Clinical Standardization

CHEST PAIN, ADULT, EMERGENCY DEPARTMENT & INPATIENT, PATHWAY

Updated: May 8, 2023

Clinical Pathway Summary

CLINICAL PATHWAY NAME: Chest Pain in the Adult

PATIENT POPULATION AND DIAGNOSIS: Adult patients experiencing chest pain with suspicion of Acute Coronary Syndromes (ACS).

APPLICABLE TO: All Spectrum Health Sites

BRIEF DESCRIPTION: This clinical guideline outlines the management of chest pain with suspected ACS and potential STEMI. Multiple algorithms and tables are provided for a comprehensive guide to addressing treatment and management. Beginning guidelines direct initial evaluation of suspected ACS in addition to ACS rule out strategies. High Sensitivity Troponin results are reviewed. A stress test decision tree is provided in addition to a table directing an algorithm to order noninvasive cardiac stress testing. The hypothermia treatment algorithm for treatment of cardiac arrest to Cath Lab is provided.
Associated Guideline: STEMI Cath lab activation

OPTIMIZED EPIC ENHANCEMENTS: Order sets: ED Chest Pain and STEMI, ED Obs Chest Pain

IMPLEMENTATION DATE: September 2022

LAST REVISED: May 8, 2023

Pathway Information

OWNER(S): Dr. Trevor Cummings, Dr. Jeffrey Decker

Contributor(s): Dr. Ryan Madder

EXPERT IMPROVEMENT TEAM (EIT): Clinical Cardiology and ED Cardiac Care

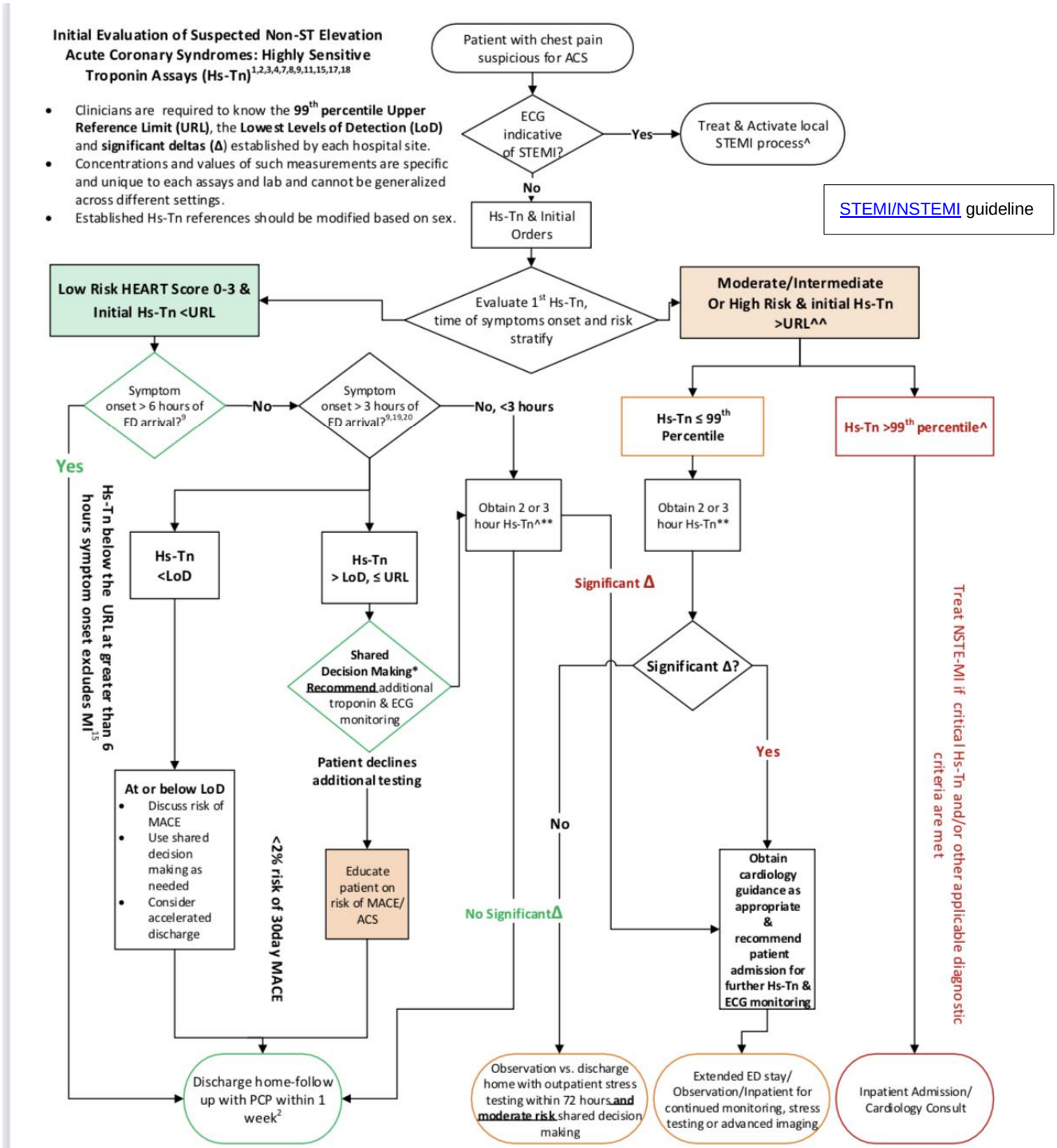
CLINICAL PRACTICE COUNCIL (CPC): Cardiovascular Health, Acute Health

