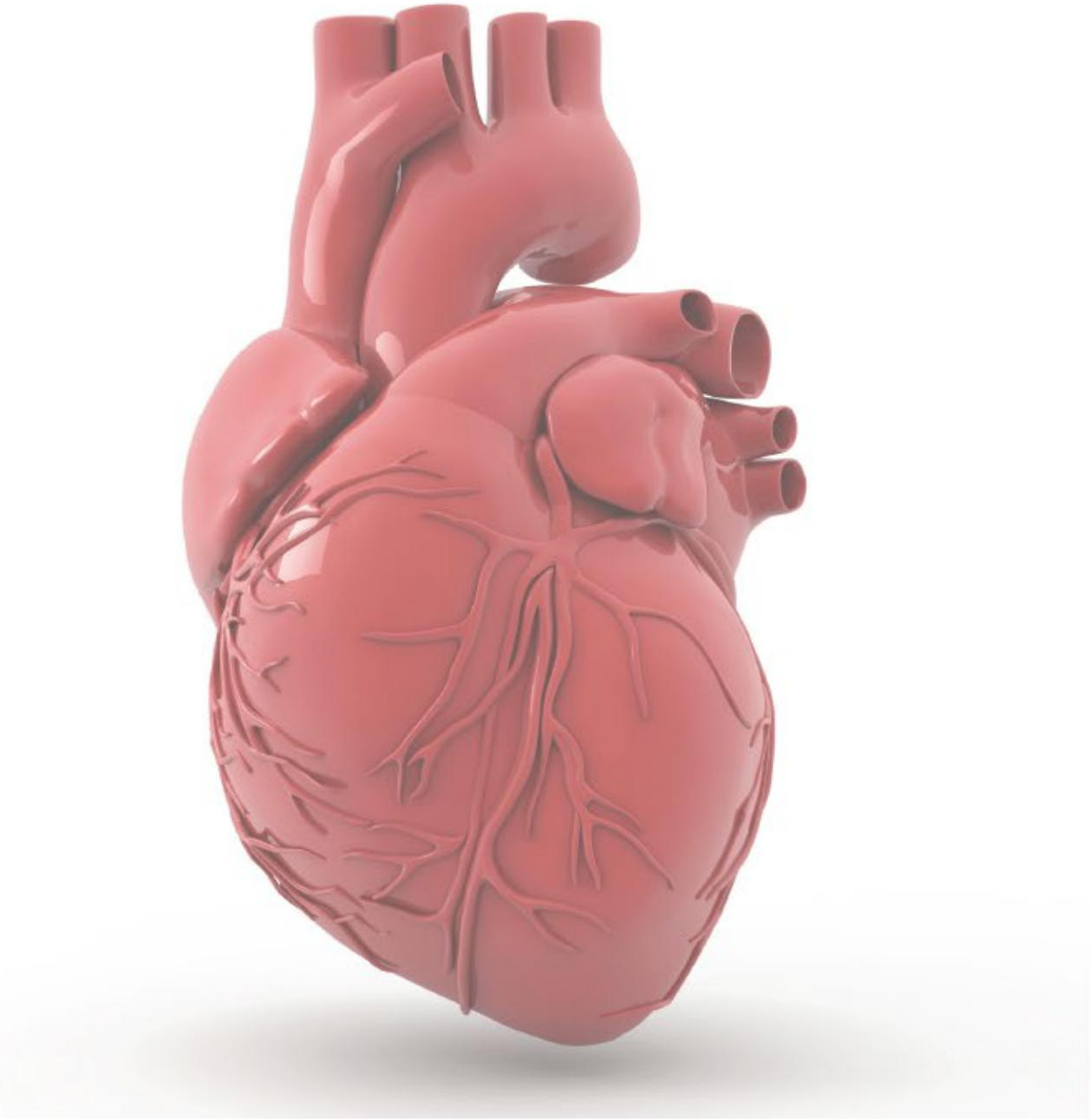
Ministry of Health
Republic of Maldives

World Health Organization
Maldives

National Treatment Guideline for

ACUTE CORONARY SYNDROME (ACS)



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1. Introduction

Maldives with a population of over 500000, is made up of over 1200 islands scattered in the Indian Ocean. According to the World bank, though achieved at a higher cost, Maldives has the best health performance in comparison to other South Asian countries. The Ministry of Health in an article published in 2022, Primary Health Care for Universal Health Coverage' states that 22% of the Country's GDP is spent on Health of which only 11% is spent on service delivery.

Even with a remarkable achievement in the health sector, as in most other countries, non-communicable disease accounts for the highest deaths in Maldives, of which 36% is due to cardiovascular disease. In the Maldives Health Statistics 2022, published by the Ministry of Health, states that cardiovascular disease were among the top 5 leading causes of admission and, from which ischemic heart disease admissions were 41% followed by cerebrovascular diseases 27%, with majority of the inpatients being males across all age groups.

The clinical guidelines are evidence-based recommendations that have the potential to influence treatment outcomes. It is designed to support the healthcare professionals in the decision-making process to optimize patient management at every level. The need to standardize care especially for the island health centers with minimal resources is important for timely, effective and practical care provision.

How to use this guideline:

The provided text outlines several key principles of care, emphasizing a patient-centered and multidisciplinary approach.

- Clinical Judgement and Individualized Care:
    - Clinicians are advised to exercise clinical judgement, taking into account the unique circumstances of each patient.
    - Collaboration with the patient, their carer, or guardian is essential in decision-making.

- Patient-Centered Care:
    - Health care should be respectful and responsive to the preferences, needs, and values of patients and consumers.

  - Key aspects include treating patients with dignity, providing information in an understandable format, and involving patients in decision-making.

- Dignity and Respect:
  - Treating patients with dignity and respect is fundamental to patient-centred care.
  - Communication about clinical conditions and treatment options should be done with empathy and sensitivity.

- Information Sharing:
  - Patients should be provided with information in a format that is accessible and understandable to them.

- Patient Participation:
  - Encouraging patients to actively participate in decisions related to their care fosters a sense of empowerment.

- Multidisciplinary Care:
  - Comprehensive care involves collaboration among various healthcare professionals (doctors, nurses, pharmacists, physiotherapists, etc.).
  - Coordination and communication between clinicians are vital, especially in tertiary care hospitals.

