Clinical Guidelines
for the State of Qatar

The assessment and management of stable angina

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Date issued: December 2016
Date of next revision: March 2019
Version history

<table>
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<tr>
<th>Version</th>
<th>Status</th>
<th>Date</th>
<th>Editor</th>
<th>Description</th>
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<tr>
<td>1.0</td>
<td>Final</td>
<td>19th March 2017</td>
<td>Guidelines Team</td>
<td>Final version for publication.</td>
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Acknowledgements

The following individuals are recognised for their contribution to the successful implementation of the National Guidelines project.

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1 Information about this guideline

1.1 Objective and purpose of the guideline
The purpose of this guideline is to define the appropriate diagnosis and management of stable angina in adults. The objective is to reduce inappropriate investigation, prescribing and referral of patients presenting to provider organisations in Qatar.

1.2 Scope of the guideline
Aspects of care covered within this guideline, include:
- Diagnosis investigation and management of stable angina in adults.
- Criteria for consideration of coronary revascularisation.
- Follow-up of patients with stable angina.

Aspects of care not covered within this guideline are:
- Diagnosis and management of stable angina in children and pregnant women.
- Diagnosis and management of cardiac chest pain not caused by coronary artery disease.
- Diagnosis and management of non-cardiac chest pain.
- Management of acute coronary syndrome - See the MOPH National Guideline on Assessment and management of Acute Coronary Syndrome.
- Angina occurring early after initially successful CABG or percutaneous transluminal coronary angioplasty.

1.3 Editorial approach
This guideline document has been developed and issued by the Ministry of Public Health of Qatar (MOPH), through a process which aligns with international best practice in guideline development and localisation. The guideline will be reviewed on a regular basis and updated to incorporate comments and feedback from stakeholders across Qatar.

The editorial methodology, used to develop this guideline, has involved the following critical steps:
- Extensive literature search for well reputed published evidence relating to the topic.
- Critical appraisal of the literature.
- Development of a draft summary guideline.
- Review of the summary guideline with a Guideline Development Group, comprised of practising physicians and subject matter experts from across provider organisations in Qatar.
- Independent review of the guideline by the Clinical Governance body appointed by the MOPH, from amongst stakeholder organisations across Qatar.

Explicit review of the guideline by patient groups was not undertaken.

Whilst the MOPH has sponsored the development of the guideline, the MOPH has not influenced the specific recommendations made within it.
1.4 Sources of evidence
The professional literature published in the English language has been systematically queried using specially developed, customised, and tested search strings. Search strategies are developed to allow efficient yet comprehensive analysis of relevant publications for a given topic and to maximise retrieval of articles with certain desired characteristics pertinent to a guideline.

For each guideline, all retrieved publications have been individually reviewed by a clinical editor and assessed in terms of quality, utility, and relevance. Preference is given to publications that:

1. Are designed with rigorous scientific methodology.
2. Are published in higher-quality journals (i.e. journals that are read and cited most often within their field).
3. Address an aspect of specific importance to the guideline in question.

Where included, the ‘goal length of stay’ stated within this guideline is supported by and validated through utilisation analysis of various international health insurance databases. The purpose of database analysis is to confirm the reasonability and clinical appropriateness of the goal, as an achievable benchmark for optimal duration of inpatient admission.

1.5 Evidence grading and recommendations
Recommendations made within this guideline are supported by evidence from the medical literature and where possible the most authoritative sources have been used in the development of this guideline. In order to provide insight into the evidence basis for each recommendation, the following evidence hierarchy has been used to grade the level of authoritativeness of the evidence used, where recommendations have been made within this guideline.

Where the recommendations of international guidelines have been adopted, the evidence grading is assigned to the underlying evidence used by the international guideline. Where more than one source has been cited, the evidence grading relates to the highest level of evidence cited:

- **Level 1 (L1):**
  - Meta-analyses.
  - Randomised controlled trials with meta-analysis.
  - Randomised controlled trials.
  - Systematic reviews.

- **Level 2 (L2):**
  - Observational studies, examples include:
    - Cohort studies with statistical adjustment for potential confounders.
    - Cohort studies without adjustment.
    - Case series with historical or literature controls.
    - Uncontrolled case series.
  - Statements in published articles or textbooks.