CPC APPROVAL DATE: September 23, 2022, November 1, 2022

OTHER TEAM(S) IMPACTED: Emergency Department, Hospitalists, Cardiologists, Cath lab

Clinical Pathways Clinical Approach

Initial Evaluation of ACS



^At anytime either ECG or troponin findings indicate STEMI or NSTEMI, immediately implement appropriate treatment in accordance with the AHA & local hospital recommendations.

*The use of shared decision making and the discussion of individualized patient risk level should be documented in medical decision making.

**Consider onset of symptoms when determining the necessary time intervals for serial troponin studies. Local assays and corresponding cutoffs must be evaluated to differentiate between normal or elevated troponin findings. Serial troponin studies may continue in the ED, or could be completed in observation or inpatient status as appropriate/available.

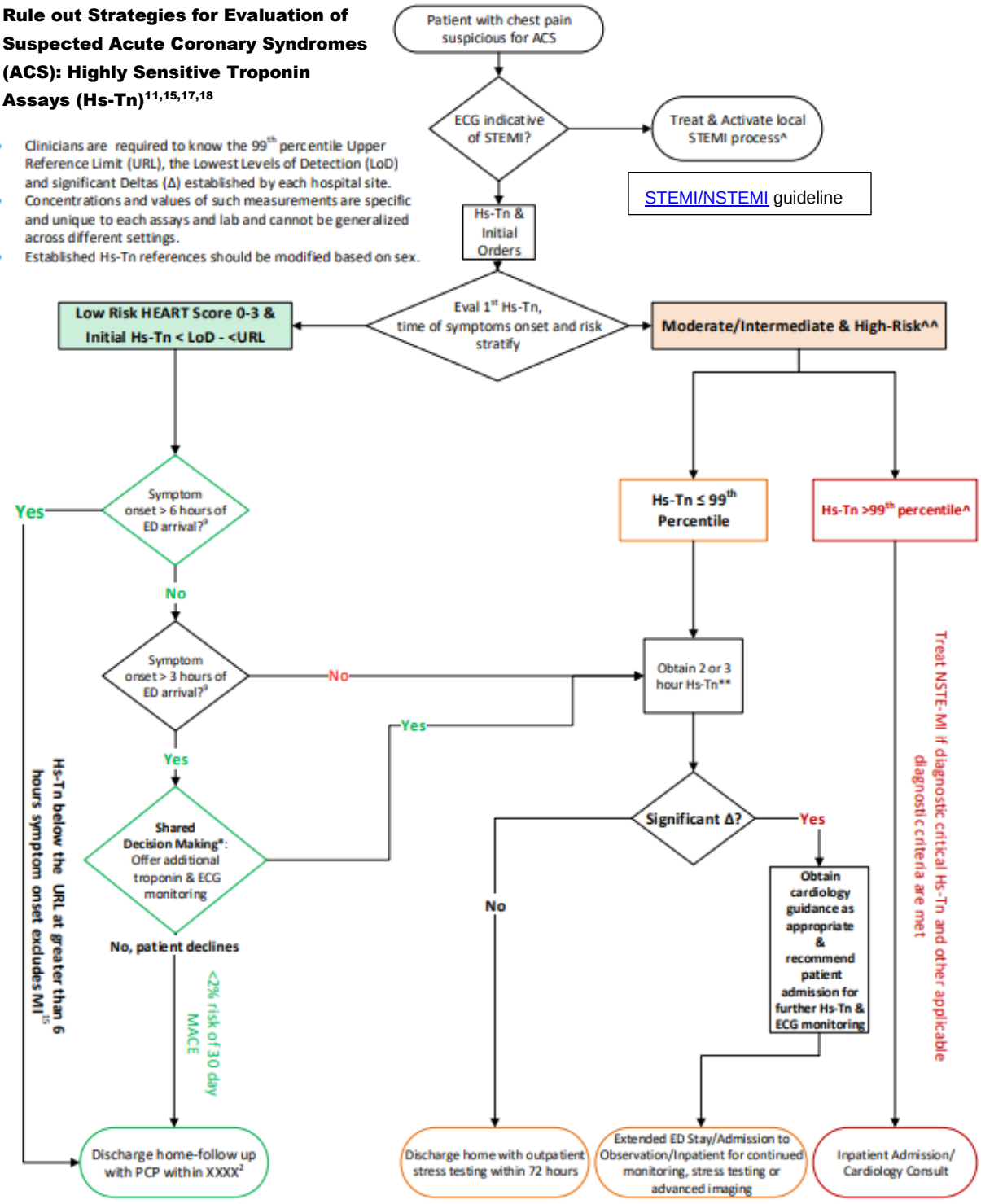
^^High-risk patients should be admitted unless serial Hs-Tn studies demonstrate no significant increase and after cardiology consult.