- Integrated Approach:
  - An integrated, systems-based approach is crucial for delivering person-centred care.
  - Objectives include establishing clear communication lines between healthcare components, ensuring prompt access to quality care, and integrating risk management and operational processes.

- Coordination and Communication:
  - Coordination is emphasized, ensuring that different components of the healthcare system work together seamlessly.
  - Communication is key to providing consistent and effective care.

- Risk Management and Governance:
    - An integrated approach includes incorporating risk management, governance, and operational processes.
    - Education, training, and orientation are essential components.

- Access to Resources:
    - The workforce should have access to necessary resources, policies, and procedures to support the integrated approach.

In summary, these principles underscore the importance of tailoring care to individual patients, fostering collaboration among healthcare professionals, and integrating various components of the healthcare system to provide comprehensive and person-centered care.

2. Scope

This guideline apply to all health centers and hospitals under the Ministry of Health and also can be used by private and corporate health care institutions.

The three-tier health care delivery system of Maldives includes island level primary health centers, higher level health facilities at atoll/regional level and tertiary care hospitals. This guideline will highlight the minimum standard of care that should be available and provided in each level of health facility for patients presenting with signs and symptoms of acute coronary syndrome, and how the continuum of care should be carried out.

3. Case Definition

Acute Coronary Syndromes: it is a spectrum of clinical conditions that include patients presenting with acute symptoms and signs of myocardial ischemia, with or without ECG changes and with or without acute increase in cardiac troponin markers. Based on these findings ACS is further classified into ST-elevation myocardial infarction (STEMI), Non-ST-elevation acute coronary syndrome (NSTE-ACS) and unstable angina.

Myocardial infarction: it is based on the acute symptoms and signs of myocardial ischemia along with ECG changes and a raised high-sensitive Cardiac Troponin (hs-cTn) levels and

consists of ST segment elevation myocardial infarction (STEMI) and Non-ST segment elevation acute coronary syndrome (NSTE-ACS).

Unstable angina: it is myocardial ischemia at rest or on minimal exertion in the absence of any cardiomyocyte injury or necrosis. Characteristic features are prolonged (>20 min) angina at rest; new onset of severe angina; angina that is increasing in frequency, longer in duration, or lower in threshold; or angina that occurs after a recent episode of MI.

Primary Percutaneous Coronary Intervention (PCI): Emergent PCI with balloon, stent, or other approved device, performed on the IRA without initial fibrinolytic treatment

Rescue PCI: Emergency PCI performed as soon as possible in cases of failed fibrinolytic treatment.

Facilitated PCI: Is defined as the use of immediate pharmacological fibrinolytic treatment after the onset of STEMI, when timely PCI is unavailable, in an attempt to establish early reperfusion. Successful thrombolysis should be then followed by patient transport to a hospital with an interventional Cath-lab for early mechanical reperfusion.

4. Signs & Symptoms

Chest pain is a common reason for patients to seek emergency care. It is important to understand the need to distinguish acute coronary syndrome (ACS) from other potential causes of non-cardiac related chest pain. The Acute Myocardial Infarction (AMI), occurs when the cardiac muscle experiences oxygen deprivation, leading to ischemic chest pain. While a quick diagnosis is possible in cases of ST- elevation myocardial infarction (STEMI), this represents a small percentage of chest pain patients.

The challenge is not only identifying high-risk patients but also recognizing non-urgent cases or the absence of disease. Treating non-ACS cases as ACS can lead to unnecessary medical costs and potential risks hence a correct diagnosis is crucial to avoid unnecessary treatments, and hospital admissions. It is important for the clinician to carry out a focused medical history and physical examination to obtain an accurate diagnosis.

- **Clinical Presentation:**
    - Patients may present with vague symptoms ranging from increasing chest pain to cardiac arrest.
    - Symptoms include central or left-sided chest pain, pressure, tightness, heaviness, or burning sensation.
    - Associated symptoms may include pain radiating to the upper extremity, mandible, neck, or epigastric discomfort, along with sweating, shortness of breath, nausea, and vomiting.

- **Physical Examination:**
    - Diaphoresis, tachypnea, tachycardia or bradycardia, hypotension, crackles, S3, and murmur of Mitral regurgitation may be observed.
    - Examination may be normal in uncomplicated cases.
    - Vital signs including pulse assessment, blood pressure measurement, respiratory rate, pulse oximetry, temperature and heart and lung auscultation, is recommended to rule out differential diagnoses and identify Acute Coronary Syndrome (ACS).

- **Differentiating ACS and Identifying Causes of Chest Pain:**
    - Distinguishing between acute and stable chest pain is crucial.
    - The term "chest pain" may not fully capture patient descriptions, so using descriptors like "typical angina," "atypical angina," and "noncardiac" is encouraged.
    - Comprehensive history-taking, considering the nature, onset, duration, location, radiation, precipitating and relieving factors, and associated symptoms, helps identify potential cardiac causes.
    - Diagnosis is confirmed by typical chest pain, ECG changes, and the rise and/or fall of cardiac troponin levels.

- **Categorization of Chest Pain:**
    - Emphasis is placed on specific characteristics indicating probable ischemia.

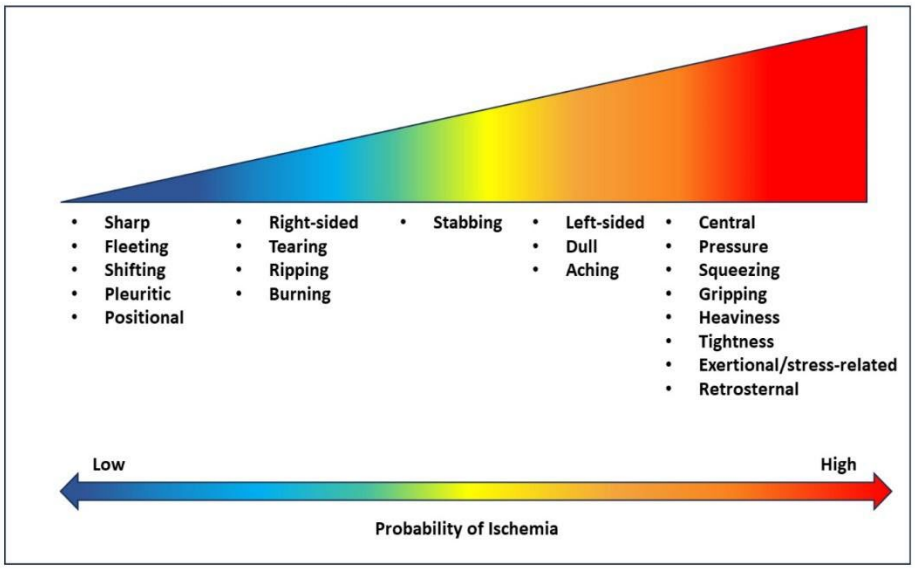


Figure 1: Index of Suspicion That Chest "Pain" Is Ischemic in Origin on the Basis of Commonly Used Descriptors (Adapted from 2021 AHA guideline on evaluation and diagnosis of chest pain)

