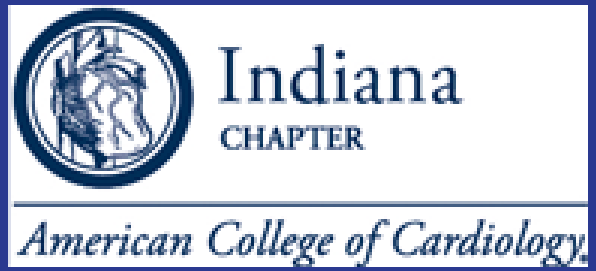

2021 ACC/AHA/Chest Chest Pain Guidelines

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DISCLOSURE

NONE

Citation

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Top 10 Take-Home Messages

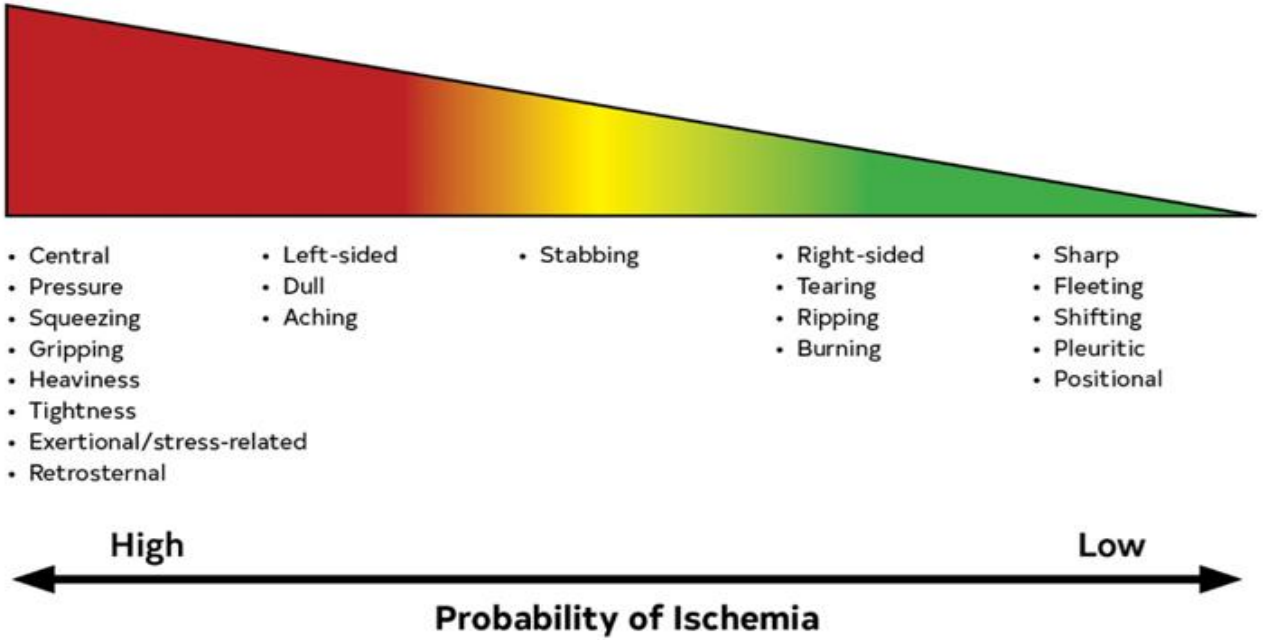
2021 Evaluation and Diagnosis of Chest Pain

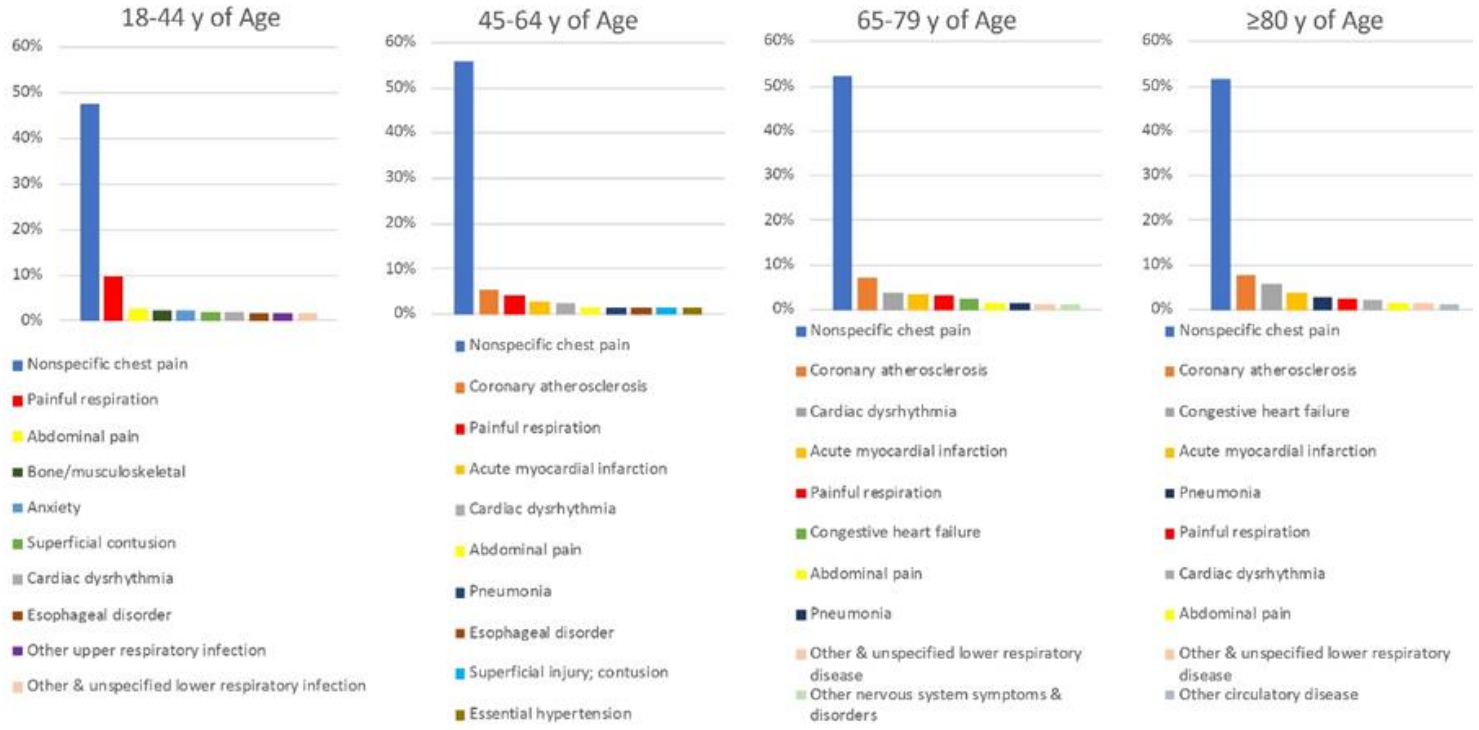
Chest Pain Means More

- Pain, pressure, tightness,
- discomfort in the chest, shoulders, arms, neck, back, upper abdomen, or jaw,
- shortness of breath and fatigue

<u>Should all be considered anginal equivalents.</u>

Figure 2. Index of Suspicion That Chest "Pain" Is Ischemic in Origin on the Basis of Commonly Used Descriptors.