12.1.19 S. Mullennix, T. Cummings Approved C. Port, v1

Rule Out Strategies for Suspected ACS

Rule out Strategies for Evaluation of Suspected Acute Coronary Syndromes (ACS): Highly Sensitive Troponin Assays (Hs-Tn)[11,15,17,18]

- Clinicians are required to know the 99th percentile Upper Reference Limit (URL), the Lowest Levels of Detection (LoD) and significant Deltas (Δ) established by each hospital site.
- Concentrations and values of such measurements are specific and unique to each assays and lab and cannot be generalized across different settings.
- Established Hs-Tn references should be modified based on sex.



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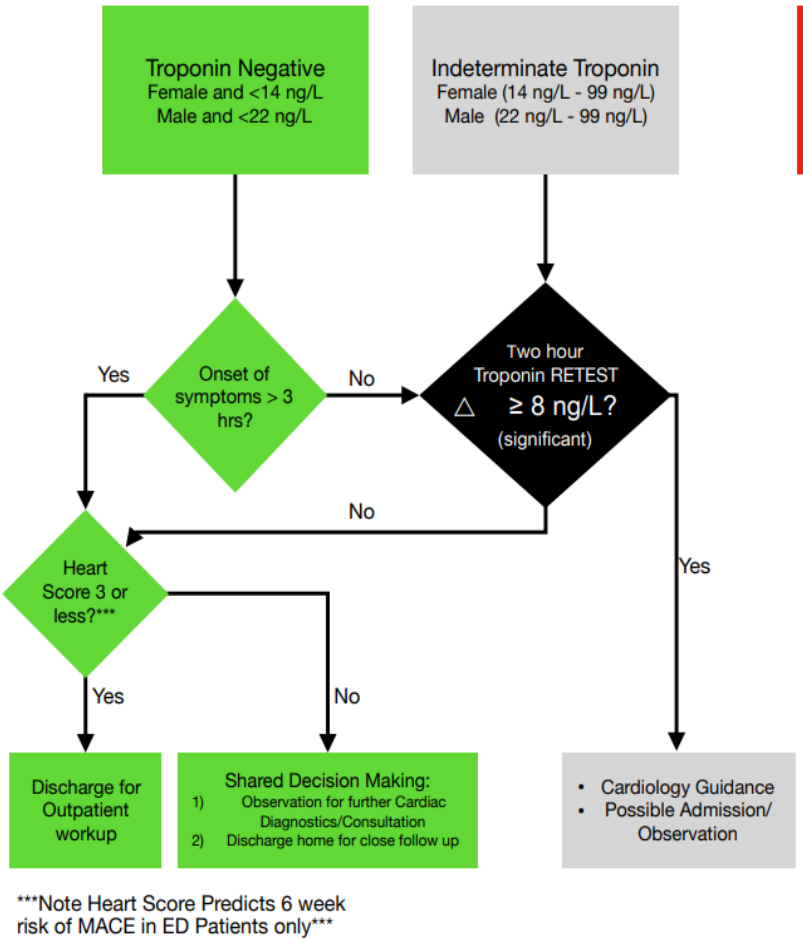
High Sensitivity Troponin T: Stress Testing