- **Level 3 (L3):**
  - Expert opinion.
  - Unpublished data, examples include:
    - Large database analyses.
    - Written protocols or outcomes reports from large practices.
In order to give additional insight into the reasoning underlying certain recommendations and the strength of recommendation, the following recommendation grading has been used, where recommendations are made:

- **Recommendation Grade A1 (RGA1):** Evidence demonstrates at least moderate certainty of at least moderate net benefit.
- **Recommendation Grade A2 (RGA2):** Evidence demonstrates a net benefit, but of less than moderate certainty, and may consist of a consensus opinion of experts, case studies, and common standard care.
- **Recommendation Grade B (RGB):** Evidence is insufficient, conflicting, or poor and demonstrates an incomplete assessment of net benefit vs harm; additional research is recommended.
- **Recommendation Grade C1 (RGC1):** Evidence demonstrates a lack of net benefit; additional research is recommended.
- **Recommendation Grade C2 (RGC2):** Evidence demonstrates potential harm that outweighs benefit; additional research is recommended.
- **Recommendation of the GDG (R-GDG):** Recommended best practice on the basis of the clinical experience of the Guideline Development Group members.

1.6 **Guideline Development Group members**

The following table lists members of the Guideline Development Group (GDG) nominated by their respective organisations and the Clinical Governance Group. The GDG members have reviewed and provided feedback on the draft guideline relating to the topic. Each member has completed a declaration of conflicts of interest, which has been reviewed and retained by the MOPH.

<table>
<thead>
<tr>
<th>Guideline Development Group members</th>
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<tr>
<td><strong>Name</strong></td>
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1.7 **Responsibilities of healthcare professionals**

This guideline has been issued by the MOPH to define how care should be provided in Qatar. It is based upon a comprehensive assessment of the evidence as well as its applicability to the national context of Qatar. Healthcare professionals are expected to take this guidance into account when exercising their clinical judgement in the care of patients presenting to them.

¹ Dr Ahmed Babiker attended the MOPH in his capacity as a Clinical Pharmacist and advisor on the availability of medications in Qatar.

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The guidance does not override individual professional responsibility to take decisions which are appropriate to the circumstances of the patient concerned. Such decisions should be made in consultation with the patient, their guardians, or carers and should consider the individual risks and benefits of any intervention that is contemplated in the patient’s care.

1.8 Abbreviations used in this guideline
The abbreviations used in this guideline are as follows:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
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<tbody>
<tr>
<td>ACE</td>
<td>Angiotensin-converting enzyme</td>
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<tr>
<td>ACS</td>
<td>Acute coronary syndrome</td>
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<tr>
<td>ASCVD</td>
<td>Atherosclerotic cardiovascular disease</td>
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<tr>
<td>BMI</td>
<td>Body mass index</td>
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<tr>
<td>BNP</td>
<td>Beta-natriuretic peptide</td>
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<td>BP</td>
<td>Blood pressure</td>
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<td>CAD</td>
<td>Coronary artery disease</td>
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<td>CABG</td>
<td>Coronary artery bypass grafting</td>
</tr>
<tr>
<td>CBC</td>
<td>Complete blood count</td>
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<tr>
<td>CMR</td>
<td>Cardiac magnetic resonance</td>
</tr>
<tr>
<td>CVD</td>
<td>Cardiovascular disease</td>
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<tr>
<td>ECG</td>
<td>Electrocardiogram</td>
</tr>
<tr>
<td>eGFR</td>
<td>Estimated glomerular filtration rate</td>
</tr>
<tr>
<td>GTN</td>
<td>Glyceryl trinitrate</td>
</tr>
<tr>
<td>HBA₁c</td>
<td>Glycated haemoglobin</td>
</tr>
<tr>
<td>MDT</td>
<td>Multi-disciplinary team</td>
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<tr>
<td>MI</td>
<td>Myocardial infarction</td>
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<tr>
<td>MPS</td>
<td>Myocardial perfusion scintigraphy</td>
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<tr>
<td>NSTEACS</td>
<td>Non-ST-segment elevation acute coronary syndrome</td>
</tr>
<tr>
<td>NSTEMI</td>
<td>Non-ST-segment elevation myocardial infarction</td>
</tr>
<tr>
<td>PCI</td>
<td>Percutaneous coronary intervention</td>
</tr>
<tr>
<td>PCV13</td>
<td>13-valent pneumococcal conjugate vaccine</td>
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<tr>
<td>PPSV23</td>
<td>23-valent pneumococcal polysaccharide vaccine</td>
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<tr>
<td>PTP</td>
<td>Pre-test probability</td>
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<tr>
<td>SPECT</td>
<td>Single photon emission computed tomography</td>
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<tr>
<td>STEMI</td>
<td>ST-segment elevation myocardial infarction</td>
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2 Organisation of care in Qatar

2.1 Role of the Ministry of Public Health
The Ministry of Public Health of Qatar (MOPH) has been given the responsibility to guide reform in Qatar in order to establish one of the world’s most admired and renowned healthcare systems. The MOPH’s role is to create a clear vision for the nation’s health direction, set goals and objectives for the country, design policies to achieve the vision, regulate the medical landscape, protect the public’s health, set the health research agenda, and monitor and evaluate progress towards achieving those objectives.