18-44 y of Age
60%
50%
40%
30%
20%
10%
0%
Nonspecific chest pain
Painful respiration
Abdominal pain
Bone/musculoskeletal
Anxiety
Superficial contusion
Cardiac dysrhythmia
Esophageal disorder
Other upper respiratory infection
Other & unspecified lower respiratory infection
45-64 y of Age
60%
50%
40%
30%
20%
10%
0%
Nonspecific chest pain
Coronary atherosclerosis
Painful respiration
Acute myocardial infarction
Cardiac dysrhythmia
Abdominal pain
Pneumonia
Esophageal disorder
Superficial injury; contusion
Essential hypertension
65-79 y of Age
60%
50%
40%
30%
20%
10%
0%
Nonspecific chest pain
Coronary atherosclerosis
Cardiac dysrhythmia
Acute myocardial infarction
Painful respiration
Congestive heart failure
Abdominal pain
Pneumonia
Other & unspecified lower respiratory disease
Other nervous system symptoms & disorders
≥80 y of Age
60%
50%
40%
30%
20%
10%
0%
Nonspecific chest pain
Coronary atherosclerosis
Congestive heart failure
Acute myocardial infarction
Pneumonia
Painful respiration
Cardiac dysrhythmia
Abdominal pain
Other & unspecified lower respiratory disease
Other circulatory disease

High-Sensitivity Troponins Preferred

High-sensitivity cardiac troponins are the preferred standard for establishing a biomarker diagnosis of acute myocardial infarction.

COR	LOE	Recommendations
1	B-NR	1. In patients presenting with acute chest pain, serial cTn I or T levels are useful to identify abnormal values and a rising or falling pattern indicative of acute myocardial injury (1-21).
1	B-NR	2. In patients presenting with acute chest pain, high-sensitivity cTn is the preferred biomarker because it enables more rapid detection or exclusion of myocardial injury and increases diagnostic accuracy (17, 21-25).

COR	LOE	Recommendations
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Early Care for Acute Symptoms

Patients with acute chest pain or chest pain equivalent symptoms should seek medical care immediately by calling 9-1-1. Although most patients will not have a cardiac cause, the evaluation of all patients should focus on the early identification or exclusion of life-threatening causes.

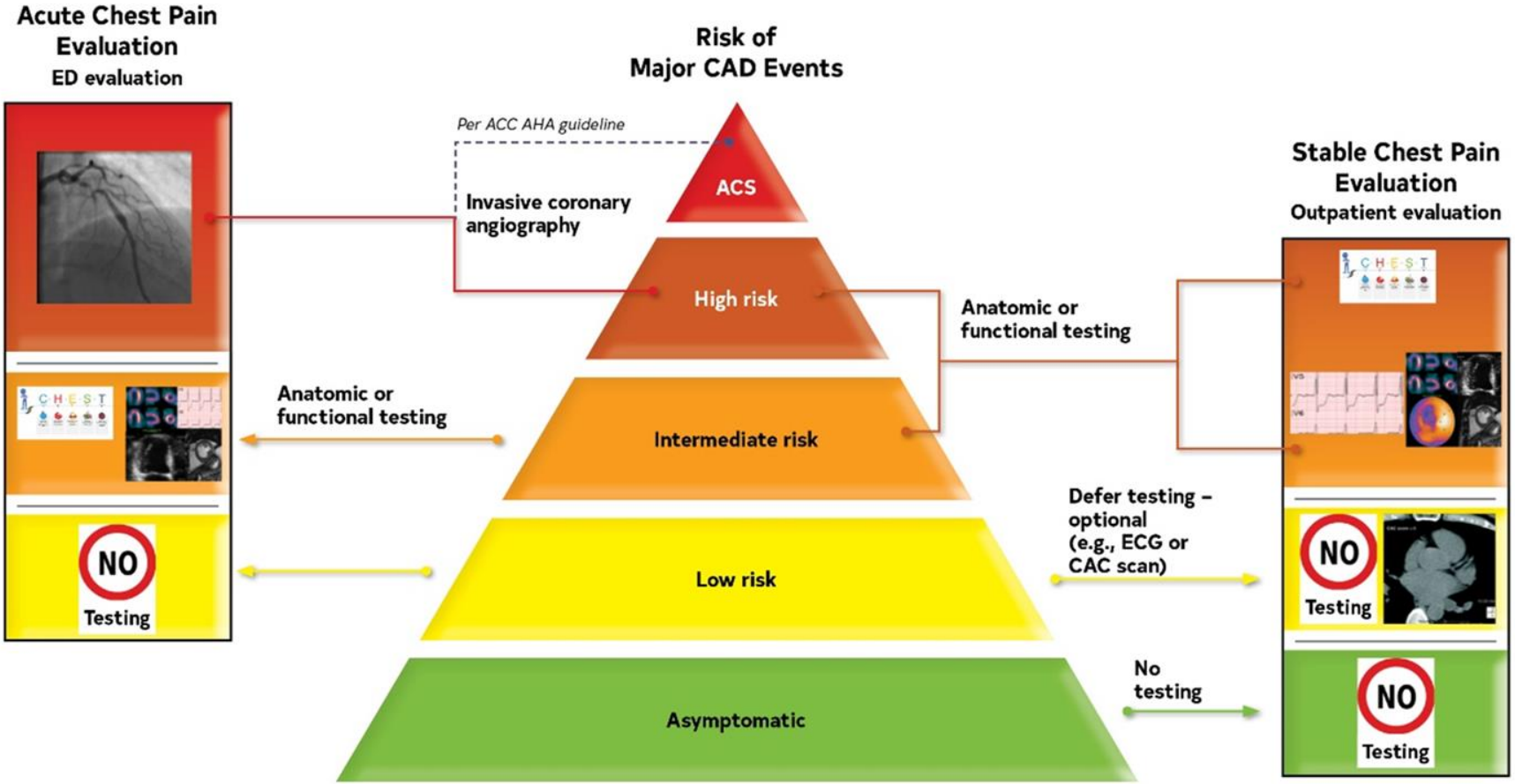
1	C-LD	1. In patients with acute chest pain, it is recommended that 9-1-1 be activated by patients or bystanders to initiate transport to the closest ED by emergency medical services (EMS).

