

HEART Score		
History	Highly suspicious	2
	Moderately suspicious	1
	Slightly suspicious	0
ECG	Significant ST-depression	2
	Non-specific abnormality	1
	Normal	0
Age	≥65 y	2
	45–<65 y	1
	<45 y	0
Risk factors	≥3 risk factors	2
	1–2 risk factors	1
	None	0
Troponin (serial)	≥3 × 99th percentile	2
	1–<3 × 99th percentile	1
	≤99th percentile	0
TOTAL		
Low-risk: 0–3		
Not low-risk: ≥4		

North American Chest Pain Rule		
High Risk Criteria		Y/N
Typical symptoms for ischemia		
ECG: acute ischemic changes		
Age ≥50 y		
Known coronary artery disease		
Troponin (serial) >99th percentile		
Low-risk: All No		
Not Low-risk: Any Yes		

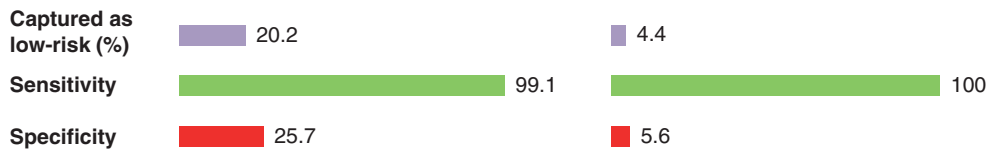


FIGURE 19-3 Examples of decision-aids used in conjunction with serial measurement of cardiac troponin for evaluation of acute chest pain. (Figure prepared from data in SA Mahler et al: *Int J Cardiol* 168:795, 2013.)

myocardial perfusion images can be obtained; the absence of any perfusion abnormality substantially reduces the likelihood of coronary artery disease. In some centers, early myocardial perfusion imaging is performed as part of a routine strategy for evaluating patients at low or intermediate risk of ACS in parallel with other testing. Management of patients with normal perfusion images can be expedited with earlier discharge and outpatient stress testing, if indicated. Those with abnormal rest perfusion imaging, which cannot discriminate between old or new myocardial defects, must undergo additional in-hospital evaluation.

OTHER NONINVASIVE STUDIES

Other noninvasive imaging studies of the chest can be used selectively to provide additional diagnostic and prognostic information on patients with chest discomfort.

Echocardiography Echocardiography is not necessarily routine in patients with chest discomfort. However, in patients with an uncertain diagnosis, particularly those with nondiagnostic ST elevation, ongoing symptoms, or hemodynamic instability, detection of abnormal regional wall motion provides evidence of possible ischemic dysfunction. Echocardiography is diagnostic in patients with mechanical complications of MI or in patients with pericardial tamponade. Transthoracic echocardiography is poorly sensitive for aortic dissection, although an intimal flap may sometimes be detected in the ascending aorta.

CT Angiography (See Chap. 270e) CT angiography is emerging as a modality for the evaluation of patients with acute chest discomfort. Coronary CT angiography is a sensitive technique for detection of obstructive coronary disease, particularly in the proximal third of the major epicardial coronary arteries. CT appears to enhance the speed to disposition of patients with a low-intermediate probability for ACS; its major strength being the negative predictive value of a finding of

no significant disease. In addition, contrast-enhanced CT can detect focal areas of myocardial injury in the acute setting as decreased areas of enhancement. At the same time, CT angiography can exclude aortic dissection, pericardial effusion, and pulmonary embolism. Balancing factors in the consideration of the emerging role of coronary CT angiography in low-risk patients are radiation exposure and additional testing prompted by nondiagnostic abnormal results.

MRI (See Chap. 270e) Cardiac magnetic resonance (CMR) imaging is an evolving, versatile technique for structural and functional evaluation of the heart and the vasculature of the chest. CMR accurately measures ventricular dimensions and function and can be performed as a modality for pharmacologic stress perfusion imaging. Gadolinium-enhanced CMR can provide early detection of MI, defining areas of myocardial necrosis accurately, and can delineate patterns of myocardial disease that are often useful in discriminating ischemic from non-ischemic myocardial injury. Although usually not practical for the urgent evaluation of acute chest discomfort, CMR can be a useful modality for cardiac structural evaluation of patients with elevated cardiac troponin levels in the absence of definite coronary artery disease. CMR coronary angiography is in its early stages. MRI also permits highly accurate assessment for aortic dissection but is infrequently used as the first test because CT and transesophageal echocardiography are usually more practical.

CRITICAL PATHWAYS FOR ACUTE CHEST DISCOMFORT

Because of the challenges inherent in reliably identifying the small proportion of patients with serious causes of acute chest discomfort while not exposing the larger number of low-risk patients to unnecessary testing and extended ED or hospital evaluations, many medical centers have adopted critical pathways to expedite the assessment and management of patients with nontraumatic chest pain, often in dedicated chest pain units. Such pathways are generally aimed at