The MOPH has the dual mandate to develop policies and programmes to improve the people’s health so that they may enjoy longer and more productive lives, and to lay the foundation for a vibrant country for decades to come.

The MOPH does not provide clinical services. Instead its goal is to vest responsibility for care in the hands of both public and private sector healthcare institutions, whilst regulating, monitoring, and evaluating this care against agreed upon outcomes. The MOPH is committed to establishing an environment that promotes quality and wellness through policies in such areas as public health, health insurance, information technology, licensure and credentialing; and continuing medical education.

2.2 Provision of care
Healthcare provision in Qatar comprises of the following main entities:

- **Public Sector:**
  - Primary care health centres - provided by the Primary Health Care Corporation of Qatar.
  - Secondary and tertiary care hospitals and outpatient clinics - provided by the Hamad Medical Corporation (HMC).
  - Paediatric Emergency Care provided by specialist Paediatric Emergency Centres within HMC.
  - QP Clinics for personnel and families of Qatar Petroleum.
  - Sports Medicine centre provided by a specialist Sport Medicine Hospital – Aspetar.
  - Ministry of Interior clinics for personnel and families of Qatar’s police services.
  - Ministry of Defence clinics for personnel and families of Qatar’s armed forces.
  - Specialist obstetric, gynaecological and paediatric care provided by Sidra Medical & Research Center.

- **Private sector:**
  - A range of single-handed generalist and specialist clinics.
  - Polyclinics.
  - Specialist hospitals.

The aim of the MOPH’s National Health Strategy is to rebalance healthcare delivery with a greater emphasis on primary and community care and an expansion of the role played by the private sector.
3 Key recommendations of the guideline

The key recommendations of this guideline are:

Referral for suspected Acute Coronary Syndrome:
- Refer patients to hospital as an emergency if acute coronary syndrome (ACS) is suspected; or there any of the following are present [2]:
  - Prolonged or recurrent chest pain typical of ischaemia; or
  - Pain free, but the patient has had chest pain typical of ischaemia in the last 48 hours [R-GDG]; or
  - A resting 12-lead ECG indicates ischaemia; or
  - There are signs of complications e.g. pulmonary oedema.
- If the patient has been pain free for 48 hours or more and does not have any high risk features (e.g. presyncope, syncope or heart failure symptoms), refer urgently for outpatient cardiology assessment [R-GDG].

Assessing the pre-test probability of CAD (see Section 8.2):
- Stepwise assessment of patients presenting with angina symptoms (who do not have a history of established ASCVD), is recommended to determine the most appropriate method of diagnostic evaluation [9].
  - Assessment comprises of:
    - Clinical assessment.
    - Assessment of pre-test probability (PTP) of CAD.
    - Determining which investigations are required to confirm the diagnosis of CAD.

Non-invasive stress testing (see Section 8.2.1- 8.2.3):
- Non-invasive stress testing is not routinely indicated in patients with a PTP of <15%[9].
- Patients who are deemed to have a PTP of between 15-85% should be investigated for CAD using a non-invasive stress test using one of the following tests [R-GDG]:
  - Stress echocardiography.
  - Myocardial perfusion scintigraphy (MPS) with single photon emission computed tomography (SPECT).
  - Perfusion cardiac magnetic resonance (CMR).
- Patients with a high PTP of >85% should be considered to have CAD and additional stress imaging will not add diagnostic value [9].
- If the patient declines stress imaging or is unsuitable, consider investigation using an exercise ECG [R-GDG].

Further management and referral (see Section 8.3):
- Patients diagnosed with CAD following investigation with stress imaging or those with a PTP probability of >85% should be managed as having established CAD.
- Medical management should be optimised and patients should be risk-assessed in order to determine their probability of experiencing a cardiac event [9].
- Those deemed to be at medium or high risk of a cardiac event should be considered for invasive coronary angiography (see Section 10.2).

Medical management (See Section 9.1):
- Sublingual GTN tablets or spray should be used for the immediate relief of angina and before performing activities that are known to precipitate angina [1,3]
Either beta blockers or calcium channel blockers should be used as the first line therapy for the relief of symptoms of stable angina [14][L1, RGA1].
If adequate control of anginal symptoms is not achieved with beta blocker or calcium-channel blocker monotherapy, use the two in combination [1,3].

Secondary prevention of ASCVD (see Section 9.2):
- Anti-thrombotic medication [2,9]:
  - All patients diagnosed with angina should receive long-term therapy with aspirin.
- Blood pressure control [1,2,4,9]:
- Lipid management [1,2,4,9,11]:
- Diabetes control [9]:
- Smoking [9]:
  - All smokers should be advised to quit and offered cessation assistance.
- Physical activity and rehabilitation following treatment should be encouraged within exercise tolerances [9,16].
- Attention should be given to diet and body weight [9]:
- The presence of sleep apnoea symptoms should be assessed, especially in obese patients [9].