Chest Pain Center/Emergency Department/Observation/Inpatient Unit Patients:
Key Points

- Elevated HsTn levels in the critical range (>100ng/L) or abnormal deltas (>=8ng/L) must be confirmed and approved by a physician.
- If baseline HsTn levels are indeterminate (women: 14-99ng/L; men: 22-99ng/L), a 2-hour HsTn level must be evaluated prior to stress testing.
- If patient's symptom onset is less than 3 hours, a two hour follow up HsTn level must be evaluated prior to stress testing.
- If patient's symptom onset is greater than 3 hours, and baseline HsTn level is normal, no additional serial troponin is required prior to proceeding to stress testing.

Spectrum Health High Sensitivity Troponin ED Algorithm



Note Heart Score Predicts 6 week risk of MACE in ED Patients only

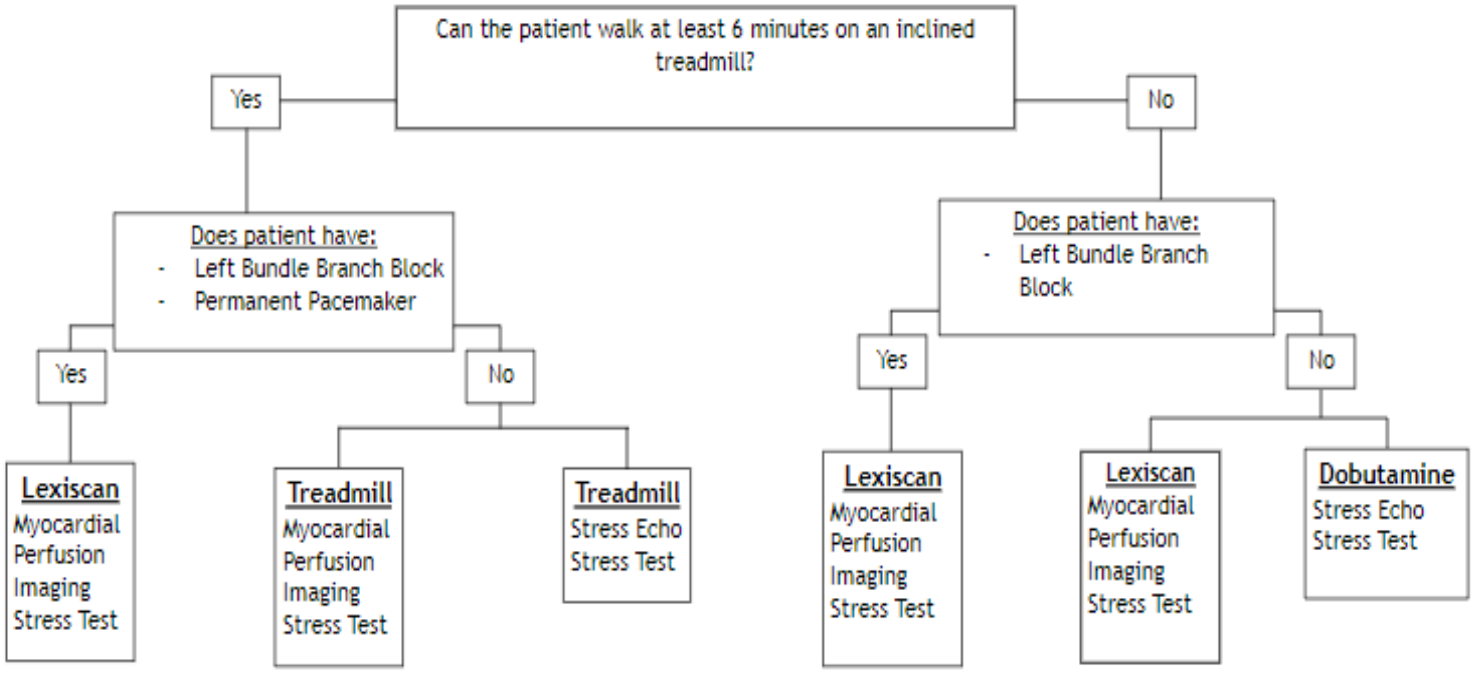
Δ of 20% significant when troponin critical