Scoring systems

ACS diagnosis is confirmed in cases with significant ECG changes (such as STEMI) or increased levels of myocardial markers in plasma. However, absence of such abnormalities does not rule out ACS, making early diagnosis challenging. Guidelines primarily focus on identifying high-risk patients who would benefit the most from early aggressive therapies.

Various scoring methods are developed to identify patients at the highest risk of ACS or adverse outcomes, guiding the application of aggressive therapies. The HEART score was specifically developed for chest pain patients presenting to the Emergency. It is a risk-stratification tool that uses information available at the time of presentation for ED patients with chest pain. The score seeks to identify a patient's short-term risk for major adverse cardiac events (MACE).

The HEART score encloses each of the previously mentioned parameters of clinical judgement: History, ECG, Age, Risk factors and Troponin levels. The HEART score translates the clinical judgement into a uniformly comprehensive number of 0-10.

A score of 0-3 is generally considered low risk (2.5% MACE over next 6 weeks), 4-6 is considered moderate risk (20.3% MACE over next 6 weeks) and 7-10 is considered high risk (72.7% MACE over next 6 weeks). Cases with a low-risk HEART score may be discharged

home but those with moderate to high risk need to be referred to higher centers for further management and early invasive strategies.

HEART Score for Chest Pain Patients		
History	Highly Suspicious	2
	Moderately Suspicious	1
	Slightly Suspicious	0
ECG	Significant ST-Deviation	2
	Non Specific repolarisation Disturbance / LBBB / PM	1
	Normal	0
AGE	≥ 65 Years	2
	> 45 and < 65 Years	1
	≤ 45 years	0
Risk Factors	≥ 3 risk factors or history of atherosclerotic disease*	2
	1 or 2 factors	1
	No Risk factors known	0
Troponin	≥ 3x normal limit	2
	> 1 and < 3x normal limit	1
	≤ 1x normal limit	0

*** Risk Factors for atherosclerotic disease:**
Hypercholesterolemia
Hypertension
Diabetes Mellitus
Cigarette Smoking
Positive family history
Obesity

Table 1: Heart Score stratifies patient for major adverse cardiac events. (0-3: low risk, 4-6: moderate risk, 7-10: high risk)

TIMI Risk Score

The TIMI (Thrombolysis in Myocardial Infarction) score is also a well-validated tool for early risk assessment. Based on trials like TIMI 11B and ESSENCE, this score evaluates seven key factors to estimate mortality and other major cardiac complications. Each of the seven factors in the TIMI risk score contributes 1 point, making it a straightforward and easy tool to use in emergency rooms. A higher score indicates greater risk of adverse outcomes, including death, recurrent MI, or severe ischemia necessitating urgent intervention. The risk of these events rises progressively with increasing TIMI scores.

History	Points
Age ≥ 65 yrs	1
≥3 CAD risk factors (FHx, HTN, chol, DM, active smoker)	1
Known CAD (stenosis ≥50%)	1
ASA use in past 7 days	1
Presentation	
Recent (≤24H) severe angina	1
cardiac markers	1
ST deviation ≥0.5mm	1
Risk Score=Total points	**0-7**

TIMI Score	Risk of Adverse Events at 14 days
0-1	Low risk (~4-8%)
2-3	Intermediate risk (~13-20%)
4-5	High risk (~24-40%)
6-7	Very high risk (~41-50%)

Table 2: TIMI risk score and risk of cardiac events in 14 days

5. Differential Diagnosis

There are many conditions that present with acute chest pain apart from ACS and are commonly considered in the differential diagnosis of ACS. While ST–elevation myocardial infarction (STEMI) is identifiable on the ECG, distinguishing between non–ST-elevation Acute Coronary syndrome (NSTE)-ACS and non-cardiac (ACS) chest pain poses a primary challenge.

Below is a breakdown of various causes of chest pain as a differential diagnosis, some of which may present with life-threatening implications:

Life-threatening conditions mimicking ACS:

Aortic dissection may be indicated by sudden, severe chest or back pain, especially when associated with a limb pulse differential. Pulmonary Embolism may manifest with tachycardia, dyspnea, and accentuated P2. Gastrointestinal causes like Esophageal Rupture can be suggested by chest pain along with a painful, tympanic abdomen.

System	Syndrome	Clinical description	Key distinguishing features
Cardiac	Angina	Exertional retrosternal chest pressure, burning, or heaviness relieved by rest or nitroglycerin; radiating occasionally to the neck, jaw, epigastrium, shoulders, left arm	Precipitated by exercise, cold weather, or emotional stress; duration of 2-10 min
	Rest or unstable angina	Same as angina, but may be more severe	Typically <20 min; lower tolerance for exertion; crescendo pattern
	Acute myocardial infarction	Crushing, pressure-like pain; may radiate to arm/jaw; associated with diaphoresis, nausea, dyspnea.	Sudden onset, usually lasting >30 min; often associated with shortness of breath, weakness, nausea, vomiting
	Pericarditis	Sharp, pleuritic pain aggravated by changes in position; highly variable duration	Pericardial friction rub
Vascular	Aortic dissection	Excruciating, ripping pain of sudden onset in the anterior aspect of the chest, often radiating to the back	Marked severity of unrelenting pain; usually occurs in the setting of hypertension or underlying connective tissue disorder such as Marfan syndrome
	Pulmonary embolism	Sudden onset of dyspnoea and pain, usually pleuritic with pulmonary infarction	Dyspnoea, tachypnoea, tachycardia, signs of right-sided heart failure
	Pulmonary hypertension	Substernal chest pressure, exacerbated by exertion	Pain associated with dyspnoea and signs of pulmonary hypertension