Specialist management (see Section 10):
- Outpatient referral to a cardiologist is indicated for the following patients [10]:
  - All patients with a new diagnosis of angina.
  - Patients with poorly controlled angina symptoms despite maximal treatment.
  - Patients requesting referral.
  - Patients with a significant co-morbidity which cannot otherwise be managed in primary care.

Coronary angiography and revascularisation:
- See Section 10.2.

Follow-up (see Section 11):
- Patients presenting with angina and with a diagnosis of coronary artery disease should receive long-term structured follow-up in primary care [2].
4 Background information

4.1 Definitions

Stable angina:
- Angina is a symptom of myocardial ischaemia.
- Typically presents with chest heaviness or tightness that is [1-3]:
  - Precipitated by exertion or emotional stress; and
  - Is relieved by rest or nitrates.
- Angina is usually caused by coronary artery disease (CAD) [2].
- Angina is considered stable when [1,2,4]:
  - It is not a new symptom.
  - There is no deterioration in frequency, severity or duration of episodes.
  - It is predictable in onset, reproducible and relieved within a few minutes by rest or nitrates.
  - There is no recent myocardial damage.

Unstable angina:
- Unstable angina is defined as [2]:
  - A new onset of chest pain or discomfort, or
  - Abrupt deterioration in previously stable angina.
  - With frequent occurrences of chest pain or discomfort; and
  - With little or no exertion.
  - Episodes are often prolonged.

Myocardial infarction:
- Sudden insufficiency of the blood supply to the myocardium resulting in myocardial necrosis [5].
- Usually occurs as a result of thrombotic occlusion of a coronary artery and typically results in [2,4]:
  - Cardiac chest pain.
  - Raised biomarkers of myocardial damage,
  - Characteristic ECG changes:
    - ST segment elevation or new onset left bundle branch block.
    - ST-segment depression or T-wave inversion.

Acute coronary syndrome:
- Acute coronary syndrome (ACS) is defined as a condition in which there is a coronary artery event with plaque rupture, erosion, or coronary dissection, resulting in the formation of intra-coronary thrombus [2].
- ACS includes the following [2,6]:
  - ST-segment elevation myocardial infarction (STEMI).
  - Non-ST-elevation acute coronary syndromes (NSTEMI), which is comprised of:
    - Unstable Angina.
    - Non-ST-segment elevation myocardial infarction (NSTEMI).
4.2 Epidemiology
In 2013, 12.9% of registered deaths in Qatar were related to atherosclerotic cardiovascular disease (ASCVD)[7]:
- In the Qatari population, 12.2% of deaths were related to ASCVD.
- In the non-Qatari population, 13.2% of deaths were related to ASCVD.

The 2012 Qatar the STEPwise survey showed the following prevalences for key ASCVD risk factors in the survey population [8]:
- Raised blood pressure in 32.9%:
  - Females - 37.7%.
  - Males – 28%.
- Raised total cholesterol in 21.9%:
  - Females - 24.6%.
  - Males -19.1%.
- Raised blood glucose (blood glucose ≥110 mg/dl) as well as those with history of receiving medication for diabetes was 16.7%:
  - Males - 17.6%.
  - Females - 15.9%.
- Smoking was 16.4%:
  - Males - 31.9%.
  - Females - 1.2%.
- Low level of physical activity was 45.9%:
  - Females - 54.2%.
  - Males - 37.4%.
- Obesity (body mass index (BMI) ≥30 kg/m²) was 41.4%:
  - Females - 43.2%.
  - Males - 39.5%.

4.3 Risk factors
The main risk factors for ASCVD are as follows [24,7,8]:
- Smoking.
- Hypertension.
- Diabetes mellitus (DM).
- Family history of premature CAD.
- Dyslipidaemia.
- Male sex.
- Increasing age.
- Obesity.
- Sedentary lifestyle.
5 Clinical presentation

Taking a detailed clinical history documenting:

- The characteristics of the pain, including [2]:
  - Location.
  - Radiation.
  - Severity.
  - Duration and frequency.
  - Factors that provoke and relieve the pain.
- Any associated symptoms, such as [2,9]:
  - Breathlessness.
  - Syncope.
- Stability of symptoms, e.g. [2,9]:
  - Whether the chest pain follows a predictable pattern such as exercise-induced
  - A new or deteriorating chest pain that may require urgent assessment.
- Any history of angina, myocardial infarction (MI), coronary revascularisation, or other cardiovascular disease (CVD) and any cardiovascular risk factors [2].
- Comorbidities [9].
- Quality of life of the patient [9].

