Policy and Procedure: Management of Chest Pain in the Emergency Department Using the HEART Score

Policy Title:

Chest Pain Evaluation and Risk Stratification in the Emergency Department

Department:

Emergency Department

Effective Date:

[Insert Date]

Review Date:

[Insert Review Date]

Prepared by:

[Insert Author Name & Title]

Approved by:

[Insert Approving Body]

Policy Statement:

To ensure the safe, standardized, and evidence-based evaluation and management of adult patients presenting to the Emergency Department (ED) with non-traumatic chest pain suggestive of possible acute coronary syndrome (ACS), the HEART Score will be used as a validated risk stratification tool. Our centre doesn't have ICU or CCU capabilities for managing patients with ACS thus timely referral of patients of high suspension of ACS is mandatory.

Purpose:

To guide physicians and staff in:

1. Stratifying patients presenting with chest pain based on their short-term risk of major adverse cardiac events (MACE).
2. Appropriately managing patients based on risk category.
3. Ensuring timely referral, observation, or safe discharge.
4. Minimizing inappropriate admissions and testing while maintaining patient safety.

Scope:

This policy applies to all adult patients (≥18 years old) presenting to the Emergency Department with **chest pain or symptoms suggestive of ACS**, and to all ED physicians, cardiology consultants, nurses, and ancillary staff involved in their care.

Procedure:

I. Initial Assessment:

1. Conduct **primary survey (ABCs)** and initiate emergency resuscitation if indicated.
2. Obtain a **focused history**, **physical examination**, **12-lead ECG**, and **serum hs-troponin level**.
3. Apply the **HEART Score** for all patients with **non-ST elevation chest pain** or **nondiagnostic ECGs**.

II. HEART Score Criteria:

Component	Score 0	Score 1	Score 2
History	Slightly suspicious	Moderately suspicious	Highly suspicious
ECG	Normal	Nonspecific repolarization	Significant ST depression
Age	<45 years	45–64 years	≥65 years
Risk Factors	No risk factors	1–2 risk factors	≥3 risk factors or history of CAD
Troponin*	≤ normal limit	1–3× normal limit	>3× normal limit

- **Total Score Range:** 0–10

III. Risk Stratification and Management:

HEART Score	Risk Level	MACE Risk (6 Weeks)	Recommended Management
0–3	Low Risk	<2%	- Discharge with outpatient follow-up - Consider early stress testing or CT coronary angiography after cardiology consultation
4–6	Moderate	~12–16%	Refer for chest pain unit/CCU capable hospital for observation.
7–10	High Risk	>50%	Arrange for referral utilizing Emergency response system.

IV. Additional Considerations:

1. **Serial Troponins** should be performed at presentation and 1-3-6 hours later for moderate and high-risk patients.
2. **Repeat ECG** if clinical status changes or at 3–6 hour interval.
3. Use **clinical judgment** in conjunction with HEART Score—do not rely on score alone when symptoms are atypical or suggest other aetiologies (e.g., aortic dissection, pulmonary embolism).
4. Patients with **alternative diagnoses** (e.g., GERD, musculoskeletal pain) and low HEART scores may be safely discharged after evaluation.
5. **Chest pain categorization:**
   - **5.1. Highly Suspicious (2 points):** Chest pain characteristics are **typical of ACS**, including:
     - 5.1.1. **Central or left-sided chest pressure**, squeezing, or heaviness
     - 5.1.2. **Radiation to arm, neck, jaw, or back**
     - 5.1.3. **Provoked by exertion or stress**
     - 5.1.4. **Relieved by rest or nitroglycerin**
     - 5.1.5. Associated symptoms like **diaphoresis, nausea, dyspnea**

     This is the classic "anginal" pattern and should raise strong suspicion for myocardial ischemia.

   - **5.2. Moderately Suspicious (1 point):** Pain has **some features suggestive of ACS**, but also some atypical elements. Examples:
     - 5.2.1. Chest pain at rest, but **no clear exertional component**
     - 5.2.2. Slight radiation but **not typical locations**
     - 5.2.3. **Mild discomfort** rather than pressure
     - 5.2.4. Occurs **intermittently**, not clearly relieved by nitroglycerin
     - 5.2.5. Associated with vague symptoms like fatigue or palpitations

     These cases are "gray zone"—ACS is possible, but not classic.

   - **5.3. Slightly Suspicious (0 points):** Pain is **atypical for ACS**, or suggests another diagnosis:
     - 5.3.1. **Sharp, stabbing, or pleuritic pain** (worse with breathing or position)
     - 5.3.2. Localized with **palpation** (suggests musculoskeletal cause)
     - 5.3.3. **Very brief** pain lasting seconds
     - 5.3.4. **Reproducible or positional** pain
     - 5.3.5. Clearly related to **GERD, anxiety, or trauma**

     In these cases, ACS is considered unlikely based on history alone.