Pulmonary	Pleuritis and/or pneumonia	Pleuritic pain, usually brief, over the involved area	Pain pleuritic and lateral to the midline, associated with dyspnoea
	Tracheobronchitis	Burning discomfort in the midline	Midline location. Associated with coughing
	Spontaneous pneumothorax	Sudden onset of unilateral pleuritic pain, with dyspnoea	Abrupt onset of dyspnoea and pain
Gastrointestinal	Oesophgeal reflux	Burning substernal and epigastric discomfort, 10-60 min in duration	Aggravated by a large meal and postprandial recumbency; relieved by antacid
	Peptic ulcer	Prolonged epigastric or substernal burning	Relieved by antacid or food
	Gall bladder disease	Prolonged epigastric or right upper quadrant pain	unprovoked or following a meal
	Pancreatitis	Prolonged, intense epigastric or substernal pain	Risk factors, including alcohol, hypertriglyceridemia, medication
Musculoskeletal	Costochondritis	Sudden onset of fleeting pain	May be reproduced by pressure over the affected joint; occasionally, swelling and inflammation over the costochondral joint
	Cervical disc disease	Sudden onset of fleeting pain	May be reproduced with movement of neck
	Trauma or strain	Constant pain	Reproduced by palpation or movement of the chest wall or arms
Infectious	Herpes zoster	Prolonged burning pain in dermatomal distribution	Vesicular rash, dermatomal distribution

Psychological	Panic disorder	Chest tightness or aching, often accompanied by dyspnoea and lasting 30 min or more, unrelated to exertion or movement	Patient may have other evidence of an emotional disorder

Table 3: Differential diagnosis

6. Investigations:

Essential investigation at all levels of healthcare centres should include the following:

- Electrocardiogram (ECG)
- High-sensitivity Cardiac Troponins (hs-cTn)

In addition to these, higher centres with Emergency Physicians or Cardiologists should have access to bedside echocardiography, Point-of-Care ultrasound (POCUS).

Electrocardiogram: It is recommended that an ECG is obtained immediately upon first medical contact and interpreted by a qualified medical officer or an emergency physician within 10 min.

ST-segment elevation MI: STEMI: In the appropriate clinical context, new onset LBBB or ST-segment elevation (measured at the J-point) is considered suggestive of ongoing coronary artery acute occlusion in the following cases:

New ST elevation at the J-point in at least two contiguous leads:

• ≥2.5 mm in men <40 years, ≥2 mm in men ≥40 years, or ≥1.5 mm in women regardless of age in leads V2–V3

• and/or ≥1 mm in the other leads (in the absence of left ventricular [LV] hypertrophy or left bundle branch block [LBBB]).

New onset LBBB: The most widely accepted tools to aid in the diagnosis of MI in the presence of LBBB are the Sgarbossa criteria which identifies three ECG criteria that may improve the diagnosis of MI in patients with LBBB:

ST-elevation of ≥1 mm and concordant with the QRS complex (5 points)

ST-segment depression ≥1 mm in lead V1, V2, or V3 (3 points)

ST elevation ≥5 mm and discordant with the QRS complex (2 points)

These criteria are specific, but not sensitive (36%) for myocardial infarction. A total score of ≥ 3 is reported to have a specificity of 90% for diagnosing myocardial infarction Thus, the Sgarbossa criteria are informative if present but not reassuring if absent and cannot be used to exclude MI. In order to improve diagnostic accuracy, Smith et al. developed the "modified Sgarbossa criteria," in which the modified rule is positive for “STEMI” if there is discordant ST elevation with amplitude > 25% of the depth of the preceding S-wave.

Non-ST-elevation [NSTE]-ACS: ECG changes, including transient ST-segment elevation, persistent or transient ST-segment depression, and T wave abnormalities, including hyperacute T waves, T wave inversion, biphasic T waves, flat T waves, and pseudo normalization of T waves. Normal ECG can be present in some occasions also.

Those with a typical rise and/or fall in cardiac troponin levels will be diagnosed as non-ST-elevation MI (NSTEMI). Other patients, whose troponin level will remain below the 99th centile be diagnosed as UA.

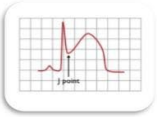
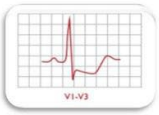
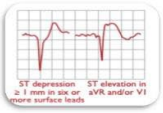
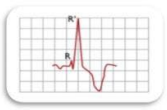
Figure		ECG Pattern	Criteria	Signifying
	1	STEMI	New ST-elevation at the j-point in ≥ 2 contiguous leads ≥ 2.5 mm in men < 40 years, ≥ 2 mm in men ≥ 40 years, or ≥ 1.5 mm in women regardless of age in leads V2-V3 and/or ≥ 1 mm in the other leads (in the absence of LV hypertrophy or left bundle branch block) Including V3R and V4R	Ongoing acute coronary artery occlusion
	2	Posterior STEMI	ST- segment depression in leads V1-V3, especially when the terminal T-wave is positive (ST-segment elevation equivalent), and concomitant ST-segment elevation ≥ 0.5 mm recorded in leads V7-V9	Posterior STEMI
	3	LCx occlusion, right ventricular MI	ST- segment elevation in V7-V9 and V3R and V4R, respectively	Left circumflex (LCX) artery occlusion or right ventricular MI
	4	Multivessel ischaemia left main obstruction	St depres8sion ≥ 1mm in six or more surface leads (inferolateral ST depression), coupled with ST-segement Elevation in a VR and/or VI	Multivessel ischaemia or left main coronary artery obstruction, particularly if the patient presents with harmodynamic compromise
	5	Left bundle branch block/paced rhythm	QRS duration greater than 120 ms absence of Q wave in leads I, V5 and V6 Monomorphic R wave in I, V5 and V6 ST and T wave displacement opposite to the major deflection of the QRS compress	Patient with a high clinical suspicion of ongoing myocardial ischaemia should be managed in a similar way to STEMI patients
	6	Right bundle branch block	QRS duration greater than 120 ms rsR'"bunny ear" Pattern in the anterior precordial leads (leads V1-V3) Slurred S waves in leads I, aVL and frequently V5 and V6	Patient with a high clinical suspicion of on going myocardi ischaemia should managed in a similae way to STEMI patients'

Table 4: ECG abnormalities in STEMI. (Adapted from 2023 European Society of Cardiology guidelines on Acute Coronary syndrome)

Cardiac Biomarkers: *High-sensitivity cardiac troponins (hs-cTn):* preferably high sensitivity cardiac troponin (hs-cTn), is recommended in all patients with suspected ACS. If the clinical presentation is compatible with myocardial ischaemia, then a rise and/or fall in cTn above the 99th percentile of healthy individuals points to a diagnosis of MI. It is also important to consider that there are other clinical conditions apart from primary coronary event (Type 1 MI) in which elevations in cTn can be observed.

