ASNC

American Society of Nuclear Cardiology

Patient First

Imaging in Chest Pain: A Checklist

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The appropriate assessment and evaluation of chest pain is critical to patient care. The 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain[1] presents an approach for risk stratification and the diagnostic workup of patients with chest pain.

The American Society of Nuclear Cardiology #PatientFirst initiative advocates for a patient-first approach and not a modality-centric approach for evaluating patients with chest pain. Unique clinical features of every patient should be critically evaluated, including the need for testing, contraindications of certain tests and downstream testing burden. Considering patient characteristics and needs when selecting a test for evaluation of chest pain leads to the most appropriate care.

[1]2021 AHA/ACC/ASE/ASNC/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain. A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. J Am Coll Cardiol. 2021; Oct 28:[Epub ahead of print]

First Issued: October 2021

Considerations *Before* Selecting a Test for Patients with Chest Pain

- ✓ Does the patient need a test at all?
- ✓ Does the risk factor profile merit preventive therapy?
- ✓ Will test results change management?
- ✓ What is the likelihood of coronary artery disease (CAD)?
- ✓ What is the likelihood of significant coronary artery calcification?
- ✓ What is the testing availability and expertise?
- ✓ Does the patient have known prior CAD?
- ✓ Does the patient have contraindications to anatomical testing, such as renal insufficiency or IV contrast allergy or arrhythmia?
- ✓ Does the patient have contraindications for exercise or pharmacologic stress?
- ✓ Has the patient undergone prior coronary revascularization?
- ✓ What are results of prior tests? Are they equivocal or non-diagnostic?
- ✓ Is left ventricular systolic function known to be normal or reduced?
- ✓ Will flow quantification be helpful in guiding management (e.g., in microvascular disease)?
- ✓ Are there financial barriers that would prevent one test over another?

Considerations *For* Test Selection

Diagnostic imaging tests are complementary, and sometimes a second test may be necessary. Understanding the information and limitations of each diagnostic imaging modality and careful patient-based selection of the test will yield the most favorable results. In addition, decision making and choice of testing may differ based on the clinical setting - Physician's Office versus Emergency Department.

✓ **Clinic/Physician's Office**

- Patients with a low likelihood of CAD – exercise ECG/ cardiac CT
- Patients with an intermediate likelihood of CAD - to determine if symptoms are from CAD, functional testing with stress myocardial perfusion imaging (MPI) (SPECT or PET)/stress cardiac magnetic resonance (CMR)/stress Echo
- Patients with high likelihood of CAD functional testing to assess burden of disease and prognosis

✓ **Emergency Department**

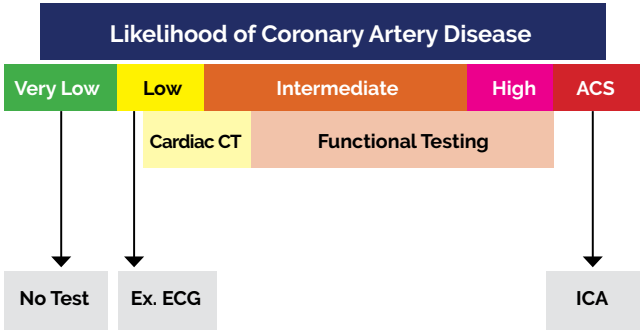
- Patients with low likelihood of CAD: no test or cardiac CT – based on the patient's CAD risk
- Patients with intermediate-to-high likelihood of CAD with no acute coronary syndrome (ACS) – functional testing based on availability and local expertise
- If ACS confirmed – invasive coronary angiography (ICA); non-invasive diagnostic testing is rarely appropriate in confirmed ACS

It is important to ask the right questions and select the right test.

✓ **Does the patient have CAD?**
- Anatomical imaging directly images CAD , and is likely to be beneficial in those with low likelihood. Disease can be effectively ruled out in these patients.

✓ **Patient in whom CAD is more likely – are the symptoms from CAD?**
- Functional testing is the better approach to assess impact of disease burden and prognosis.

