

LAB TEST: CK-MB

Test Description	
Test Name	CK-MB
Rationale for Reducing Overuse	<p>Troponin has become the cardiac biomarker of choice for detecting myocardial injury.^{1,2} CK-MB should never be used as a surrogate marker for myocardial injury when troponin is available. Despite troponin being clinically superior to CK-MB in both specificity and sensitivity, CK-MB is still being used at a high rate in some hospitals.^{3,4}</p> <p>Despite its history of widespread use, it is difficult to find any situation in which CK-MB adds anything other than cost to the clinical utility of cardiac troponin (cTn) if that marker is used properly.⁵</p>
Scope of the Issue	
<input checked="" type="checkbox"/> Inpatient Setting	<input checked="" type="checkbox"/> Outpatient Setting
	<input checked="" type="checkbox"/> Emergency Department
Additional Details	<p>Internal Medicine</p> <ul style="list-style-type: none"> • Cardiology • Critical Care
Recommendations	
<p>Summary of Recommendations</p> <ul style="list-style-type: none"> - Canadian recommendations - International recommendations 	<p>No Canadian Recommendations (see international recommendations below)</p> <p>American Society for Clinical Pathology Recommendation #9</p> <p>Don't test for myoglobin or CK-MB in the diagnosis of acute myocardial infarction (AMI). Instead, use troponin I or T. Unlike CK-MB and myoglobin, the release of troponin I or T is specific to cardiac injury.</p> <p>American Heart Association/American College of Cardiology Guideline¹</p> <p>With contemporary troponin assays, CK-MB and myoglobin are not useful for diagnosis of ACS (class III no benefit, level of evidence A)</p> <p>European Society of Cardiology Guidelines²</p> <p>For ACS diagnostic purposes, it is not recommended to routinely measure additional biomarkers such as CK, CK-MB, h-FABP, or copeptin, in addition to hs-cTn.</p> <p>Society of Hospital Medicine – Adult Hospital Medicine</p> <p>Don't order creatine kinase (CK) or Creatine Kinase-Myocardial Band (CK-MB) in suspected Acute Coronary Syndrome or Acute Myocardial Infarction.</p>
Additional Information	<p>Research has illustrated that in clinical scenarios where both troponin and CK-MB are ordered together the likelihood that troponin is negative and CK-MB is positive in the context of an acute myocardial infarction is extremely low.⁴</p>
<p>Summary of existing metrics/indicators for appropriate use (further details below) (e.g., PT/PTT, % time test conducted, if applicable)</p>	<p>International initiatives have achieved 80–98% reductions in CK-MB testing in the listed studies below.^{6–10}</p>

Success Stories

Highlights	Summary of Implementation Strategy	Barriers to Change and Facilitators of Success
Truman Medical Centers Kansas City 98% reduction⁸	<ul style="list-style-type: none">two-campus medical center in the Midwestern United States with about 520 beds. The main campus, a level 1 trauma center in the inner city, provides interventional cardiology services but does not perform open heart surgerythe Cardiology Division and pathology and laboratory medicine departments came to agreement that CK-MB testing was unnecessary in the ACS workup. CK-MB was removed from the ACS panelWhen CK-MB was part of the ACS panel prior to the intervention there were 12000 tests annually, 3 years post-intervention there were 159 tests annually	<p>Identified Barriers:</p> <ol style="list-style-type: none">CK-MB was listed in the ACS panelDiffering perceptions about the value of CK-MB testing <p>Facilitators of Success:</p> <ol style="list-style-type: none">Removal of CK-MB from the ACS panelClose collaboration between the Cardiology and Pathology departmentsPresentation of literature and local data on CK-MB testing
Brigham and Women's Hospital⁹ 80% reduction saving USD\$47,000 annually⁹	<ul style="list-style-type: none">777-bed, tertiary care center located in Boston, MACK-MB removed from paper test requisition and electronic order entry system	<p>Identified Barriers:</p> <ol style="list-style-type: none">CK-MB was present in the cardiac marker section of ED test requisitions <p>Facilitators of Success:</p> <ol style="list-style-type: none">Removed CK-MB from paper requisitions, electronic order entry screens, and the "chest pain" panel
Johns Hopkins Bayview Medical Center 95% reduction saving USD\$720,000 annually¹⁰	<ul style="list-style-type: none">555-bed academic medical center in Baltimore, MD.Developed an institutional guideline in consultation with cardiologists which suggested ordering troponin alone when suspecting ACS, informational sessions to high utilizing internal medicine and emergency department providers, disseminated a pocket-sized quick reference card summarizing the recommended ordering algorithm to all hospital providers, removed orders for CK-MB from all standardized order sets, pop-up warnings created for instances where a provider attempted to order CK or CK-MB	<p>Identified Barriers:</p> <ol style="list-style-type: none">CK and CK-MB listed on standard order sets including admission and routine daily order setsSeveral high utilizing providers <p>Facilitators of Success:</p> <ol style="list-style-type: none">Removed CK and CK-MB from order sets andImplemented an educational pop-up warning for CK-MB or CK ordersTargeted education given to high utilizing providers

Tips on Implementation

Feasible tips or suggestions for [initiating] implementation

(Per recommendation type, e.g., uncoupling, test reduction, etc.)

- Most common effective strategy

Common effective strategies include:

- Removing CK from order sets
- Revision of institutional guidelines
- Targeted information sessions

Choosing Wisely Canada Applicable Toolkits

[Give the Test a Rest](#)

References:

1. Amsterdam, E. A. *et al.* **2014 AHA/ACC guideline for the management of patients with non-st-elevation acute coronary syndromes: A report of the American college of cardiology/American heart association task force on practice guidelines.** *Circulation* vol. 130 (2014).
2. Collet, J. P. *et al.* 2020 ESC Guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation. *Eur. Heart J.* **42**, 1289–1367 (2021).
3. Kavsak, P. A. *et al.* Effects of contemporary troponin assay sensitivity on the utility of the early markers myoglobin and CKMB isoforms in evaluating patients with possible acute myocardial infarction. *Clin. Chim. Acta* **380**, 213–216 (2007).
4. Volz, K. A., McGillicuddy, D. C., Horowitz, G. L. & Sanchez, L. D. Creatine kinase-MB does not add additional benefit to a negative troponin in the evaluation of chest pain. *Am. J. Emerg. Med.* **30**, 188–190 (2012).
5. Saenger, A. K. & Jaffe, A. S. Requiem for a Heavyweight. *Circulation* **118**, 2200–2206 (2008).
6. Mrazek, C. *et al.* Inappropriate use of laboratory tests: How availability triggers demand – Examples across Europe. *Clin. Chim. Acta* **505**, 100–107 (2020).
7. Zhang, L. *et al.* Financial impact of a targeted reduction in cardiac enzyme testing at a community hospital. *J. Community Hosp. Intern. Med. Perspect.* **6**, 32816 (2016).
8. Singh, G. & Baweja, P. S. Creatine Kinase-MB: The Journey to Obsolescence. *Am. J. Clin. Pathol.* **141**, 415–419 (2014).
9. Le, R. D. *et al.* Clinical and financial impact of removing creatine kinase-MB from the routine testing menu in the emergency setting. *Am. J. Emerg. Med.* **33**, 72–75 (2015).
10. Larochelle, M. R., Knight, A. M., Pantle, H., Riedel, S. & Trost, J. C. Reducing excess cardiac biomarker testing at an academic medical center. *J. Gen. Intern. Med.* **29**, 1468–1474 (2014)