Availability of Point-of-Care high sensitivity cardiac troponin (hs-cTn) testing is recommended in all levels of health care hospitals.

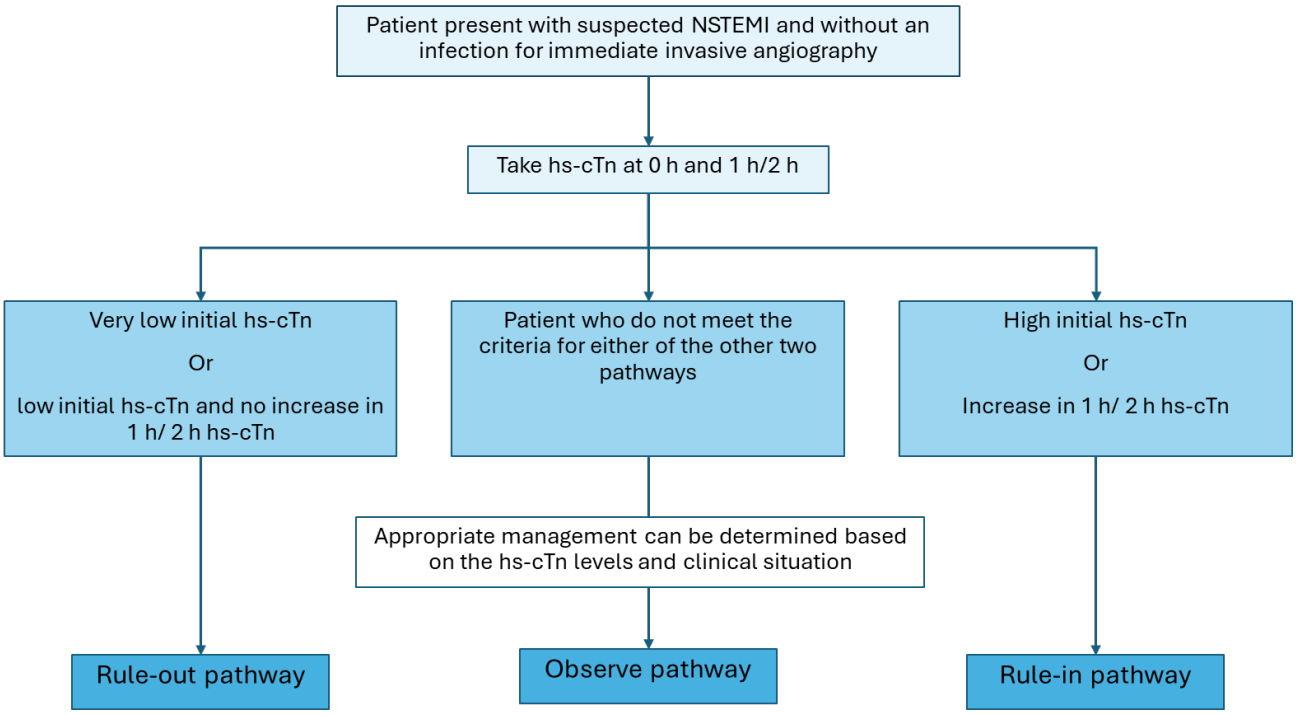


Figure 2: Rule-out and Rule-in algorithm

Other biomarkers:

The use of biomarkers other than cTn for the diagnosis of ACS is not recommended (unless cTn is not available). Among the additional biomarkers evaluated for the diagnosis of NSTEMI, creatine kinase myocardial (CKMB) isoenzyme, may have clinical relevance when used in combination with (standard) cTn T/I.

Echocardiography:

In emergency rooms and chest pain units of higher-level health facilities and tertiary hospitals, either focused cardiac ultrasound (FoCUS) or transthoracic echocardiography (TTE) performed or interpreted by trained healthcare professionals is recommended. In cases of suspected ACS with diagnostic uncertainty, TTE can be useful to identify signs suggestive of ongoing ischaemia or prior MI.TTE can also be useful to suggest alternative etiologies associated with chest pain (i.e. acute aortic disease, RV signs in pulmonary embolism [PE]).

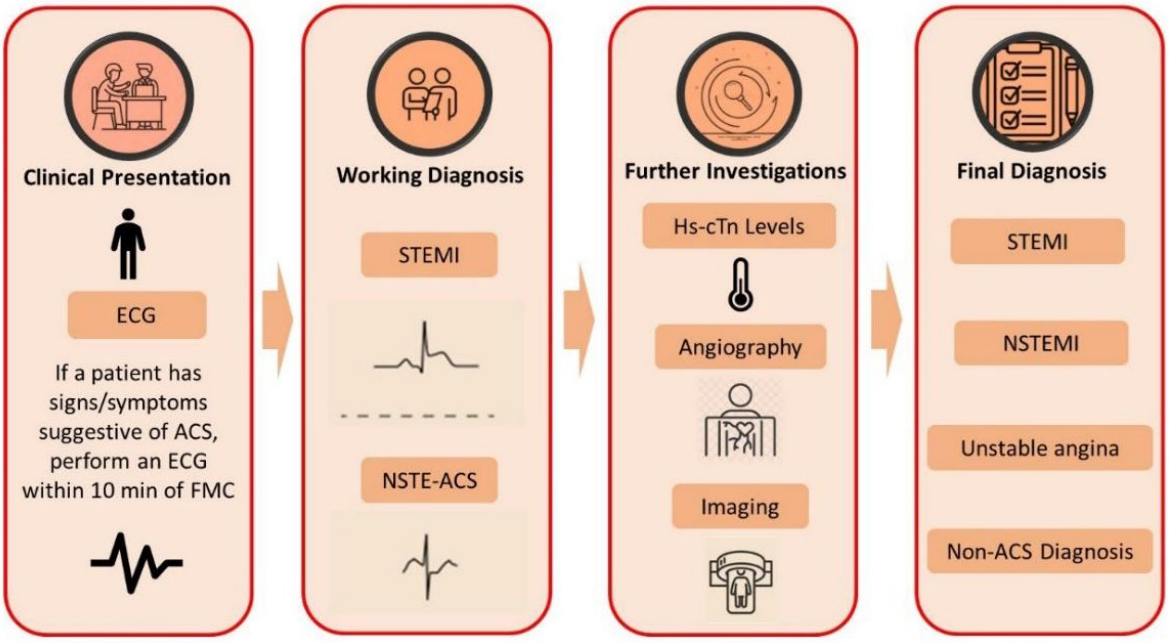


Figure 3: Classification of patients presenting with suspected acute coronary syndrome: from a working to a final diagnosis. (Adapted from 2023 European Society of Cardiology guidelines on Acute Coronary syndrome)

