High Sensitivity Troponin Fact Sheet and Suspected ACS Evaluation Pathway

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Implementation

On Oct. 2, 2024, the new hs-cTnT assay will replace the current contemporary troponin I (cTnI) assay at Vanderbilt University Hospital and Monroe Carell Jr. Children's Hospital at Vanderbilt. The old cTnI assay will not be available after this time. **This change will not affect Vanderbilt Regional Hospitals.**

Ordering Options

1. ***High Sensitivity Troponin-T Base + 3 Hour (ED Evaluation):*** Default to immediate draw, repeat at 3 hrs
2. ***High Sensitivity Troponin-T Base, 3, 6 Hour:*** Default to immediate draw, repeat at 3 and 6 hrs
3. ***Troponin-T High Sensitivity – Timed:*** Option to continue daily (trend hs-cTnT during acute hospitalization)

Key Test Characteristics

- Change in units
  - Whole number reporting (eg., 60 ng/L vs 0.06 ng/mL or 1000-fold difference)
  - Delta (change in hs-cTnT) and Percent Delta available for interpretation
- Sex-specific upper limits of normal (99th percentile)
  - 14 ng/L for adults assigned female at birth
  - 22 ng/L for adults assigned male at birth
  - 19 ng/L for unknown sex
  - Reference values have not been established for patients <17 years old
  - hs-cTnT values above these limits are diagnostic of myocardial injury. Clinical features other than sex assigned at birth affect hs-cTnT cutoffs (age, renal function, left ventricular hypertrophy).
- Critical value alert for first hs-cTnT ≥52 ng/L within 48 hours
- Absolute delta change of ≥3 ng/L for hs-cTnT values below the sex-specific 99th percentile (14 ng/L for female, 22 ng/L for male, 19 ng/L for unknown sex). This indicates true biological change and indicates acute myocardial injury in the appropriate clinical context, including as described in the New Vanderbilt Suspected Acute Coronary Syndrome Evaluation Pathway.
- Changes in hs-cTnT values of ≥20% when one of the values is above the 99th percentile are indicative of true biological change and, therefore, indicate the presence of acute myocardial injury.
- Changes in hs-cTnT values of <20% when one of the values is above the 99th percentile. These are suggestive of chronic myocardial injury. Notable exceptions to this conclusion are in the very early (<3 hours) and very late (days) phases of an acute myocardial injury.
- The lowest measurable value for hs-cTnT is 6 ng/L (i.e., limit of quantitation). Values below this level are important in the New Vanderbilt Suspected Acute Coronary Syndrome Evaluation Pathway.
- Myocardial infarction is defined as an acute myocardial injury secondary to ischemia (inadequate blood flow). **Therefore, not all acute myocardial injuries are myocardial infarctions and should not be treated as such.**
- Type 1 myocardial infarctions are myocardial infarctions secondary to an acute coronary atherothrombosis. Not all myocardial infarctions are type 1 myocardial infarctions.

Required Learning

New High Sensitivity Cardiac Troponin T (hs-cTnT) & Myocardial Injury Evaluation Protocol Learning Module available in the Vanderbilt University School of Medicine Compliance Training System.

Suggested Reading

- Kontos MC, de Lemos JA, Hess EP et al. 2022 ACC Expert Consensus Decision Pathway on the Evaluation and Disposition of Acute Chest Pain in the Emergency Department. J Am Coll Cardiol. 2022;80(20):1925-1960.
- Thygesen K et al. Fourth Universal Definition of Myocardial Infarction (2018). Circulation. 2018;138(20):e618-e651.
- DeFilippis AP. Assessment and Treatment of Patients with Type 2 Myocardial Infarction and Acute Nonischemic Myocardial Injury. Circulation. 2019;140(20):1661-1678.

New Vanderbilt Suspected Acute Coronary Syndrome Evaluation Pathway (hs-cTnT)

Background

Pathway goals and metrics
Authors

Reference Values

- Sex-specific upper limits of normal (99th percentile)
  - 14 ng/L for adults assigned female at birth
  - 22 ng/L for adults assigned male at birth
  - 19 ng/L for unknown sex
  - Reference values have not been established for patients <17 years old
- hs-cTnT values above these limits are diagnostic of myocardial injury
- Critical value alert for first hs-cTnT ≥ 52 ng/L within 48 hours

Patient with Chest Pain/ Symptoms Concerning for ACS

Review **Considerations, Reference Values, Acute Myocardial Injury** before entering pathway

ECG

Nonischemic ECG

ST depression, T wave, or other ischemic changes

STEMI

Call FlightComm (1-1111) to activate STEMI Alert

hs-cTnT

hs-cTnT

Initial hs-cTnT **<6ng/L**

Initial hs-cTnT **6-14 ng/L** (female)
Initial hs-cTnT **6-22 ng/L** (male)

Initial hs-cTnT **>14ng/L** (female)
Initial hs-cTnT **>22ng/L** (male)

Symptom onset?

< 3 hours → Order **hs-cTnT (3hr repeat)**

> 3 hours

3h Delta (Δ)

Δ < 3 ng/L

Δ ≥ 3 ng/L

Lower concern for ACS

Order **hs-cTnT (3hr repeat)**

High concern for ACS

- **Management per NSTEMI Guidelines**
- e.g. hs-cTnT >100 ng/L
- Recurrent/persistent symptoms
- Ischemic ECG changes

Eligible for discharge*

*For patients with a HEART Score ≥ 7, consider discussing disposition with **Cardiology Triage Attending (7a-5p):**

615-343-3255

OR

Cardiology Fellow (5p-7a & weekend):

615-831-8272

Discuss disposition with Cardiology:

1. CAC Request
2. Cardiology Triage Attending (7a-5p): 615-343-3255
3. Cardiology Fellow (5p-7a & weekend): 615-831-8272
4. For complex cases that you are considering rapid follow-up, consider discussing the case with the Triage Cardiology Attending/Cards Fellow

Considerations

- Critically ill patient in need of CCU and/or emergent procedure: see here
  - Consult Cardiology: Critical Care (pages the CCU Fellow)
- Did patient undergo CABG w/in the past 30 days?
  - Consult Cardiac Surgery

Acute Myocardial Injury Definition

- Indicates a true biological change in the appropriate clinical context and, therefore, the presence of acute myocardial injury as described in the new Vanderbilt Suspected Acute Coronary Syndrome Evaluation Pathway
  - Absolute delta change of ≥ 3 ng/L for hs-cTnT values below the sex-specific 99th percentile (14 ng/L for female, 22 ng/L for male, and 19 ng/L for unknown sex)

    OR
  - Changes in hs-cTnT values of ≥ 20% when at least one of the values is above the 99th percentile