Carry out a physical examination to:

- Identify risk factors for ASCVD [1,2,10,11]:
  - Measure body weight and height – this allows calculation of body mass index (BMI).
  - Measure waist circumference.
  - Measure blood pressure (BP).
  - Look for signs of hyperlipidaemia, e.g.:
    - Corneal Arcus.
    - Xanthelasma.
    - Tendinous xanthomata.
- Examine for signs of non-atherosclerotic CVD [2]:
  - Aortic stenosis (ejection systolic murmur).
  - Arrhythmia.
  - Hypertrophic cardiomyopathy
- Examine for evidence of peripheral artery disease, e.g. absent foot pulses or bruits [10].
- Examine for non-cardiac causes of chest pain [2].

6 Diagnosis

A working diagnosis of angina can be made in primary care on the basis of clinical history, but further diagnostic assessment and risk stratification are needed, which require referral to a specialist [1].

Diagnose stable angina based on one of the following [2]:

- Clinical assessment alone; or
- Clinical assessment plus diagnostic testing, i.e. anatomical testing for obstructive CAD and/or functional testing for myocardial ischaemia.

Suspect angina in patients presenting with tight, dull, or heavy chest discomfort which is [1,2]:

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• Retrosternal or left-sided, radiating to the left arm, neck, jaw, or back.
• Angina pain [1,2]:
  o Is predictable.
  o Is not fleeting in nature and usually lasts for longer than a minute.
  o Is not usually sharp or stabbing or influenced by respiration.
  o Subsides gradually.
• Associated with exertion or emotional stress and relieved within a few minutes by rest or glyceryl trinitrate (GTN) [2].
• Precipitated by cold weather or a meal [2].

Some patients may present with atypical symptoms, including [1,2,9,12]:
• Breathlessness.
• Nausea.
• Epigastric discomfort or burping.
• Atypical symptoms are particularly likely in:
  o Women.
  o Older people.
  o Those with diabetes mellitus.

Following initial assessment in primary care, patients with suspected angina should, wherever possible, have the diagnosis confirmed and the severity of the underlying coronary heart disease assessed in the chest pain evaluation service [1][L1, RGA2].

7 Differential diagnosis

7.1 Other causes of chest pain
Cardiac causes of chest pain include [1,2,9,12]:
• Unstable angina:
  o New onset of chest pain or discomfort, or sudden worsening of stable angina.
  o Occurs frequently and with little or no exertion
  o Episodes often prolonged.
• Myocardial infarction.
• Valvular heart disease (e.g. aortic stenosis).
• Hypertrophic cardiomyopathy.
• Prinzmetal's (vasospastic) angina:
  o A rare form of angina in which pain is experienced at rest rather than during activity.
  o Spasm of proximal coronary arteries causes narrowing or occlusion.
  o During vasospasm, ECG usually shows ST-elevation.
• Pericarditis.

Non-cardiac causes of chest pain include [2,4,10,13]:
• Aortic dissection.
• Pulmonary embolism.
• Gastro-oesophageal reflux.
• Oesophageal dysmotility.
• Psychological causes, e.g.:
  o Anxiety.
  o Panic attacks.

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Patients with proven cardiac chest pain can also experience non-cardiac chest pain, and they often interpret the non-cardiac pain as symptoms of heart disease. It is important to distinguish between the two causes early, in order to reduce levels of distress and avoid inappropriate treatments [R-GDG].

7.2 Referral to the Emergency Department
Refer patients to hospital as an emergency if ACS is suspected; or there any of the following are present [2]:

- Prolonged or recurrent chest pain typical of ischaemia; or
- Pain free, but the patient has had chest pain typical of ischaemia in the last 48 hours [R-GDG]; or
- A resting 12-lead ECG indicates ischaemia; or
- There are signs of complications e.g. pulmonary oedema.

If the patient has been pain free for 48 hours or more and does not have any high risk features (e.g. presyncope, syncope or heart failure symptoms), refer urgently for outpatient cardiology assessment [R-GDG].

8 Investigation

8.1 Initial investigation
Resting ECG [9]:

- All patients should have a resting 12-lead ECG [9][L2, RGA2]:
  - A normal ECG does not exclude the diagnosis of ischaemia.
  - The ECG establishes a baseline for future comparisons.
  - May assist in clarifying differential diagnosis.
- The typical ECG changes consistent with ischaemia include [2]:
  - ST-segment deviation.
  - T wave abnormalities.
  - New onset or intermittent left bundle branch block.
  - Pathological Q waves.