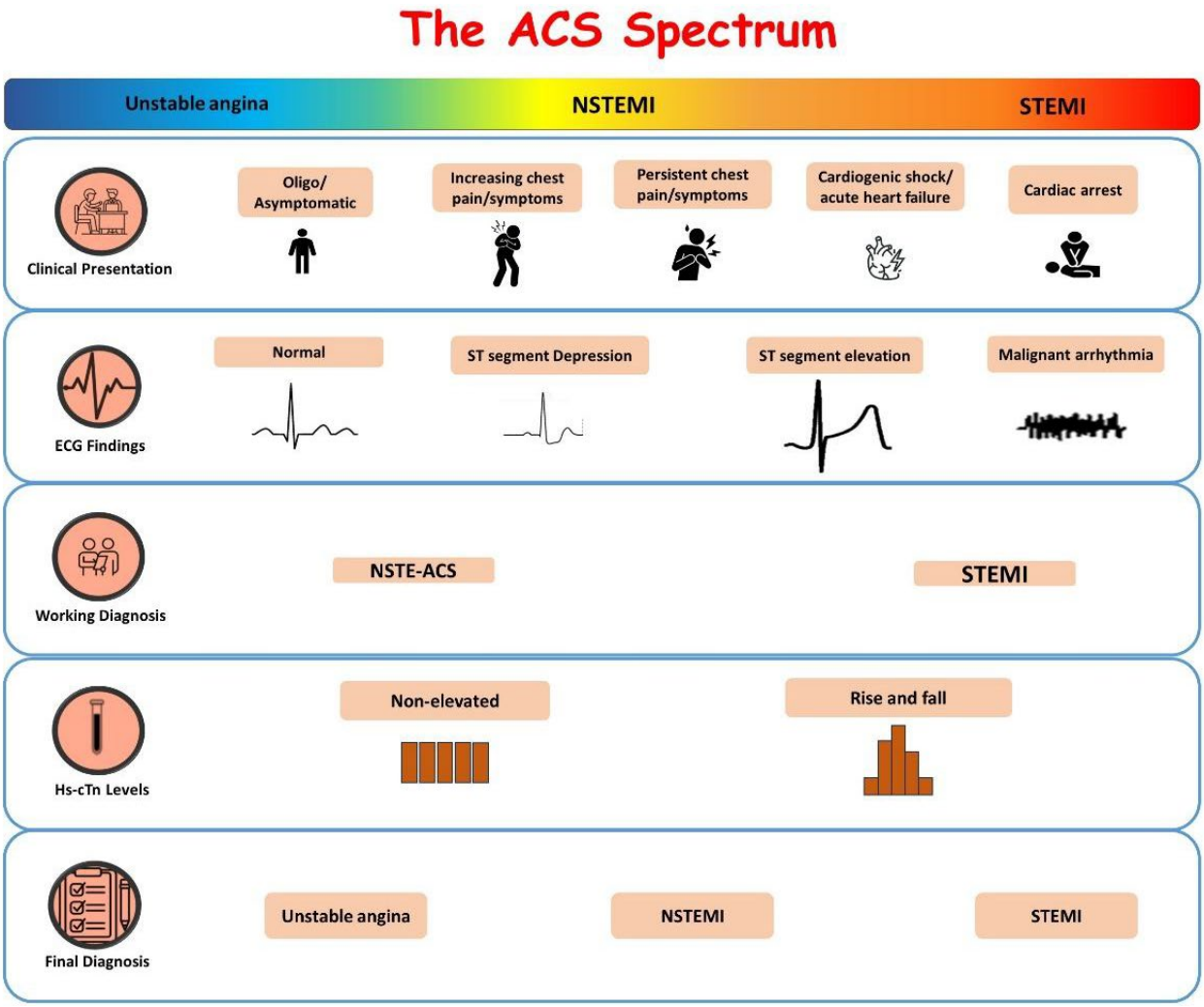


Figure 4: The spectrum of clinical presentations, electrocardiographic findings, and high-sensitivity cardiac troponin levels in patients with ACS (Adapted from 2023 European Society of Cardiology guidelines on Acute Coronary syndrome)

7. Management

STEMI- Early management

Immediately assess eligibility (irrespective of age, ethnicity or sex) for coronary reperfusion therapy (either primary percutaneous coronary intervention [PCI] or fibrinolysis) in people with acute ST-segment elevation myocardial infarction (STEMI).

Acute pharmacotherapy

Oxygen: Oxygen supplementation is recommended in ACS patients with hypoxaemia (oxygen saturations <90%). Oxygen supplementation in patients who are not hypoxic (oxygen saturations >90%) is not associated with clinical benefits and is therefore not recommended.

Nitrates: Sublingual nitrate (Nitroglycerin: 0.3 -0.6mg repeated 3 times) may be helpful to relieve ischaemic symptoms. However, a reduction in chest pain after nitroglycerine administration can be misleading and is not recommended as a diagnostic manoeuvre. In patients with an ECG compatible with ongoing STEMI and symptom relief after nitroglycerine administration, it is recommended to obtain another 12-lead ECG within 10 minutes from the first ECG. Complete normalisation of ST-segment elevation, along with relief of symptoms, after nitroglycerine administration is suggestive of coronary spasm, with or without associated MI. Nitrates should not be given to patients with hypotension, marked bradycardia or tachycardia, right ventricular (RV) infarction, known severe aortic stenosis, or phosphodiesterase 5 inhibitor (Sildenafil, Tadalafil) use within the previous 24–48 hours.