Quantitative Use of High Sensitivity

Hs-cTn (ng/L)	Acute and Chronic conditions
10,000	Very Large AMI, severe myocarditis
1000	Large AMI, myocarditis, Critical Illness
100	Small AMI, myocarditis, Takotsubo, PE, Shock, CHF, hypertensive crisis, SAB, etc
50	Micro AMI, myocarditis, Takotsubo, PE, shock, CHF, hypertensive crisis, SAB, stable CAD, etc
10	Stable angina, CHF, LVH, subclinical heart disease, etc
5	Healthy Individuals

Wildi et al. Clin Biochem. 2015; 48: 218-22.

Stress Test Decision Tree



Stress Echo: Testing to evaluate patients for coronary artery disease by utilizing stress testing along with echocardiography to visualize the structure, function and wall motion of the myocardium.

-**Treadmill Echo**-Patients that **can** walk a treadmill >6min., are <350 pounds, and **do not** have a LBBB or pacemaker.

-**Dobutamine Echo**-Patient's that **cannot** walk a treadmill >6min., and **do not** have a LBBB or pacemaker, or for patients >350 pounds (treadmill wt. limit is 350#)

- (Medicated test in which patients are given Dobutamine to increase heart rate to a minimum of 85% of age predicted max heart rate)

Myocardial Perfusion Imaging: Nuclear stress testing that evaluates a patient for coronary artery disease by visualizing perfusion and function of the myocardium.

-**Treadmill Nuclear**-Patients that **can** walk a treadmill >6min., are <350 pounds, and **do not** have a LBBB or pacemaker

-**Lexiscan Nuclear**-Patient's that **cannot** walk a treadmill >6min., or for patients that **have** a LBBB or pacemaker.

- (Medicated test in which patients are given Lexiscan to dilate the coronary arteries to assess blood flow to the heart- do not need to increase heart rate)

