHg, DBP >90mmHg)
- Uncontrolled cardiac arrhythmias with symptoms/hemodynamic compromise
- Significant electrolyte abnormalities
- High degree (2nd,3rd grade) AV block
- Hypertrophic cardiomyopathy, other outflow tract obstruction (aortic stenosis)
- Symptomatic HF, low EF (<50%) known/suspected
- Acute pulmonary embolus/myocarditis/pericarditis, aortic dissection
- Mental or physical impairment leading to inability to exercise adequately

II. For Patients UNABLE To Exercise

A. DOBUTAMINE STRESS ECHO

Good Candidate:

- Low/Intermediate ACS risk [HEART 0-6], ECG with non-specific or baseline abnormalities, test of choice for pts with asthma/COPD

Poor Candidate:
- Uncontrolled HTN (resting SBP >160mmHg, DBP >90mmHg), low EF (<50%) known/suspected, paced/AICD, severe CAD or prior CABG, serious/unstable/uncontrolled arrhythmia

Things to Consider
- May cause dangerous ventricular arrhythmias, especially in patients with poor left ventricular function or severe coronary heart disease
- Morbidly obese pts can have poor echo windows

B. ADENOSINE STRESS TEST

Good Candidate:
- Intermediate ACS risk [HEART 4-6], Test of choice for pts with LBBB, pacemaker/AICD, known/suspected left ventricular function

Contraindications to Adenosine Testing:
- Pts with active bronchospasm, currently treated for asthma/COPD, or history of severe bronchospastic airway disease including intubation
- Theophylline-containing medications within the last 72 hrs or allergy
- Pts taking oral dipyridamole
- HR < 50bpm
- High grade (2nd, 3rd) degree AV block
- Hypotension
- Sick sinus syndrome

[4] CDU Stress Test Protocol

1. A working IV (any gauge)
2. NPO for at least 4 hours
3. No caffeine in last 12 hours
4. Hold all beta blockers (exercise and Dobutamine stress tests)
5. BP appropriate: <160/90 mmHg
6. Give patients all BP home meds (except BB) ; supplement PRN (ex. clonidine 0.1mg, Norvasc 5 mg, Lisinopril 5 mg) or increase usual dose)
7. Two sets of negative TnT in eCare 3 hrs apart or a physician order on chart that it's ok to do stress test less than 3 hrs apart
8. Potassium level within normal range. If original = K+ < 3.0 and is treated, repeat potassium level in 1 hour; no need to repeat if K+ >3.0 and treated
9. If ordered, CT chest and/or vascular doppler results are negative for PE/DVT prior to stress testing