Share the Decision-Making.

Clinically stable patients presenting with chest pain should be included in decision-making; information about risk of adverse events, radiation exposure, costs, and alternative options should be provided to facilitate the discussion.

Testing Not Needed Routinely for Low-Risk Patients.

For patients with acute or stable chest pain determined to be low risk, urgent diagnostic testing for suspected coronary artery disease is not needed.

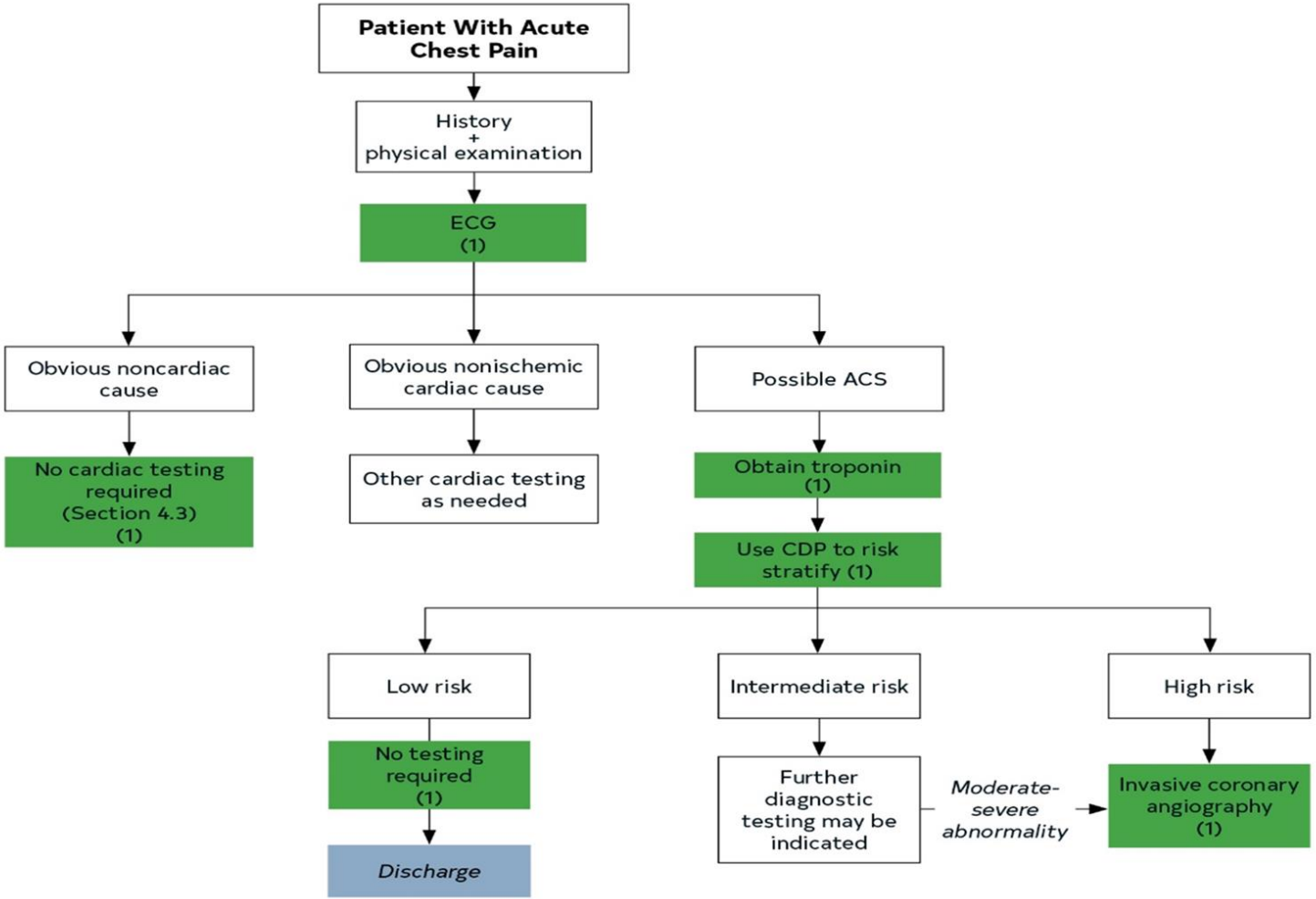

Acute Chest Pain Evaluation
ED evaluation
NO
Testing
Risk of Major CAD Events
Per ACC AHA guideline
ACS
Invasive coronary angiography
High risk
Anatomic or functional testing
Intermediate risk
Low risk
Asymptomatic
Anatomic or functional testing
Defer testing – optional (e.g., ECG or CAC scan)
No testing
Stable Chest Pain Evaluation
Outpatient evaluation
NO
Testing
NO
Testing

Pretest likelihood of CAD	Low	→ No testing necessary	→ Option for CAC for ASCVD risk stratification			
	Intermediate-high	→ Younger patient (<65 Years)	**OR**	Less obstructive CAD suspected	→	CCTA favored
	Intermediate-high	→ Older patient (≥65 Years)	**OR**	More obstructive CAD suspected	→	Stress testing favored

	Favors use of CCTA	Favors use of stress imaging
Goal	• Rule out obstructive CAD • Detect Nonobstructive CAD	• Ischemia guided management
Availability and expertise	• High quality imaging and exert interpretation routinely available	• High quality imaging and expert interpretation routinely available
Likelihood of obstructive CAD	• Age <65	• Age ≥65
Prior test results	• Prior functional study inconclusive	• Prior CCTA inconclusive
Other compelling indications	• Anomalous coronary arteries • Require evaluation of aorta or pulmonary arteries	• Suspect scar (especially if PET or stress CMR available) • Suspect coronary microvascular dysfunction (when PET or CMR available)

Recommendations for Patients With Acute Chest Pain and Suspected ACS (Not Including STEMI) Referenced studies that support the recommendations are summarized in Online Data Supplements 8 and 9.		
COR	**LOE**	**Recommendations**
1	B-NR	1. In patients presenting with acute chest pain and suspected ACS, clinical decision pathways (CDPs) should categorize patients into low-, intermediate-, and high-risk strata to facilitate disposition and subsequent diagnostic evaluation.
1	B-NR	2. In the evaluation of patients presenting with acute chest pain and suspected ACS for whom serial troponins are indicated to exclude myocardial injury, recommended time intervals after the initial troponin sample collection (time zero) for repeat measurements are: 1 to 3 hours for high-sensitivity troponin and 3 to 6 hours for conventional troponin assays.