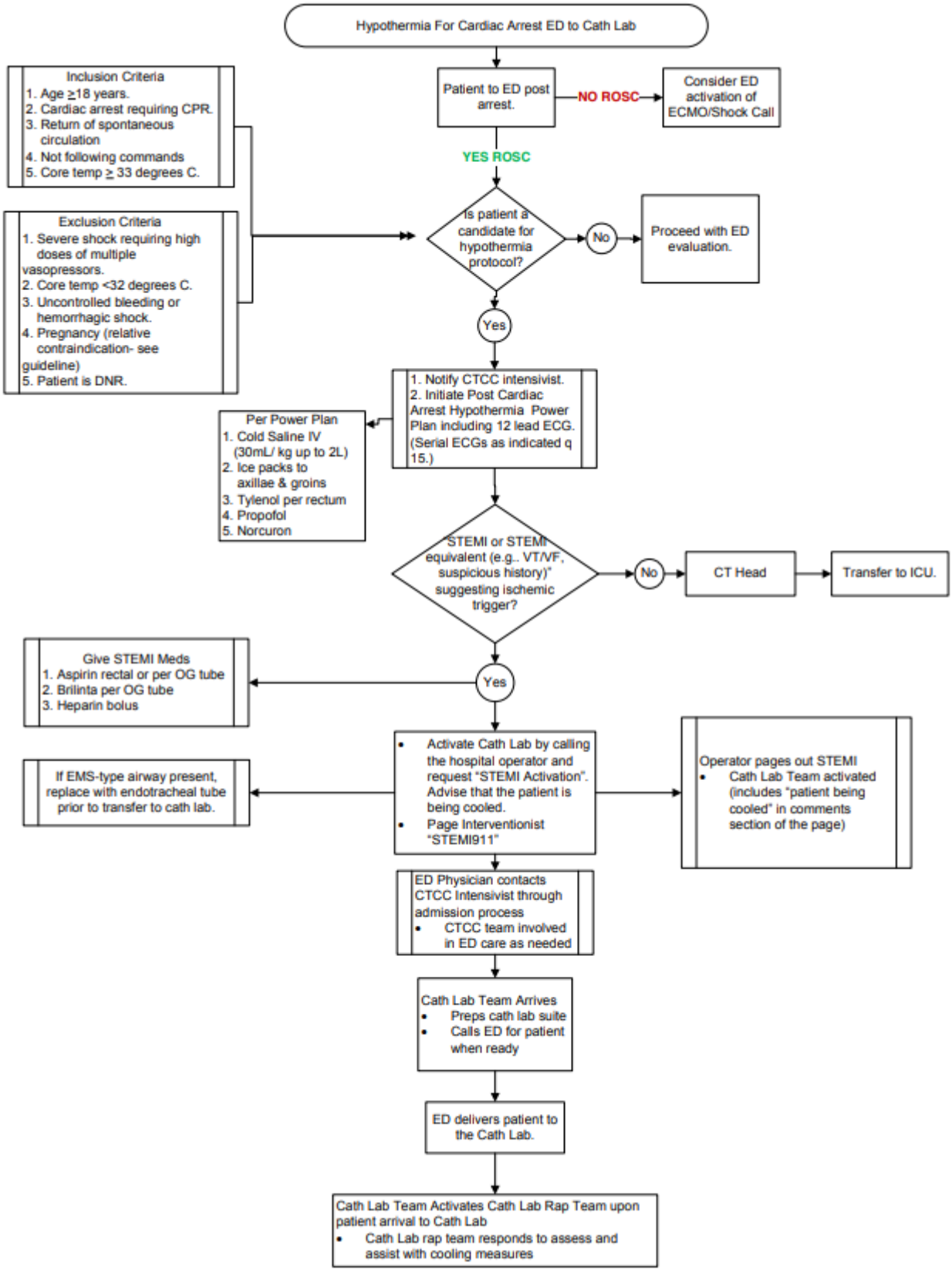
Other testing offered at SH-CVI: Nuclear MUGA imaging, GXT-treadmill stress testing (no imaging) and vascular testing (Vascular tests include: Carotid duplex tests, Renal Doppler studies, Upper and Lower Venous and Arterial studies, and ABI testing.

Algorithm for Ordering Noninvasive Cardiac Stress Testing

Indicates recommend stress test to order

Patient History	Exercise Echo	Chemical Echo	Exercise Nuclear SPECT MPI	Chemical Nuclear SPECT MPI	Non Imaging Treadmill	CTA
Patient with know CAD/ prior stent without prior MI	●	●	●	●		
Cardiomyopathy/ resting wall motion abnormalities			●	●		●
Patient with conduction abnormalities, especially LBBB, A fib and ventricular paced rhythm				●		●
Patient has poor echo windows (eg. Patient morbid obese BMI >40, COPD, emphysema, or breast implants)			●	●		●
Patient has poor exercise tolerance/unable to achieve maximum exertion/unable to reach 7 mets (ex. duration of 5 mins)		●		●		●
Patients with renal inusufficiency/failure or allerigic to contrast dye	●	●	●	●		
Patients with known valvular stenosis or significant regurgitation	●	●				●
Low risk < 40 yrs of age male					●	●
>60 yrs of age	●	●	●	●		
Pregnant	●					

Hypothermia Initiation to Cath Lab



References:

Bart, BA, Erlien, DA, Herzog, CA, & Asinger, RW. Marked differences between patients referred for stress echocardiography and myocardial perfusion imaging studies. *American Heart Journal*. 2005; 149(5): 888-893. https://doi.org/10.1016/j.ahj.2004.10.004

