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
Initial Evaluation of ACS

- 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 assay and lab and cannot be generalized across different settings.
- Established Hs-Tn references should be modified based on sex.

Low Risk HEART Score 0-3 & Initial Hs-Tn < URL

Symptom onset > 6 hours of ED arrival?

Yes

Hs-Tn < LoD

At or below LoD
- Discuss risk of MACE
- Use shared decision making as needed
- Consider accelerated discharge

Discharge home-follow up with PCP within 1 week

No

Hs-Tn > LoD ≤ URL

Shared Decision Making: Recommend additional troponin & ECG monitoring

Significant Δ

Obtain 2 or 3 hour Hs-Tn**

Obtain cardiology guidance as appropriate & recommend patient admission for further Hs-Tn & ECG monitoring

Yes

Obtain 2 or 3 hour Hs-Tn**

Yes

Inpatient Admission/ Cardiology Consult

Extended ED stay/ Observation/Inpatient for continued monitoring, stress testing or advanced imaging

Extended ED stay/ Observation/Inpatient for continued monitoring, stress testing or advanced imaging

No

Observe vs. discharge home with outpatient stress testing within 72 hours and moderate risk, shared decision making

Inpatient Admission/ Cardiology Consult

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

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.

STEMI/NSTEMI guideline

Treatment STEMI if critical Hs-Tn and/or other applicable diagnostic criteria are met.
Rule Out Strategies for Suspected ACS

**Rule out Strategies for Evaluation of Suspected Acute Coronary Syndromes (ACS): Highly Sensitive Troponin Assays (Hs-Tn)**

- 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 assay and lab and cannot be generalized across different settings.
- Established Hs-Tn references should be modified based on sex.

**STEMI/NSTEMI guideline**

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**Low Risk HEART Score 0-3 & Initial Hs-Tn < LoD - cURL**

- Symptom onset > 6 hours of ED arrival?
  - Yes
    - Symptom onset > 3 hours of ED arrival?
      - Yes
        - Shared Decision Making**: Offer additional troponin & ECG monitoring
      - No
        - Hs-Tn below the URL at greater than 6 hours symptom onset excludes MI.
          - No patient declines
        - Discharge home - follow up with PCP within XXXX.
  - No
    - Discharge home with outpatient stress testing within 72 hours

**Evil 1st Hi-Tn, time of symptoms onset and risk stratify**

**Moderate/Intermediate & High-Risk**

- Hs-Tn ≤ 99th Percentile
  - Obtain 2 or 3 hour Hs-Tn**
  - Significant Δ?
    - Yes
      - Obtain cardiology guidance as appropriate & recommend patient admission for further Hs-Tn & ECG monitoring
    - No
      - Discharge home with outpatient observation or inpatient for continued monitoring, stress testing or advanced imaging
  - Inpatient Admission/Cardiology Consult

- Hs-Tn > 99th percentile^
  - STEMI/NSTEMI guideline
  - Treat NSTEMI if diagnostic criteria Hs-Tn and other applicable diagnostic criteria are met

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*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 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.

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

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**Spectrum Health High Sensitivity Troponin ED Algorithm**

**Quantitative Use of High Sensitivity**

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


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

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**Admission/Consult appropriate service**

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**Δ of 20% significant when troponin critical**

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**Discharge for Outpatient workup**

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**Shared Decision Making:**

1. Observation for further cardiac diagnostics/consultation
2. Discharge home for close follow up

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**Cardiology Guidance**

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**Possible Admission/Observation**
Stress Test Decision Tree

Can the patient walk at least 6 minutes on an inclined treadmill?

- Yes
  - Does patient have:
    - Left Bundle Branch Block
    - Permanent Pacemaker
      - Lexiscan
        - Myocardial Perfusion Imaging Stress Test
      - Treadmill
        - Myocardial Perfusion Imaging Stress Test
      - Treadmill Stress Echo Stress Test
  - No

- No
  - Does patient have:
    - Left Bundle Branch Block
      - Lexiscan
        - Myocardial Perfusion Imaging Stress Test
      - Treadmill
        - Myocardial Perfusion Imaging Stress Test
    - Dobutamine Stress Echo Stress Test

**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**

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