Blood tests should include [2,9]:

- CBC.
- Serum creatinine and eGFR.
- Lipid profile.
- Fasting blood glucose and HBA1c.
- Thyroid function tests
• Liver function tests.
• Beta-natriuretic peptide (BNP) - if heart failure is suspected.

Chest radiograph:
• A chest radiograph is recommended in patients with an atypical presentation of angina or suspicion of pulmonary disease [9][L3, RGA2].
• Consider also in patients with suspected heart failure [9].

8.2 Assessing the pre-test probability of CAD
Stepwise assessment of patients presenting with angina symptoms (who do not have a history of established ASCVD), is recommended to determine the most appropriate method of diagnostic evaluation [9].

Assessment comprises of the following steps [2,9]:
• Determine clinically whether pain is: typical angina, atypical angina or non-anginal:
  o Patients with all of the following are determined to have typical angina:
    ▪ Constricting discomfort in the anterior chest, neck, shoulders, jaw or arms.
    ▪ Pain is precipitated by physical exertion.
    ▪ Pain is relieved by rest or GTN.
  o Patients with two of the above features are defined as having atypical angina.
  o Patients with one or none of the above features are defined as having non-anginal pain.
• Use the table below to determine the patient’s pre-test probability (PTP) of having CAD.
• Determine which investigations are required to confirm the diagnosis of CAD (see below).

The table below has been adapted from the European Society of Cardiology Guidelines [9] for determining the clinical PTP of CAD in patients presenting with possible symptoms of angina.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Typical angina</th>
<th>Atypical angina</th>
<th>Non-anginal pain</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-39</td>
<td>Men 59</td>
<td>Women 28</td>
<td>Men 29</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Women 10</td>
</tr>
<tr>
<td>30-39</td>
<td></td>
<td></td>
<td>Men 18</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Women 5</td>
</tr>
<tr>
<td>40-49</td>
<td>Men 69</td>
<td>Women 37</td>
<td>Men 38</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Women 14</td>
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<tr>
<td>40-49</td>
<td></td>
<td></td>
<td>Men 25</td>
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<td></td>
<td></td>
<td></td>
<td>Women 8</td>
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<tr>
<td>50-59</td>
<td>Men 77</td>
<td>Women 47</td>
<td>Men 49</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Women 20</td>
</tr>
<tr>
<td>50-59</td>
<td></td>
<td></td>
<td>Men 34</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Women 12</td>
</tr>
<tr>
<td>60-69</td>
<td>Men 84</td>
<td>Women 58</td>
<td>Men 59</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Women 28</td>
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<tr>
<td>60-69</td>
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<td>Men 44</td>
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<td></td>
<td></td>
<td></td>
<td>Women 17</td>
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<tr>
<td>70-79</td>
<td>Men 89</td>
<td>Women 68</td>
<td>Men 69</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Women 37</td>
</tr>
<tr>
<td>70-79</td>
<td></td>
<td></td>
<td>Men 54</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Women 24</td>
</tr>
<tr>
<td>≥80</td>
<td>Men 93</td>
<td>Women 76</td>
<td>Men 78</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Women 47</td>
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<tr>
<td>≥80</td>
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<td></td>
<td>Men 65</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Women 32</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risk group</th>
<th>PTP</th>
<th>Diagnostic test</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;15%</td>
<td></td>
<td>No further testing required</td>
</tr>
<tr>
<td>15-65%</td>
<td></td>
<td>Non-invasive stress testing [R-GDG]</td>
</tr>
<tr>
<td>65-85%</td>
<td></td>
<td>Non-invasive stress testing</td>
</tr>
<tr>
<td>&gt;85%</td>
<td></td>
<td>Assumed to have CAD</td>
</tr>
</tbody>
</table>

Table 8.2: Clinical pre-test probabilities and related diagnostic modality for CAD by age and sex [Adapted from ESC Guidelines 2013 [9]].

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8.2.1  Pre-test probability <15%
Patients with a PTP of <15% should have other cardiac causes of chest pain excluded with modification of risk factors for ASCVD following assessment of their 10 year ASCVD risk. Non-invasive stress testing is not routinely indicated in these patients [9].

Patients with repeated attacks of chest pain occurring only at rest, should be reviewed for possible vasospastic angina and investigated appropriately by a cardiology specialist [9].

8.2.2  Pre-test probability of 15-85%
Patients who are deemed to have a PTP of between 15-85% should be investigated for CAD using a non-invasive stress test [R-GDG].

Where available, one of the following tests may be applicable with stress applied by either exercise or pharmacological agents (typically dobutamine). Pharmacological agents may be used where exercise is not feasible or desirable [9]:

- Stress echocardiography.
- Myocardial perfusion scintigraphy (MPS) with single photon emission computed tomography (SPECT).
- Perfusion cardiac magnetic resonance (CMR).