Pain relief: Intravenous opioids (e.g. morphine 5–10 mg) should be considered for the relief of severe chest pain. Other forms of pain relief (e.g. nitrous oxide/oxygen plus i.v. acetaminophen/paracetamol) have been reported to be inferior to morphine. However, morphine may enhance nausea and vomiting and slow the gastrointestinal absorption of oral medicines, which may delay the onset of action of orally administered antiplatelet therapy. Evidence from small-scale trials suggests that i.v. morphine may also reduce myocardial and microvascular damage when given to patients with ongoing acute coronary artery occlusion, though co-administration with metoclopramide appears to negate this effect. Conversely, morphine has also been reported to reduce antiplatelet activity after administration of ticagrelor, though this effect

was rescued by metoclopramide administration. Opioids should be avoided in patients with RV infarction.

Statins: High initial dose of statins is associated with better long-term cardiovascular outcomes in MI. Loading dose of either Atorvastatin (80mg) or Rosuvastatin (40mg) is recommended to be given early after MI.

Oral antiplatelet therapy: Antiplatelet drugs play a key role in the acute phase of treatment for ACS. The choice of antiplatelet regimen should take the bleeding risk of the patient into account. Aspirin treatment is started with a loading dose (LD) of 300 mg orally (chewed or crushed) as soon as possible, followed by maintenance dose (MD) of 75–100 mg once a day. This should be followed by a loading dose of either Clopidogrel. Refer to table 3.

Primary Percutaneous Intervention (PPCI): In patients with a working diagnosis of STEMI, a PPCI strategy (i.e. immediate angiography and PCI as needed) is the preferred reperfusion strategy, provided it can be performed in a timely manner (i.e. within 90 min of patient contact with a clinician). It has shown that PPCI is superior to fibrinolysis in reducing mortality, non-fatal reinfarction, and stroke. However, in some circumstances, if PPCI is not an immediate option then fibrinolysis should be initiated expeditiously as part of a pharmaco-invasive strategy, provided the patient has presented within 12 h of symptom onset.

Fibrinolytics: Patients with a working diagnosis of acute STEMI who present to a non-PCI centre or primary PCI cannot be delivered within 90 minutes should undergo immediate fibrinolysis if presenting within 12 hours of onset of symptoms and without any contraindication. The goal is to initiate the fibrinolytic drug within 10 minutes of STEMI diagnosis.

An electrocardiogram (ECG) should be done to patients with acute STEMI treated with fibrinolysis, 60 to 90 minutes after administration. For patients who undergo fibrinolysis, rescue PCI is indicated if fibrinolysis fails (i.e. ST-segment resolution <50% within 60–90 min of fibrinolytic administration) or in the presence of haemodynamic or electrical instability, worsening ischaemia, or persistent chest pain. Do not repeat fibrinolytic therapy for such patients.

Patients with successful fibrinolysis should undergo early invasive angiography followed by facilitated PCI, within 2–24 h from the time fibrinolytic administration.

Anticoagulant with Enoxaparin or Heparin should be started after 3 hours of completing thrombolysis.

Maintenance antithrombotic therapy after revascularization: While continuation of anticoagulation after PCI is not necessary in patients, post-interventional antiplatelet treatment is mandatory in ACS patients. Following PCI, a dual antiplatelet treatment regimen consisting of a potent P2Y12 receptor inhibitor (Clopidogrel or Ticagrelor) and aspirin is generally recommended for 12 months, irrespective of the stent type, unless there are contraindications.

NSTE-ACS and unstable angina – early management

Initial drug therapy

Aspirin should be given as soon as possible to all patients with unstable angina or non-ST-elevation acute coronary syndrome (NSTE-ACS). A single loading dose of 300-mg oral aspirin (chewed or crushed) is recommended as soon as possible unless there is clear evidence that they are allergic to it.

Clopidogrel Refer to table 3.

Statin loading doses of either Atorvastatin (80mg) or Rosuvastatin (40mg) is recommended.

Low molecular weight heparin (LMWH): Enoxaparin should be given to people with NSTEMI and high-risk unstable angina which can be calculated using TIMI score (Refer to table 4).

Coronary angiography (with follow-on PCI if indicated) should be considered. The urgency for referral of PCI depends on patients TIMI risk score. Patients with unstable angina or NSTEMI who are at higher risk of adverse cardiovascular events require early invasive therapy, whereas low risk patients may undergo delayed angiography. (Refer to table 4)

Doses of fibrinolytic and antithrombotic agents

Drug	Initial Treatment
Streptokinase	1.5 million units over 30-60 min i.v.
Alteplase (tPA)	15 mg i.v. bolus 0.75 mg/kg i.v. over 30 min (up to 50 mg) then 0.5 mg/kg i.v. over 60 min (up to 35 mg)
Reteplase (rPA)	10 units + 10 units i.v. bolus given 30 min apart
Tenecteplase (TNK-TPA)	Single i.v. bolus: 30 mg (6000 U) if < 60 kg 35 mg (7000 U) if 60 to < 70 kg 40 mg (8000 U) if 70 to < 80 kg 45 mg (9000 U) if 80 to < 90 kg 50 mg (10,000 U) if ≥ 90 kg It is recommended to reduce to half dose in patients ≥ 75 years of age.
Doses of antiplatelet co-therapies	
Aspirin	Starting dose of 150-300 mg orally (or 75-250 mg i.v. if oral ingestion is not possible). Followed by a maintenance dose of 75-100 mg/day
Clopidogrel	Loading dose of 300 mg orally, followed by a maintenance dose of 75 mg/day. In patients > 75 years of age: loading dose of 75 mg, followed by a maintenance dose of 75 mg/day.
Doses of anti-thrombin binding anticoagulant co-therapies	
Enoxaparin	In patients < 75 years of age: 30 mg i.v. bolus followed 15 min later by 1 mg/kg s.c. every 12h until revascularization or hospital discharge for a maximum of 8 days. The first two s.c. doses should not exceed 100 mg per injection. In patients > 75 years of age: no i.v. bolus: start with first s.c. dose of 0.75 mg/kg with a maximum of 75 mg per injection for the first two s.c. doses. In patients with eGFR < 30 mL/min, regardless of age, the s.c. doses are given once every 24h.
Unfractionated heparin	60 U/kg i.v. bolus with a maximum of 4000 U followed by an i.v. infusion of 12 U/kg with a maximum of 1000 U/h for 24-48h. Target aPTT: 50-70s or 1.5 to 2.0 times that of control to be monitored at 3, 6, 12 and 24h.
Fondaparinux (only with streptokinase)	2.5 mg i.v. bolus followed by an s.c. dose of 2.5 mg once daily for up to 8 days or until hospital discharge.