6. Risk Factors Considered:
   6.1. Hypertension
   6.2. Hyperlipidemia (Dyslipidemia)
   6.3. Diabetes Mellitus
   6.4. Smoking (current or recent)
   6.5. Family history of premature CAD (first-degree relative with CAD: men <55 years, women <65 years)
   6.6. Obesity (BMI ≥30)
   6.7. Known atherosclerotic disease (history of myocardial infarction, percutaneous coronary intervention, coronary artery bypass grafting, or peripheral/cerebrovascular disease)

V. Documentation Requirements:

- Document the complete **HEART Score breakdown** and **final score** in the patient's ED chart.
- Record all troponin results, ECG findings, clinical impressions, and disposition decisions.
- Clearly document any **shared decision-making discussions** with the patient and family.
- Ensure that discharge instructions include **clear warning signs** and follow-up plans.

References:

1. Six AJ, Backus BE, Kelder JC. **Chest pain in the emergency room: value of the HEART score**. Neth Heart J. 2008.
2. European Society of Cardiology (ESC) Guidelines for the Management of Acute Coronary Syndromes.
3. American Heart Association (AHA) Guidelines for Chest Pain Evaluation.

* Notes on cardiac troponin test.

i-STAT Troponin vs. hs-cTn: Head-to-Head Comparison

Feature	i-STAT Troponin (Conventional POCT)	High-Sensitivity Troponin (hs-cTn)
Assay Type	Point-of-care test (POCT)	Laboratory-based or some newer POCT versions
Detection Limit	~0.02–0.08 ng/mL (20–80 ng/L)	As low as ~2–5 ng/L
Sensitivity	Moderate; cannot detect very low troponin levels	Very high; detects minute concentrations

Feature	i-STAT Troponin (Conventional POCT)	High-Sensitivity Troponin (hs-cTn)
Rule-Out Capability	Requires serial testing at longer intervals (e.g., 6–12h)	Enables rapid rule-out (0/1h or 0/3h algorithms)
Clinical Accuracy	Higher risk of false negatives in early MI	Higher sensitivity and NPV in early MI
Turnaround Time	~10 minutes at bedside	~1 hour in lab; ~20 min in some advanced POCT
Common Use	Smaller hospitals, pre-hospital, rural settings	Tertiary care, emergency departments
Standardization	Less consistent across devices	Highly validated with assay-specific cutoffs

Clinical Cutoff Values

Assay	99th Percentile Cutoff	Units	Notes
hs-cTnT (Roche)	**14 ng/L (0.014 ng/mL)**	ng/L	FDA-approved threshold; same for men and women
hs-cTnI (Abbott Architect)	**16 ng/L (women) 34 ng/L (men)**	ng/L	Sex-specific cutoffs recommended
hs-cTnI (Siemens Atellica/Dimension Vista)	**37 ng/L (combined)**	ng/L	May vary slightly by population and assay platform

Important: Always interpret results in the **context of serial measurements** (0h, 1h, 3h) and **clinical presentation**, as **single elevated values do not confirm MI** without rise/fall and evidence of ischemia.

Timing and Assay-Specific Cutoffs

0/1-Hour Algorithm

- **Time Points**: Troponin levels are measured at presentation (0 hours) and after 1 hour.
- **Assays and Cutoffs**:
  - **hs-cTnT (Roche Elecsys)**:
    - **Rule-Out**:
      - 0h < 5 ng/L
      - OR 0h < 12 ng/L and 1h change < 3 ng/L
    - **Rule-In**:
      - 0h ≥ 52 ng/L**
      - OR 1h change ≥ 5 ng/L

- **hs-cTnI (Abbott Architect)**:
  - **Rule-Out**:
    - 0h < 4 ng/L
    - OR 0h < 5 ng/L and 1h change < 2 ng/L
  - **Rule-In**:
    - 0h ≥ 64 ng/L**
    - OR 1h change ≥ 6 ng/L
- **hs-cTnI (Siemens Centaur)**:
  - **Rule-Out**:
    - 0h < 3 ng/L
    - OR 0h < 6 ng/L and 1h change < 3 ng/L
  - **Rule-In**:
    - 0h ≥ 120 ng/L**
    - OR 1h change ≥ 12 ng/L

0/3-Hour Algorithm

- **Time Points**: Troponin levels are measured at presentation (0 hours) and after 3 hours.
- **Assays and Cutoffs**:
  - **hs-cTnT (Roche Elecsys)**:
    - **Rule-Out**:
      - 0h < 14 ng/L and 3h change < 7 ng/L
    - **Rule-In**:
      - 0h ≥ 52 ng/L**
      - OR 3h change ≥ 10 ng/L
  - **hs-cTnI (Abbott Architect)**:
    - **Rule-Out**:
      - 0h < 26.2 ng/L and 3h change < 5 ng/L
    - **Rule-In**:
      - 0h ≥ 64 ng/L**
      - OR 3h change ≥ 10 ng/L
  - **hs-cTnI (Siemens Centaur)**:
    - **Rule-Out**:
      - 0h < 47.3 ng/L and 3h change < 7 ng/L
    - **Rule-In**:
      - 0h ≥ 120 ng/L**
      - OR 3h change ≥ 20 ng/L

Note: The specific cutoffs may vary slightly based on institutional protocols and patient populations.

****other causes of troponin elevation is considered including (myocarditis, sepsis, renal impairment/failure, volume overload) to be taken in consideration especially if the clinical situation is non-significant.**