Patients With Acute Chest Pain and Suspected ACS (Not Including STEMI)


Patient With Acute Chest Pain
History + physical examination
ECG (1)
Obvious noncardiac cause
Obvious nonischemic cardiac cause
Possible ACS
No cardiac testing required (Section 4.3) (1)
Other cardiac testing as needed
Obtain troponin (1)
Use CDP to risk stratify (1)
Low risk
Intermediate risk
High risk
No testing required (1)
Discharge
Further diagnostic testing may be indicated
Moderate-severe abnormality
Invasive coronary angiography (1)

Pathways.

Clinical decision pathways for chest pain in the emergency department and outpatient settings should be used routinely.

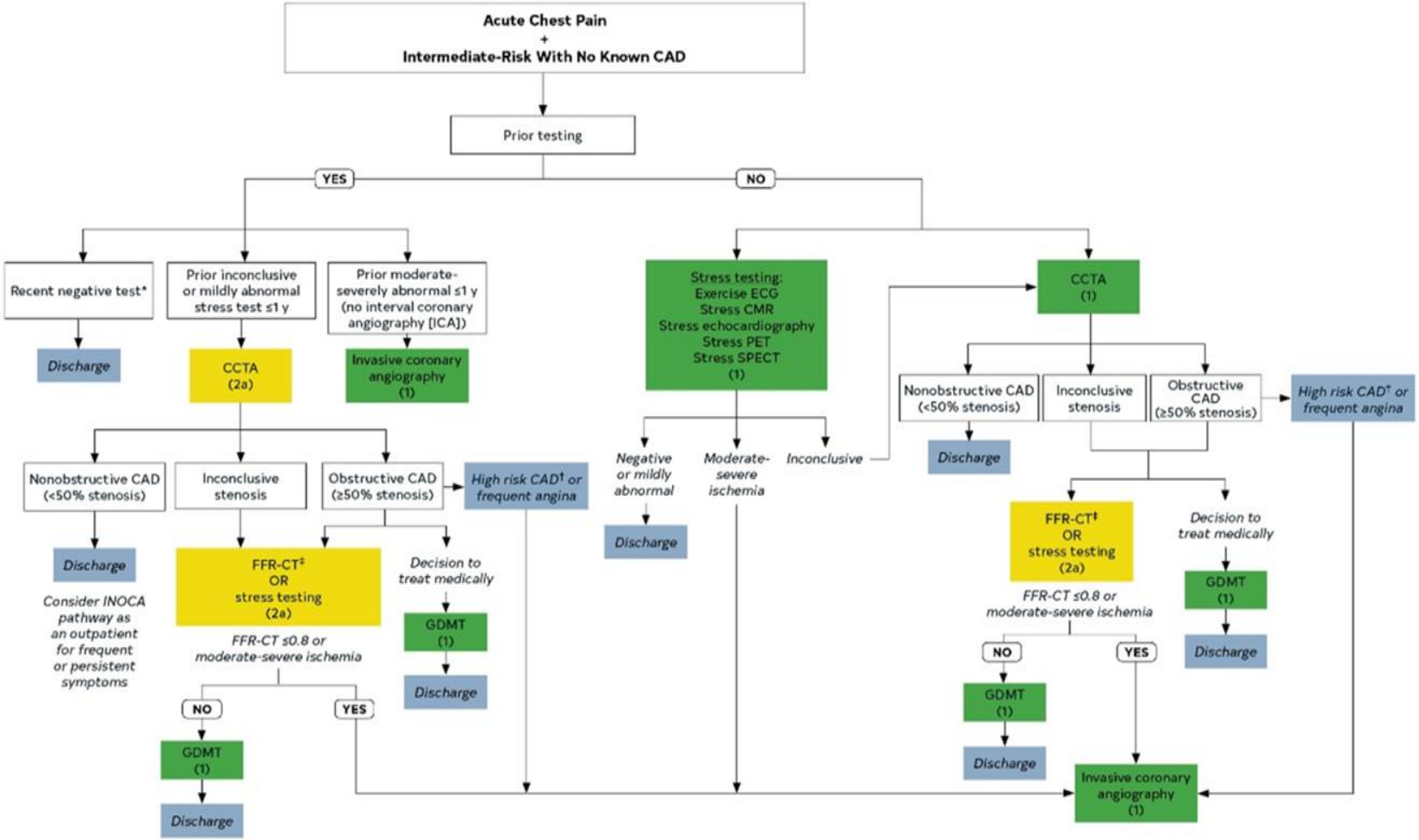
	Low Risk (<1% 30-d Risk for Death or MACE)
hs-cTn Based	
T-0	T-0 hs-cTn below the assay limit of detection or "very low" threshold if symptoms present for at least 3 h
T-0 and 1- or 2-h Delta	T-0 hs-cTn and 1- or 2-h delta are both below the assay "low" thresholds (>99% NPV for 30-d MACE)
Clinical Decision Pathway Based	
HEART Pathway	HEART score <3, initial and serial cTn/hs-cTn < assay 99th percentile
EDACS	EDACS score <16; initial and serial cTn/hs-cTn < assay 99th percentile
ADAPT	TIMI score 0, initial and serial cTn/hs-cTn < assay 99th percentile
mADAPT	TIMI score 0/1, initial and serial cTn/hs-cTn < assay 99th percentile
NOTR	0 factors

Low-Risk Patients With Acute Chest Pain

	Recommendations for Low-Risk Patients With Acute Chest Pain Referenced studies that support the recommendations are summarized in Online Data Supplements 10 and 11.	
COR	**LOE**	**Recommendations**
1	B-NR	1. Patients with acute chest pain and a 30-day risk of death or MACE <1% should be designated as low risk.
2a	B-R	2. In patients with acute chest pain and suspected ACS who are deemed low-risk (<1% 30-day risk of death or MACE), it is reasonable to discharge home without admission or urgent cardiac testing.

Low-Risk Patients With Stable Chest Pain and No Known CAD (con't.)

2a	B-R	2. For patients with stable chest pain and no known CAD categorized as low risk, CAC testing is reasonable as a first-line test for excluding calcified plaque and identifying patients with a low likelihood of obstructive CAD.
2a	B-NR	3. For patients with stable chest pain and no known CAD categorized as low risk, exercise testing without imaging is reasonable as a first-line test for excluding myocardial ischemia and determining functional capacity in patients with an interpretable ECG.