Choice of the best test can be guided by the likelihood of CAD. Several approaches are available to determine risk and to identify very-low or low-risk patients in whom testing can be avoided.[1,2]



ICA=Invasive coronary angiography

[1]2021 AHA/ACC/ASE/ASNC/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain. A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. J Am Coll Cardiol. 2021;Oct 28:[Epub ahead of print]

[2]Knuuti J, Wijns W, Saraste A, et al. 2019 ESC Guidelines for the diagnosis and management of chronic coronary syndromes. The Task Force for the diagnosis and management of chronic coronary syndromes of the European Society of Cardiology (ESC). Eur Heart J. 2020;41:407-477.

Things to Remember

- ✓ Use of anatomical imaging as a "first" test strategy versus functional testing can result in more downstream revascularizations and catheterizations. This difference was shown to be greater in patients with intermediate-to-high likelihood of CAD.[3]

- ✓ In many patients, a chest CT for another indication may be available and provide complementary information, such as presence of coronary artery calcium. In such situations, when CAD is established, further anatomical testing may not be necessary.

- ✓ The negative predictive value of most imaging tests is >90%.[4]

- ✓ How to test is equally important as when to test.

[3]Mark DB, Federspiel JJ, Cowper PA, et al. Economic outcomes with anatomic versus functional diagnostic testing for coronary artery disease. Ann Intern Med. 2016;165:94–102.

[4]Green R, Cantoni VC, Peterra M, et al. Negative predictive value of stress myocardial perfusion imaging and coronary computed tomography angiography: A meta-analysis. J Nucl Cardiol. 2018;25:1588-1597.

Clinical Considerations When Choosing a Diagnostic Imaging Test

Clinical Applicability of Imaging for Stable Chest Pain				
Parameter/ Test	Radionuclide MPI	Echo	Cardiac CT	CMR
Widespread availability	+	+	±	–
Type of stress				
Exercise	+	+	NA	NA
Vasodilator	+	NA	NA	+
Dobutamine	+	+	NA	+
Assessment of coronary flow	+	NA	±*	+
Assessment of coronary calcium	+/–	NA	+	–
Guides therapy	+	+	+	+
Prognostic value	+	+	+	+

Conditions Influencing Real-World Applicability of Tests for CAD				
Scenario/ Test	Radionuclide	Echo	Cardiac CT	CMR
LBBB	+	+	+	+
CKD/Renal failure	+	+	–**	±
ICD/ Pacemaker	+	±	±	±*
Arrhythmia	+	±	–	+
Structural information	–	+	+	+

***Approved for MRI conditional devices**
**** Exclusion criteria based on renal dysfunction: ACRIN-PA: S Cr. >1.5 mg/dL; PROMISE:S Cr. >1.5 mg/dL; ISCHEMIA: eGFR <30 mL/min/1.73 m2**

Considerations *After* Testing

- ✓ Are the symptoms from CAD? Functional testing helps answer if symptoms are from CAD and due to ischemia.
- ✓ What is the patient's risk of an adverse cardiac event? Assessment of percent ischemic myocardium provides risk from myocardial infarction and ejection fraction - provides risk from cardiac death.
- ✓ Is the patient on maximally tolerated antianginal therapy?
- ✓ Is the patient on aggressive lipid-lowering therapy?
- ✓ Would revascularization be beneficial if patient is on aggressive preventive medical therapy and on aggressive antianginal medications?
- ✓ Did the test answer the clinical question?

Create a #PatientFirst Strategy

The American Society of Nuclear Cardiology #PatientFirst Initiative (ASNC.org/PatientFirst) is a multi-stage, multifaceted program designed to improve the conversation about test selection for patients with suspected or confirmed cardiovascular conditions. The overarching goal is to ensure patients receive the right test(s) to address the specific clinical question important for managing their care.

Choosing Wisely promotes conversations between clinicians and patients by helping patients choose care that is:

- ✓ Supported by evidence
- ✓ Not duplicative of other tests or procedures already received
- ✓ Free from harm
- ✓ Truly necessary

A #PatientFirst Strategy for Evaluation of Chest Pain

- ✓ Increases patient satisfaction
- ✓ Allows efficient resource utilization
- ✓ Avoids layered testing
- ✓ Reduces costs