Brindis RG, Douglas PS, Hendel RC, et al. ACCF/ASNC appropriateness criteria for single-photon emission computed tomography myocardial perfusion imaging (SPECT MPI): A report of the American College of Cardiology Foundation Quality Strategic Directions Committee Appropriateness Criteria Working Group and the American Society of Nuclear Cardiology endorsed by the American Heart Association [published correction appears in J Am Coll Cardiol. 2005 Dec 6;46(11):2148-50]. *J Am Coll Cardiol*. 2005;46(8):1587-1605. doi:10.1016/j.jacc.2005.08.029

Douglas PS, Khandheria B, Stainback RF, et al. ACCF/ASE/ACEP/AHA/ASNC/SCAI/SCCT/SCMR 2008 appropriateness criteria for stress echocardiography: a report of the American College of Cardiology Foundation Appropriateness Criteria Task Force, American Society of Echocardiography, American College of Emergency Physicians, American Heart Association, American Society of Nuclear Cardiology, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, and Society for Cardiovascular Magnetic Resonance endorsed by the Heart Rhythm Society and the Society of Critical Care Medicine. *J Am Coll Cardiol*. 2008;51(11):1127-1147. doi:10.1016/j.jacc.2007.12.005

Fleischmann KE, Hunink MG, Kuntz KM, Douglas PS. Exercise echocardiography or exercise SPECT imaging? A meta-analysis of diagnostic test performance. *JAMA*. 1998;280(10):913-920. doi:10.1001/jama.280.10.913

Garber AM, Solomon NA. Cost-effectiveness of alternative test strategies for the diagnosis of coronary artery disease. *Ann Intern Med*. 1999;130(9):719-728. doi:10.7326/0003-4819-130-9-199905040-00003

Gibbons RJ, Balady GJ, Beasley JW, et al. ACC/AHA Guidelines for Exercise Testing. A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee on Exercise Testing). *J Am Coll Cardiol*. 1997;30(1):260-311. doi:10.1016/s0735-1097(97)00150-2

Maganti K, Rigolin VH. Stress echocardiography versus myocardial SPECT for risk stratification of patients with coronary artery disease. *Curr Opin Cardiol*. 2003;18(6):486-493. doi:10.1097/00001573-200311000-00010

Marcassa C, Bax JJ, Bengel F, et al. Clinical value, cost-effectiveness, and safety of myocardial perfusion scintigraphy: a position statement. *Eur Heart J*. 2008;29(4):557-563. doi:10.1093/eurheartj/ehm607

Mark DB, Shaw L, Harrell FE Jr, et al. Prognostic value of a treadmill exercise score in outpatients with suspected coronary artery disease. *N Engl J Med*. 1991;325(12):849-853. doi:10.1056/NEJM199109193251204

Mehta R, Ward RP, Chandra S, et al. Evaluation of the American College of Cardiology Foundation/American Society of Nuclear Cardiology appropriateness criteria for SPECT myocardial perfusion imaging. *J Nucl Cardiol*. 2008;15(3):337-344. doi:10.1016/j.nuclcard.2007.10.010

Mieres JH, Makaryus AN, Redberg RF, Shaw LJ. Noninvasive cardiac imaging. *Am Fam Physician*. 2007;75(8):1219-1228.

Mieres JH, Shaw LJ, Arai A, et al. Role of noninvasive testing in the clinical evaluation of women with suspected coronary artery disease: Consensus statement from the Cardiac Imaging Committee, Council on Clinical Cardiology, and the Cardiovascular Imaging and Intervention Committee, Council on Cardiovascular Radiology and Intervention, American Heart Association. *Circulation*. 2005;111(5):682-696. doi:10.1161/01.CIR.0000155233.67287.60

O'Keefe JH Jr, Barnhart CS, Bateman TM. Comparison of stress echocardiography and stress myocardial perfusion scintigraphy for diagnosing coronary artery disease and assessing its severity. *Am J Cardiol*. 1995;75(11):25D-34D. https://pubmed.ncbi.nlm.nih.gov/7726110/

Schinkel AF, Bax JJ, Geleijnse ML, et al. Noninvasive evaluation of ischaemic heart disease: myocardial perfusion imaging or stress echocardiography?. *Eur Heart J*. 2003;24(9):789-800. doi:10.1016/s0195-668x(02)00634-6