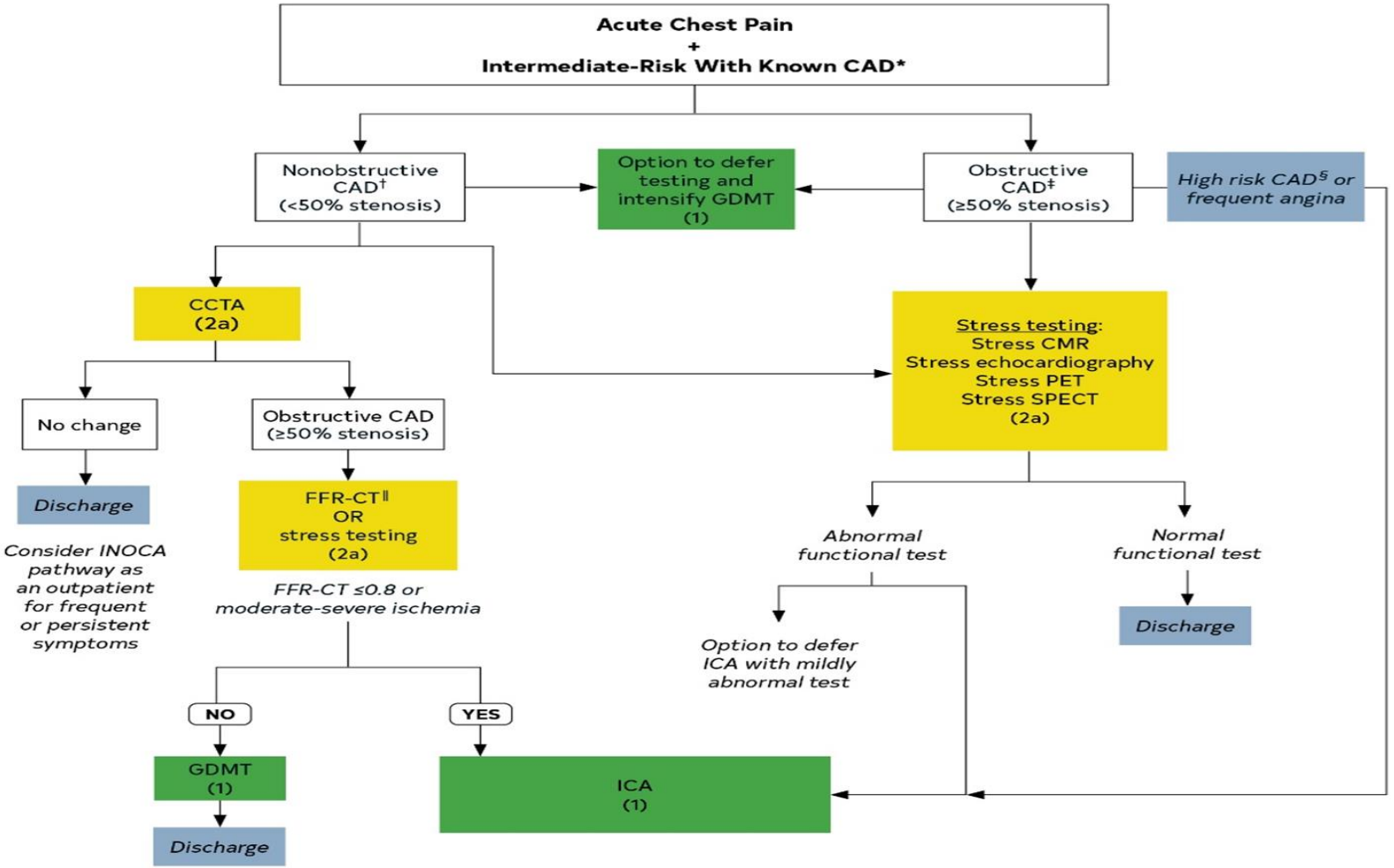

Acute Chest Pain
+
Intermediate-Risk With No Known CAD
Prior testing
YES
NO
Recent negative test*
Discharge
Prior inconclusive or mildly abnormal stress test ≤1 y
CCTA (2a)
Prior moderate-severely abnormal ≤1 y (no interval coronary angiography [ICA])
Invasive coronary angiography (1)
Nonobstructive CAD (<50% stenosis)
Discharge
Consider INOCA pathway as an outpatient for frequent or persistent symptoms
Inconclusive stenosis
FFR-CT‡ OR stress testing (2a)
FFR-CT ≤0.8 or moderate-severe ischemia
NO
YES
GDMT (1)
Discharge
Obstructive CAD (≥50% stenosis)
High risk CAD† or frequent angina
Decision to treat medically
GDMT (1)
Discharge
Stress testing: Exercise ECG Stress CMR Stress echocardiography Stress PET Stress SPECT (1)
Negative or mildly abnormal
Discharge
Moderate-severe ischemia
Inconclusive
CCTA (1)
Nonobstructive CAD (<50% stenosis)
Discharge
Inconclusive stenosis
Obstructive CAD (≥50% stenosis)
High risk CAD† or frequent angina
FFR-CT‡ OR stress testing (2a)
FFR-CT ≤0.8 or moderate-severe ischemia
NO
YES
GDMT (1)
Discharge
Decision to treat medically
GDMT (1)
Discharge
Invasive coronary angiography (1)

Intermediate-Risk Patients With Acute Chest Pain

	Recommendations for Intermediate-Risk Patients With Acute Chest Pain Referenced studies that support the recommendations are summarized in Online Data Supplements 12 and 13.	
COR	**LOE**	**Recommendations**
1	C-EO	1. For intermediate-risk patients with acute chest pain, TTE is recommended as a rapid, bedside test to establish baseline ventricular and valvular function, evaluate for wall motion abnormalities, and to assess for pericardial effusion.
2a	A	2. For intermediate-risk patients with acute chest pain, management in an observation unit is reasonable to shorten length of stay and lower cost relative to an inpatient admission.

Intermediate-Risk Patients With Acute Chest Pain and No Known CAD

	Recommendations for Intermediate-Risk Patients With No Known CAD Referenced studies that support the recommendations are summarized in Online Data Supplements 14 and 15.	
COR	**LOE**	**Recommendations**
Anatomic Testing		
1	**A**	**1. For intermediate-risk patients with acute chest pain and no known CAD eligible for diagnostic testing after a negative or inconclusive evaluation for ACS, CCTA is useful for exclusion of atherosclerotic plaque and obstructive CAD.**
1	**C-EO**	**2. For intermediate-risk patients with acute chest pain, moderate-severe ischemia on current or prior (≤1 year) stress testing, and no known CAD established by prior anatomic testing, ICA is recommended.**
2a	**C-LD**	**3. For intermediate-risk patients with acute chest pain with evidence of previous mildly abnormal stress test results (≤1 year), CCTA is reasonable for diagnosing obstructive CAD.**


