

Reviewing the 4th Universal Definition of Myocardial Infarction

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The Fourth Universal Definition of Myocardial Infarction was published in the Journal of the American College of Cardiology in August and I must comment wearing both a bedside physician hat and a physician advisor hat. As the bedside physician, I appreciate the work of the American College of Cardiology to help me understand the role of abnormal troponins in the health of my patient. I will use this document to support the clinical care that I provide to my patient as a hospitalist. I will work to understand how to use the recommended term myocardial injury and how this applies to my patient at the bedside. I also appreciate the evidence-based understanding that patients with a type 2 MI actually have higher short term and long term mortality risk.

When I put on my physician advisor hat, I have grave concerns about this publication because the consensus panel hedged. The discussion throughout the paper feels as if the panel, like the rest of us, isn't really sure what to do about "barely abnormal troponins".

Initially, the panel gives clear direction on a type 1 MI and the criteria to diagnose STEMI and NSTEMI.

Criteria for type 1 MI

Detection of a rise and/or fall of cTn values with at least one value above the 99th percentile URL and with at least one of the following:

- Symptoms of acute myocardial ischaemia;
- New ischaemic ECG changes;
- Development of pathological Q waves;
- Imaging evidence of new loss of viable myocardium or new regional wall motion abnormality in a pattern consistent with an ischaemic aetiology;
- Identification of a coronary thrombus by angiography including intracoronary imaging or by autopsy.^a

I appreciate that acute myocardial injury caused by acute myocardial ischemia is a reasonable definition for MI, but the discussion of acute myocardial injury compared to stable/chronic myocardial injury will pose a new challenge for the physician advisor.

Criteria for myocardial injury

Detection of an elevated cTn value above the 99th percentile URL is defined as myocardial injury. The injury is considered acute if there is a rise and/or fall of cTn values.

I appreciate that the clinical presentation of myocardial infarction may include ischemic symptoms like chest, upper extremity, mandibular or epigastric discomfort during exertion or at rest and I appreciate (even more) that the authors also included ischemic equivalents such as dyspnea or fatigue. However, the definition states that symptoms are one of the listed criteria for making the diagnosis and then goes on to read that MI may occur “even without symptoms”.

That certainly creates a bit of ambiguity.

Do you think auditors are going to buy my argument that the patient had an acute myocardial infarction without symptoms or with only “fatigue” as the symptom of ischemia? Nope, I don’t either. Denial.

The obvious elephant in the room is type 2 MI which remains ambiguous with the 4th universal definition of MI.

Criteria for type 2 MI

Detection of a rise and/or fall of cTn values with at least one value above the 99th percentile URL, and evidence of an imbalance between myocardial oxygen supply and demand unrelated to coronary thrombosis, requiring at least one of the following:

- Symptoms of acute myocardial ischaemia;
- New ischaemic ECG changes;
- Development of pathological Q waves;
- Imaging evidence of new loss of viable myocardium or new regional wall motion abnormality in a pattern consistent with an ischaemic aetiology.

The opinion of the licensed provider caring for the patient should matter the most when determining the clinical significance of an elevated troponin. Unfortunately, that may not always be the case. What is that auditor going to do when my licensed provider diagnoses a type 2 MI in a patient with dyspnea and acute respiratory failure. He/she is going to respond that the dyspnea was due to the respiratory failure and was not associated with a symptom of “ischemic myocardial injury in the context of a mismatch between oxygen supply and demand.” What if I then tell the auditor that this was an example of a patient who had the type 2 MI with atypical symptoms or “even without symptoms”?

I’m chuckling at myself right now!

Then I read the dagger. Ouch, it hurt. “Nevertheless, abnormal troponin values in the setting of acute and/or chronic heart failure are often better categorized as a myocardial injury condition.” I actually wrote “Oh, boy” in the margin next to this portion. It gave me a stomach ache.

Unfortunately, myocardial injury will code to a traumatic code so this will need to be addressed (hopefully soon) by Coding Clinic. Myocardial injury in the 4UDMI may be traumatic, but it may not be due to trauma so we’ll have yet another example of coding and clinical language discrepancy.

Furthermore, a model for interpreting myocardial injury is Figure 6 in the publication. Figure 6 reads that stable means a delta of less than 20%. I will begin to educate my hospitalists to bust out their iPhone calculator and work to determine the delta troponin. I do so I guess they’ll have to do so as well.

FIGURE 6 A model for interpreting myocardial injury. Ischaemic thresholds vary substantially in relation to the magnitude of the stressor and the extent of underlying cardiac disease. MI = myocardial infarction; URL = upper reference limit. *Stable denotes $\leq 20\%$ variation of troponin values in the appropriate clinical context. ^aIschaemia denotes signs and/or symptoms of clinical myocardial ischaemia.

The same figure (Oh, figure 6!) also denotes that “ischemia denotes signs and/or symptoms of clinical myocardial ischemia.” But you remember that MI may occur “even without symptoms”, right?

Get ready for it physician advisors across the country. Do you know what figure 6 spells? DENIAL. Yup, you guessed it. This will allow the auditor to question the licensed physician in your state and to challenge his/her documentation supporting MI.

This will certainly give us a lot to do. First, we’ll need to teach the 4th UDMI to our doctors and then we’ll need to help them understand how to document to effectively support their

diagnosis (using a calculator) and, finally, we'll certainly be tasked with defending their opinion when the auditors get their hands on all this ambiguity. Auditors love ambiguity.

The great news is that we have a new definition of MI which opens the conversation for how to address the clinical relevance of super sensitive troponins. Science progressed to a point where we aren't certain how to interpret the clinical relevance of a "barely abnormal troponin" and, importantly, how this fits clinically into the care of our patient. The art of medicine and the progression of science. Physician Advisors will certainly enjoy the ride!