Table 5: Fibrinolytics and antithrombotic agents and its doses (Adapted from 2023 European Society of Cardiology guidelines on Acute Coronary syndrome)

Secondary prevention

Ensure that a clear management plan is available to the person who has had an MI and includes details and timing of any further drug titration, monitoring of blood pressure and monitoring of renal function

For secondary prevention, offer people who have had MI treatment with the following drugs:

- Antithrombotic therapy
- Statin (high intensity statin, regardless of lipid levels)
- Other medications as advised by treating physicians / cardiologist

Cardiac rehabilitation after an MI

All people (regardless of their age) should be given advice about and offered a cardiac rehabilitation programme which should include:

- Regular physical activity and an exercise component,
- Psychological and social support,
- Lifestyle changes with advice on diet and weight management,
- Smoking cessation and tobacco chewing
- Dangers of alcohol consumption and illicit substance use

8. Key Message

The Acute Coronary Algorithm outlines the steps for assessing and managing a patient who presents symptoms suggestive of cardiac ischemia or infarction. All health care institutes should include the following:

Assessment in Emergency Department (ED)

- Patients should be given a Triage category of red
- Carry out a primary assessment-ABCDE (be prepared to provide CPR and defibrillation)
- Administer Aspirin, clopidogrel and consider oxygen, nitroglycerin and morphine if needed.
- Obtain a 12-lead ECG (within the first 10 minutes of patient arrival)

Based on the ECG findings, treatment recommendations are specific to each group:

- STEMI
- NSTE-ACS
    - High-risk NSTE-ACS
    - Low to intermediate risk NSTE-ACS

ACS Management focuses on early reperfusion of STEMI patients, emphasizing initial care and early referrals to appropriate centers.

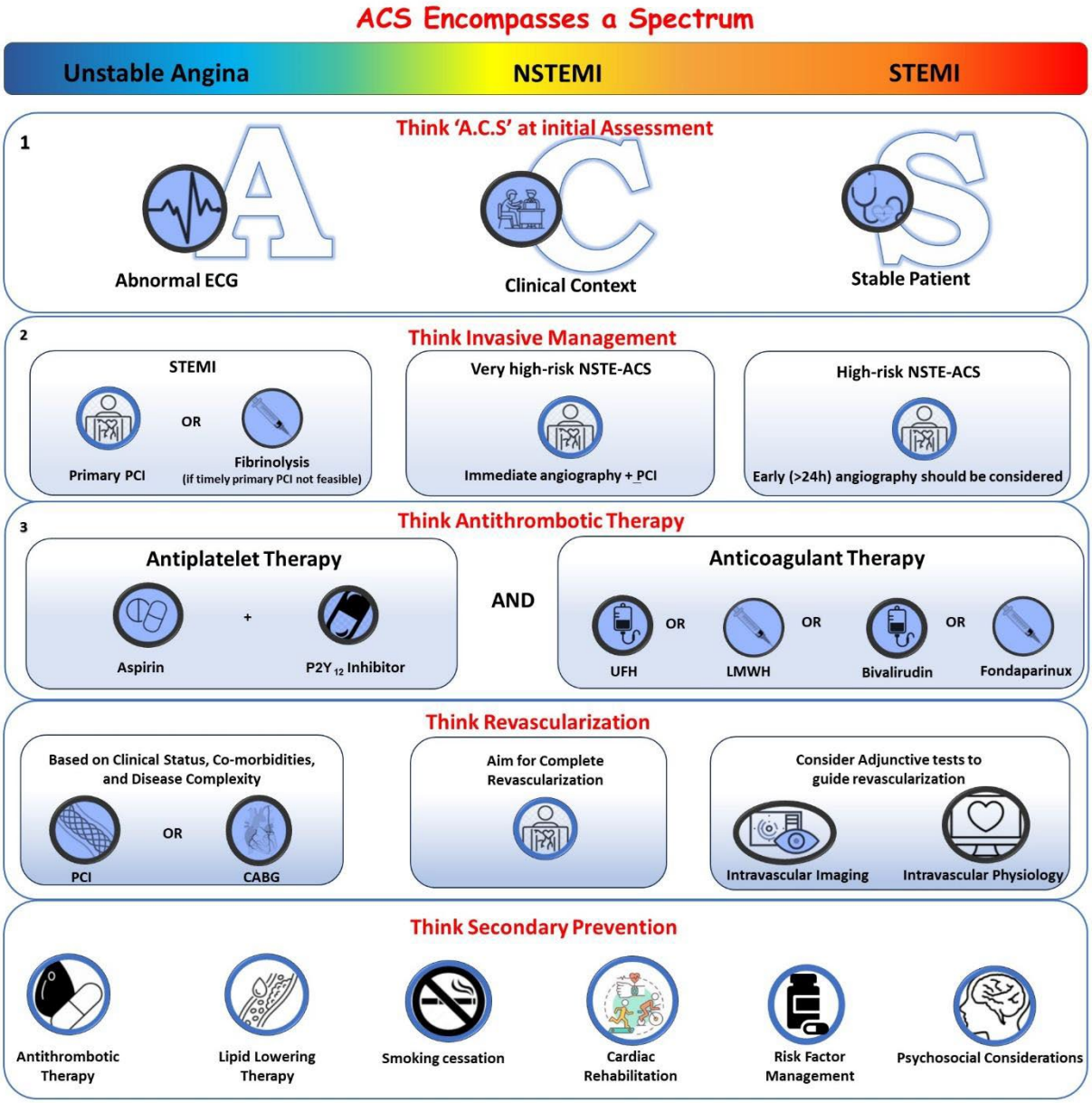


Figure 5: The clinical management pathway for patients with ACS (Adapted from 2023 European Society of Cardiology guidelines on Acute Coronary syndrome)

9. References

1. 2023 European Society of Cardiology Guidelines for the Management of Acute Coronary Syndromes
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