Acute Chest Pain
+
Intermediate-Risk With Known CAD*
Nonobstructive CAD† (<50% stenosis)
Option to defer testing and intensify GDMT (1)
Obstructive CAD‡ (≥50% stenosis)
High risk CAD§ or frequent angina
CCTA (2a)
Stress testing: Stress CMR Stress echocardiography Stress PET Stress SPECT (2a)
No change
Obstructive CAD (≥50% stenosis)
Discharge
Consider INOCA pathway as an outpatient for frequent or persistent symptoms
FFR-CT‖ OR stress testing (2a)
FFR-CT ≤0.8 or moderate-severe ischemia
Abnormal functional test
Normal functional test
Option to defer ICA with mildly abnormal test
Discharge
NO
YES
GDMT (1)
ICA (1)
Discharge

Intermediate-Risk Patients With Acute Chest Pain and Known CAD

COR	LOE	Recommendations
1	A	1. For intermediate-risk patients with acute chest pain who have known CAD and present with new onset or worsening symptoms, GDMT should be optimized before additional cardiac testing is performed.
1	A	2. For intermediate-risk patients with acute chest pain who have worsening frequency of symptoms with significant left main, proximal left anterior descending stenosis, or multivessel CAD on prior anatomic testing or history of prior coronary revascularization, ICA is recommended.
2a	B-NR	3. For intermediate-risk patients with acute chest pain and known nonobstructive CAD, CCTA can be useful to determine progression of atherosclerotic plaque and obstructive CAD .

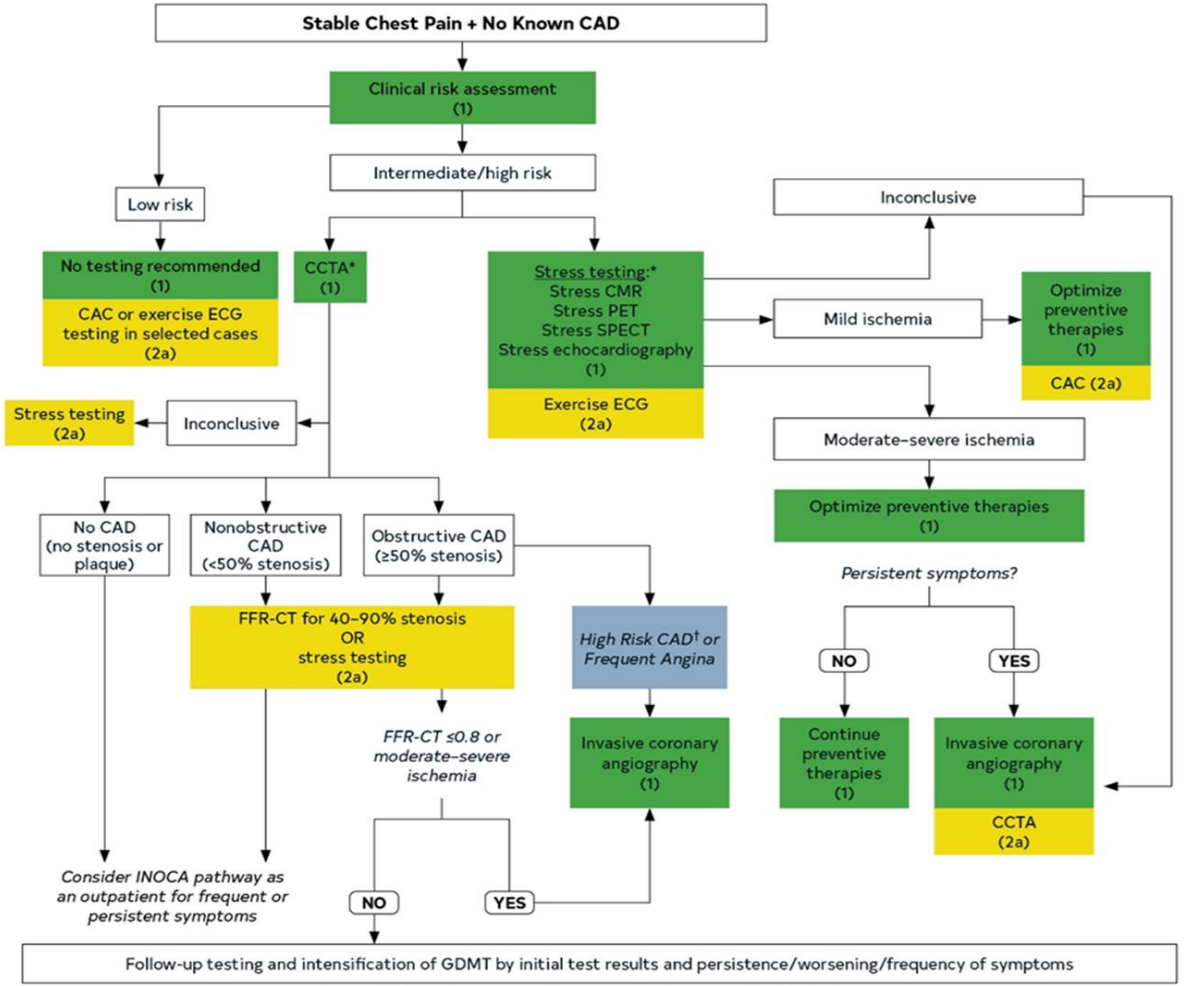
2a	B-NR	4. For intermediate-risk patients with acute chest pain and coronary artery stenosis of 40% to 90% in a proximal or middle segment on CCTA, FFR-CT is reasonable for diagnosis of vessel-specific ischemia and to guide decision-making regarding the use of coronary revascularization.
2a	B-NR	5. For intermediate-risk patients with acute chest pain and known CAD who have new onset or worsening symptoms, stress imaging (PET/SPECT MPI, CMR, or stress echocardiography) is reasonable.

Intermediate-Risk Patients With Acute Chest Pain and Known CAD

High-Risk Patients With Acute Chest Pain (con't.)