If the patient declines stress imaging or is unsuitable, consider investigation using an exercise ECG [R-GDG].

8.2.3  Pre-test probability of >85%
Patients with a high PTP of >85% should be considered to have CAD and additional stress imaging will not add diagnostic value [9]. Patients should be considered for invasive coronary angiography if the patient is at high risk of a cardiac event and/or they experience severe angina at a low levels of exercise.

8.3  Further management and referral
Patients diagnosed with CAD following investigation with stress imaging or those with a PTP of >85% should be managed as having established CAD. Medical management should be optimised and patients should be risk-assessed in order to determine their probability of experiencing a cardiac event [9].

Those deemed to be at medium or high risk of a cardiac event should be considered for invasive coronary angiography (see Section 10.2).

9  Medical management

9.1  Pharmacological management
Optimal pharmacological treatment of stable angina includes [14]:

- Anti-anginal medications as necessary; and
- Medication for secondary prevention of ASCVD.

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Pharmacological management of angina symptoms includes [1]:

- Medication monotherapy.
- Combination therapy.
- Secondary prevention of ASCVD.

### 9.1.1 Monotherapy

**First-line therapy:**

- Either beta blockers or calcium channel blockers should be used as the first line therapy for the relief of symptoms of stable angina [14][L1, RGA1].
  - Decide which drug to use based on comorbidities, contraindications and the person’s preference.
  - If one cannot be tolerated, consider switching to the other option, i.e. beta blocker or calcium channel blocker [14].
- In patients with left ventricular dysfunction [3,14]:
  - Beta-blocker therapy should be started at a very low dose and titrated up very gradually over weeks or months.
  - Rate-limiting calcium-channel blockers, diltiazem and verapamil, are contra-indicated as they may precipitate heart failure.
- Patients with Prinzmetal (vasospastic) angina should be treated with [9][L1, RGA2]:
  - A dihydropyridine derivative calcium-channel blocker (e.g. amlodipine, felodipine etc).
  - Beta blockers should be avoided.

If a patient cannot tolerate a beta blocker or a calcium channel blocker, or if both treatments are contra-indicated, consider monotherapy with one of the following [14][L3, RGA2]:

- A long-acting nitrate; or
- Ivabradine; or
- Nicorandil; or
- Trimetazidine.

Sublingual GTN tablets or spray should be used for the immediate relief of angina and before performing activities that are known to precipitate angina [1,3] – provide information on the following [14]:

- **How to use the GTN medication** – this includes advising the patient to [14]:
  - Repeat the dose after 5 minutes if the pain does not resolve.
  - Call an emergency ambulance if the pain has not resolved after taking the second dose.
- **Expected side effects** which include [3]:
  - Flushing.
  - Headache.
  - Light-headedness – in this scenario, patient should sit down or find something to hold on to.

### 9.1.2 Combination therapy

Ensure that the patient is taking the maximum licensed, or highest tolerated, dose of monotherapy before moving to combination therapy [3].

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Combination therapy [1,3]:
- If adequate control of anginal symptoms is not achieved with beta blocker or calcium-channel blocker monotherapy, use the two in combination:
  - Do not routinely combine a beta blocker with a rate-limiting CCB (diltiazem or verapamil) as severe bradycardia and heart failure may occur.
  - Use a long-acting dihydropyridine calcium-channel blocker (CCB), such as:
    - Amlodipine.
    - Modified-release Nifedipine; or
    - Felodipine.
- If a patient cannot tolerate beta blockers and calcium channel blockers or both are contraindicated, consider monotherapy with one of the following [3,14]:
  - A long-acting nitrate; or
  - Ivabradine; or
  - Nicorandil; or
  - Trimetazidine.

People on combination therapy [1,10]:
- Ensure that the person is taking the maximum licensed or highest tolerated dose of each drug.
- If symptom control is poor on the maximum licensed or tolerated doses of two drugs, refer to a cardiologist, for advice on drug management and assessment for revascularization:
  - Consider starting a third anti-anginal drug while awaiting referral.
  - Do not routinely combine a beta blocker with a rate-limiting calcium channel blocker (diltiazem or verapamil) as severe bradycardia and heart failure may occur.
  - Do not combine a rate-limiting calcium channel blocker with ivabradine, as severe bradycardia and heart failure may occur.

Assessing response and titrating therapy [1,3]:
- After initiating or changing drug therapy, response to treatment should be assessed every 2-4 weeks.
- The medication should be titrated based on symptom control to the maximum licensed or tolerated dose.

Stopping beta-blockers [3]:
- Evidence suggests that sudden withdrawal of beta-blockers may cause an exacerbation of angina.
- A gradual reduction in dose is preferred when beta-blockers are to be stopped.

