Evaluation and Diagnosis of Chest Pain

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Summary of the Clinical Problem
Chest pain is a common problem in the emergency department (ED), yet only 5.1% of patients presenting with chest pain are diagnosed with an acute coronary syndrome (ACS). Given the high frequency of chest pain in the ED, the high risk associated with ACSs, and the high prevalence of coronary heart disease, the evaluation of acute chest pain is associated with significant clinical uncertainty, unnecessary testing, resource use, and cost implications. The complete guideline addresses both acute and stable chest pain; this synopsis focuses on the major recommendations for diagnosing acute chest pain.

Characteristics of the Guideline Source
The guideline (Table) was commissioned by the ACC and AHA without commercial support. A joint committee of the ACC and AHA partnered with key medical societies. Relationships with industry were disclosed by the guideline committee and the writing group. Writing group members recused themselves from voting on sections relevant to their industry relationships. The guideline did not explicitly address the potential for bias within the source literature reviewed. The American Society of Nuclear Cardiology, a key medical society involved in cardiac imaging, ultimately withheld endorsement of the guidelines, citing a lack of balance in the presentation of the science of fractional flow reserve computed tomography and a desire for more nuanced patient-centered practice in the selection of cardiac imaging tests.

Evidence Base
The guideline recommends use of hs-cTn as the preferred biomarker for ruling out acute myocardial infarction in patients with chest pain. In 1 meta-analysis of 17 studies with 8644 patients, baseline hs-cTn vs baseline cTn demonstrated greater earlier (ie, within 2 hours) sensitivity (0.884 vs 0.749; P < .001) and negative predictive value (0.964 vs 0.935; P < .001) but lower specificity (0.816 vs 0.938; P < .001) and positive predictive value (0.558 vs 0.759; P < .001). Several studies have demonstrated that the negative predictive value of hs-cTn can be further improved to 99.1% to 100%.
by integrating serial measurements into a structured rapid rule-out strategy based on biomarker only or biomarker plus clinical risk score.5

The guidelines recommend that institutions implement structured risk assessment and evidence-based CDPs to stratify patients into low-, intermediate-, or high-risk groups to guide patient disposition and follow-up testing. CDPs, compared with unstructured clinical assessment, have been demonstrated to reduce admissions, ED length of stay, and unnecessary advanced cardiac testing without increasing risk of death or major cardiac events within 30 days.6 Furthermore, the guidelines acknowledge the strong evidence from the COMPASS-MI project (15 studies with >23,000 patients) that hs-CtTn values alone can be used to identify those at risk of myocardial infarction or death at 30 days with a negative predictive value of 99.8%.7 However, CDPs that combine cardiac risk factors with biomarker results, such as the HEART Pathway,8 should be used at centers that use CtTn, rather than hs-CtTn, biomarkers. Once low-risk patients with acute or stable chest pain are identified, they may be safely discharged from the ED, as the findings from advanced cardiac diagnostics within 30 days have not been shown to improve outcomes in this population.9 The guidelines suggest use of patient decision aids to facilitate shared decision-making in this low-risk population.

For intermediate-risk patients without known CAD, including those without evidence of either obstructive or nonobstructive CAD on prior anatomical testing, who have a negative or inconclusive evaluation for an ACS, the guidelines recommend either anatomical or functional cardiac diagnostic modalities, while indicating that the weight of evidence supports use of CCTA for index testing in this population. Discharge without advanced cardiac imaging may be considered for those with a normal CCTA result within 2 years or negative stress test within the past year.

Benefits and Harms
Practice alignment with this guideline would be expected to yield significant cost-value benefits. Together, the major recommendations have the potential to shorten time to diagnosis and ED length of stay, reduce practice variation and use of advanced cardiac diagnostics (and associated ionizing radiation exposure to patients), increase diagnostic yield, and reduce unnecessary admissions for serial biomarker rule-out and urgent cardiac risk stratification. While the safety of the recommendations included herein has been established by high-quality clinical evidence, the benefits, including cost and time savings, require further study. One potential harm relates to recommendations on matching cardiac imaging modalities to specific patient subpopulations. Because some of the listed techniques may not be available at all centers, such recommendations may lead to increases health care capital expenditures as smaller centers acquire a full array of imaging modalities.

Discussion
This represents the first multisociety guideline that addresses diagnosis and evaluation of undifferentiated chest pain. From a practice perspective, the recognition that patients at low (<1%) risk of death or major cardiac events within 30 days do not require urgent (or perhaps any) stress testing or cardiac imaging has significant implications and represents a departure from prior guidelines that recommended additional noninvasive testing within 72 hours for all patients with acute chest pain.10 For the intermediate-risk population with acute chest pain and no known CAD, the choice of anatomical or functional advanced cardiac imaging following negative workup for an ACS should be based on local availability, expertise, and patient preference.

Areas in Need of Future Study or Ongoing Research
Uncertainty exists on the unintended health effects of decreased rates of admission and urgent risk stratification for low-risk patients discharged from the ED after negative cardiac biomarker findings, as many of these patients are likely to have unaddressed cardiac risk factors. Thus, long-term outcomes in this population are likely to depend on how well individual EDs are integrated into the overall spectrum of care within a health system. Also, given data limitations, the guidelines stop short of recommending specific accelerated diagnostic protocols or CDPs. Large chest pain registry studies and multicenter pragmatic trials are warranted to document the performance of commonly used CDPs across diverse practice settings and populations.

ARTICLE INFORMATION
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REFERENCES