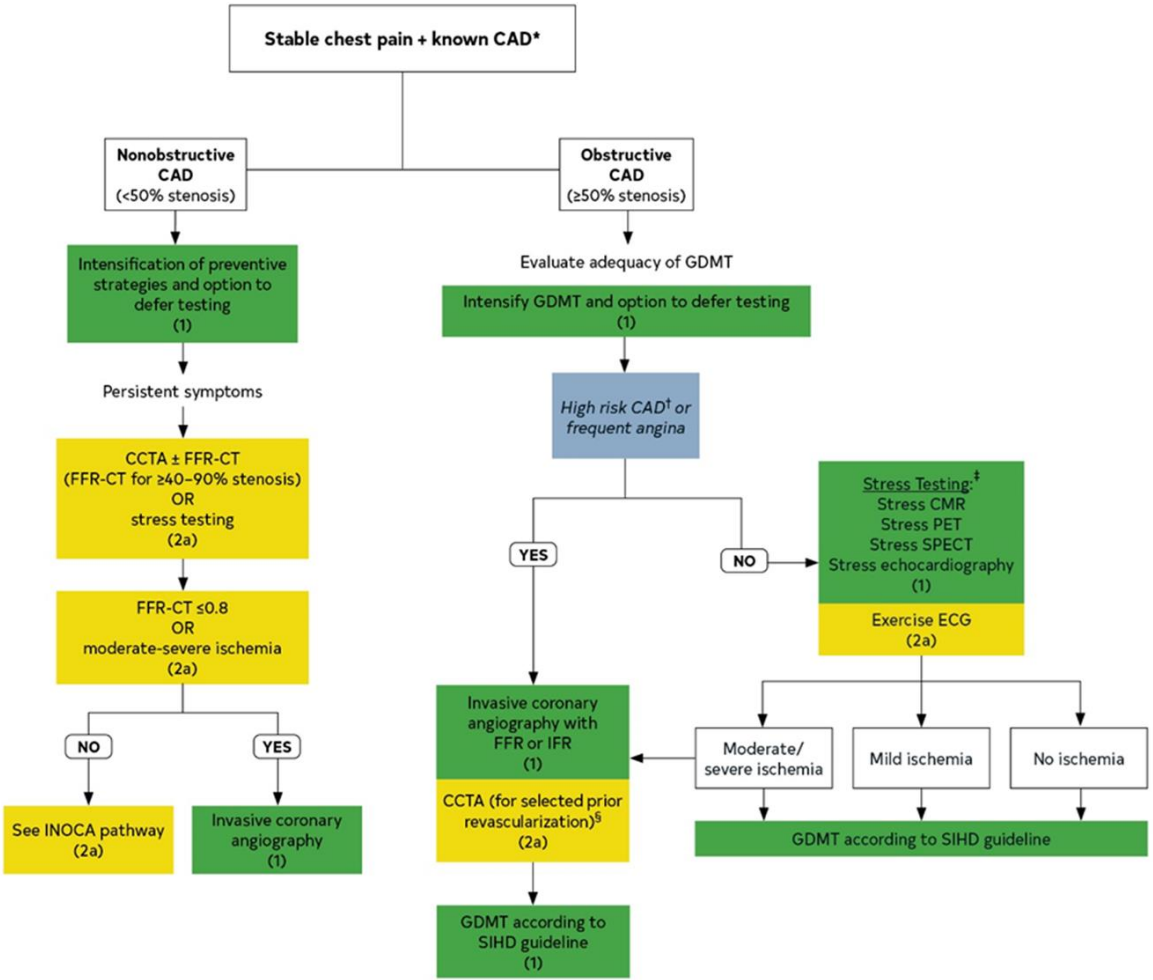
1	C-EO	2. For patients with acute chest pain and suspected ACS who are designated as high risk, ICA is recommended.
2a	B-NR	3. For high-risk patients with acute chest pain who are troponin positive in whom obstructive CAD has been excluded by CCTA or ICA, CMR or echocardiography can be effective in establishing alternative diagnoses.

Clinical Decision Pathway for Patients With Stable Chest Pain and No Known CAD

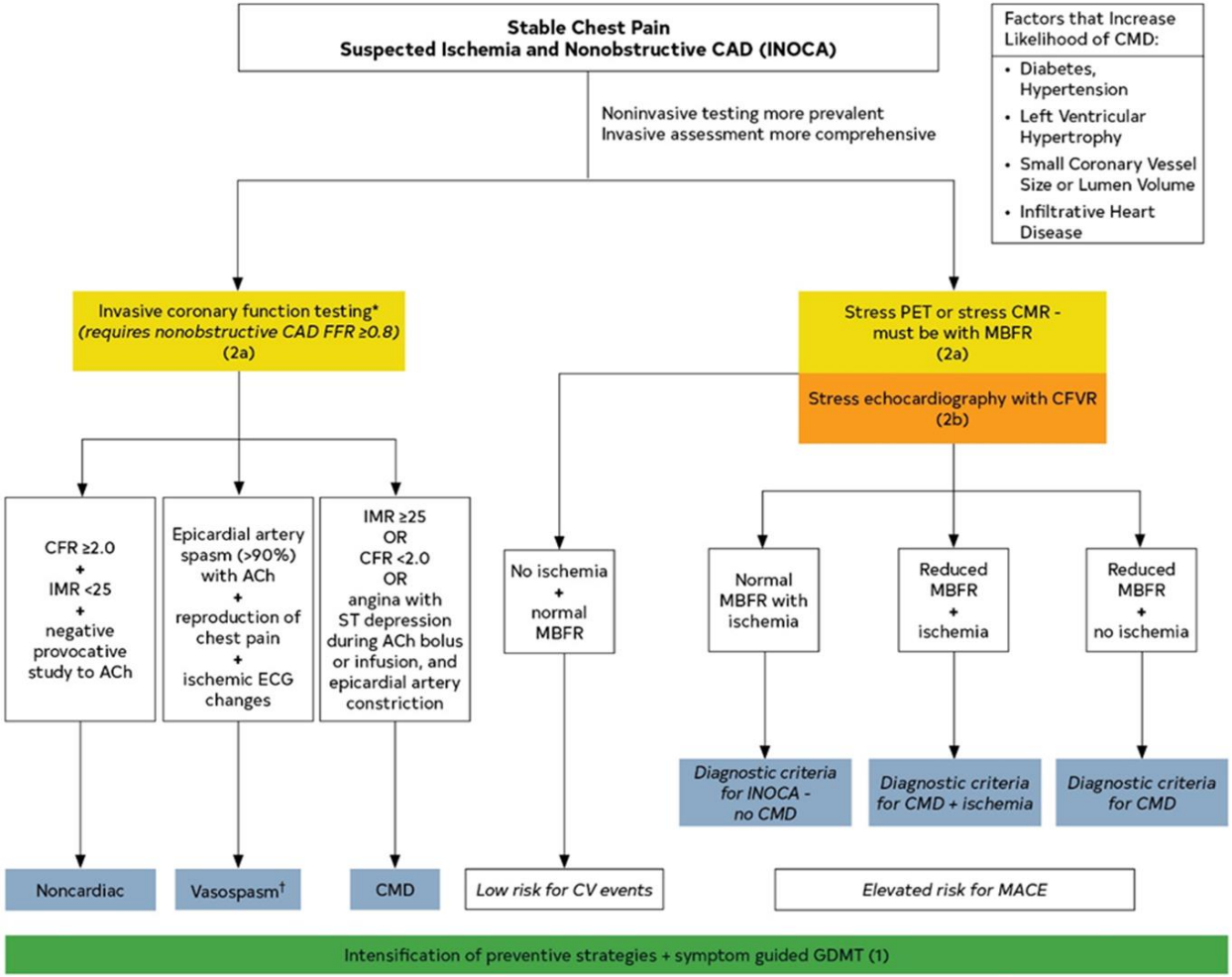


1	B-R	3. For symptomatic patients with obstructive CAD who have stable chest pain with CCTA-defined ≥50% stenosis in the left main coronary artery, obstructive CAD with FFR with CT ≤0.80, or severe stenosis (≥70%) in all 3 main vessels, ICA is effective for guiding therapeutic decision-making.
2a	B-NR	4. For patients who have stable chest pain with previous coronary revascularization, CCTA is reasonable to evaluate bypass graft or stent patency (for stents ≥3 mm).

Clinical Decision Pathway for Patients With Stable Chest Pain (or Equivalent) Symptoms With Prior MI, Prior Revascularization, or Known CAD on Invasive Coronary Angiography or CCTA, Including Those With Nonobstructive CAD.



Clinical Decision Pathway for INOCA.



Accompanying Symptoms

Chest pain is the dominant and most frequent symptom for both men and women ultimately diagnosed with Acute Coronary Syndrome.

Women

may be more likely to present with accompanying symptoms such as nausea and shortness of breath.

A Focus on the Uniqueness of Chest Pain in Women

	Recommendations for a Focus on the Uniqueness of Chest Pain in Women Referenced studies that support the recommendations are summarized in Online Data Supplements 3 and 4.	
COR	**LOE**	**Recommendations**
1	B-NR	1. Women who present with chest pain are at risk for underdiagnosis, and potential cardiac causes should always be considered.
1	B-NR	2. In women presenting with chest pain, it is recommended to obtain a history that emphasizes accompanying symptoms that are more common in women with ACS.

Considerations for Older Patients With Chest Pain

	Recommendation for Considerations for Older Patients With Chest Pain	
COR	**LOE**	**Recommendation**
1	**C-LD**	**1. In patients with chest pain who are >75 years of age, ACS should be considered when accompanying symptoms such as shortness of breath, syncope, or acute delirium are present, or when an unexplained fall has occurred.**

Identify Patients Most Likely to Benefit From Further Testing

Patients with acute or stable chest pain who are at intermediate risk or intermediate to high pre-test risk of obstructive coronary artery disease,

respectively, will benefit the most from cardiac imaging and testing.

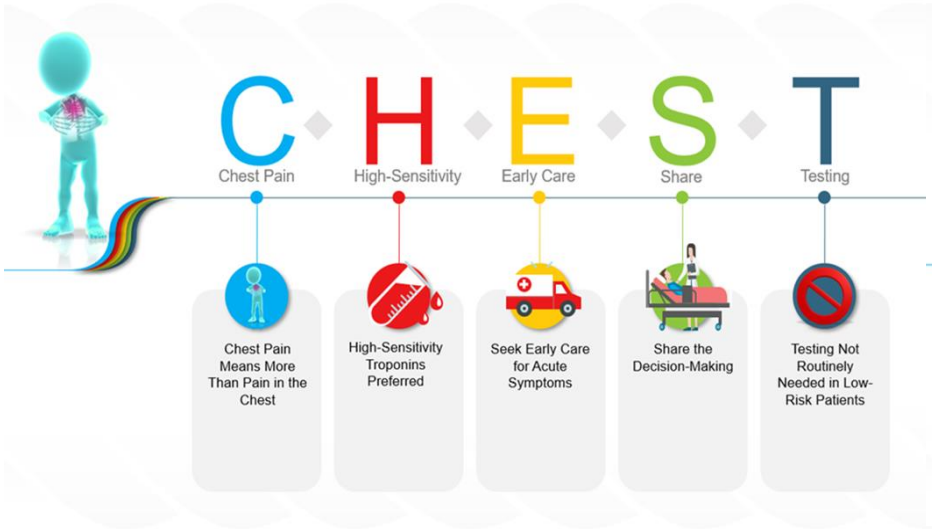
Noncardiac Is In. Atypical Is Out

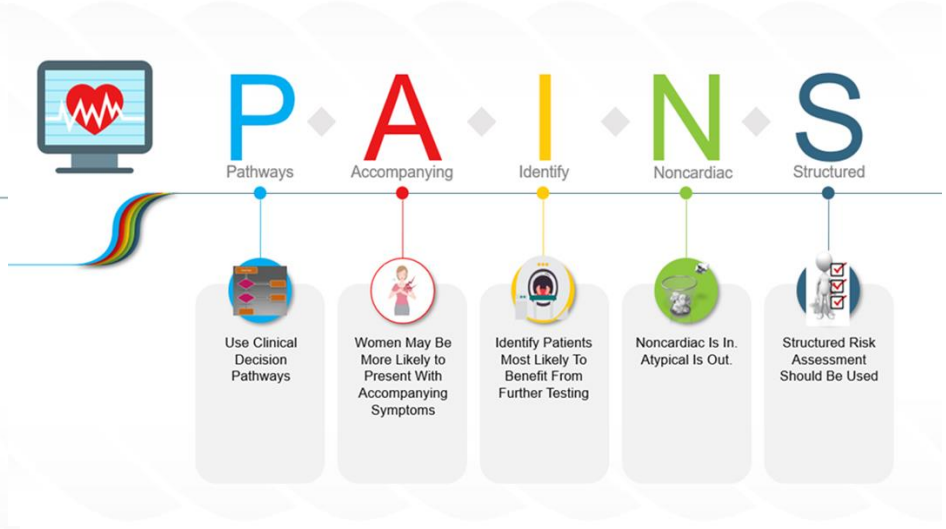
Noncardiac” should be used if heart disease is not suspected. “Atypical” is a misleading descriptor of chest pain, and its use is discouraged.

1	C-LD	2. **Chest pain should not be described as atypical, because it is not helpful in determining the cause and can be misinterpreted as benign in nature. Instead, chest pain should be described as cardiac, possibly cardiac, or noncardiac because these terms are more specific to the potential underlying diagnosis.**

Structured Risk Assessment Should Be Used.

For patients presenting with acute or stable chest pain, risk for coronary artery disease and adverse events should be estimated using evidence-based diagnostic protocols


C
Chest Pain
Chest Pain Means More Than Pain in the Chest
H
High-Sensitivity
High-Sensitivity Troponins Preferred
E
Early Care
Seek Early Care for Acute Symptoms
S
Share
Share the Decision-Making
T
Testing
Testing Not Routinely Needed in Low-Risk Patients


P
Pathways
Use Clinical Decision Pathways
A
Accompanying
Women May Be More Likely to Present With Accompanying Symptoms
I
Identify
Identify Patients Most Likely To Benefit From Further Testing
N
Noncardiac
Noncardiac Is In. Atypical Is Out.
S
Structured
Structured Risk Assessment Should Be Used

thank you

Lets Connect

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Indiana CHAPTER

American College of Cardiology