### 9.2 Secondary prevention of ASCVD
All people with angina are assumed to be at risk for future cardiovascular events, and their cardiovascular risk factors should therefore be optimised [9,15].

Attention should be paid to the following ASCVD risk factors, through a combination of lifestyle modification and, if necessary, pharmacological treatment:
- Anti-thrombotic medication [2,9]:
  - All patients diagnosed with angina should receive long term therapy with aspirin.
  - Clopidogrel is indicated as an alternative to aspirin in patients with intolerance to aspirin.
- Blood pressure control [1,2,4,9]:
  - All patients with angina should receive an ACE inhibitor if any of the following are present:
- Hypertension.
- Heart failure.
- Diabetes mellitus.

- Lipid management [1,2,4,9,11]:
  - All patients with angina should receive long-term statin therapy.
- Diabetes control [9]:
  - Consider referral to diabetes specialist team if control is difficult to achieve.
- Smoking [9]:
  - All smokers should be advised to quit and offered cessation assistance.
- Physical activity and rehabilitation following treatment should be encouraged within exercise tolerances [9,16].
- Attention should be given to diet and body weight [9]:
  - The presence of sleep apnoea symptoms should be assessed, especially in obese patients [9].

Refer also to the *MOPH National Guideline on ASCVD risk assessment and management*.

9.3 Additional advice to patients

Advice on sexual activity [3,9]:
- If sexual activity precipitates an episode of angina, sublingual GTN taken immediately before intercourse may help prevent subsequent attacks.
- The concomitant use of phosphodiesterase inhibitors (sildenafil, tadalafil, and vardenafil) with nitrates or nicorandil is contraindicated.

Advice on work [10]:
- Many people with angina can continue to work as before.
- If their job involves heavy manual work, they may need to alter their work practices.
- If their job involves driving, flying or operating heavy machinery, advise the patient to discuss with their employer and a cardiology specialist.
- If the person's employer has an occupational health department, they should be encouraged to discuss the options available for work.

Advice on exercise [16]:
- Patients with stable CAD should perform regular aerobic, strength and flexibility type exercises.
- Low activity pastimes should be limited to no more than 2 hours per day.
- 20-60 minutes of exercise (sufficient to make the patient out of breath) is recommended, 3-5 times per week, according to the exercise tolerance and severity of the angina.
- Recommended aerobic exercises include:
  - Brisk walking.
  - Jogging.
  - Swimming.
  - Skiing.
  - Skating.
  - Fitness classes.

Vaccination:
The MOPH Public Health Department recommends the following immunisations in patients with CAD, unless contraindicated [17]:
- Annual influenza vaccine, ideally before influenza viruses circulate each year.
- Pneumococcal vaccination:

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- Administer pneumococcal conjugate vaccine (PCV13), if not previously given during the patient’s lifetime.
- Administer pneumococcal polysaccharide vaccine (PPSV23), 6-12 months after vaccination with PCV13.
- Repeat PPSV23 to a maximum of 3 times during the patient’s life with the final dose given after the age of 65 years.

9.4 Psychological and cognitive issues
Psychological factors exert an influence on patients with angina in several ways [1]:
- Limitations and concerns related to living with angina can influence mood, degree of disability, quality of life, and mortality.
- Beliefs and misconceptions about heart disease have been shown to influence outcome and eliciting and reforming unhelpful beliefs decreases disability.
- Depression and anxiety influence health service use.
- The presence of depression influences mortality and morbidity.
- Patients commonly report cognitive difficulties following coronary artery bypass grafting (CABG).

The patient’s beliefs about angina should be assessed when discussing management of risk factors and how to cope with symptoms [1,14]. Involve the patients’ families or carers in the discussion when relevant [14].

10 Specialist management

10.1 Criteria for referral to a cardiologist
Outpatient referral to a cardiologist is indicated for the following patients [10]:
- All patients with a new diagnosis of angina.
- Patients with poorly controlled angina symptoms despite maximal treatment.
- Patients requesting referral.
- Patients with a significant co-morbidity which cannot otherwise be managed in primary care.

10.2 Angiography and revascularisation
Early access to angiography and coronary artery bypass surgery may reduce the risk of adverse cardiac events and impaired quality of life [1].

The main indications for revascularisation are [18]:
- Persistent symptoms despite optimal medical therapy; and/or
- Improvement of prognosis.

10.2.1 Coronary angiography
Coronary angiography should be considered for all patients with angina, particularly in the following patient groups [9,14]:
- Patients with symptoms which do not respond to maximal medical treatment.
- Those at high probability of CAD (>85% PTP), irrespective of symptom control with medical treatment.

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• High risk features on non-invasive stress tests.
• Inconclusive data from non-invasive stress testing.

Consider additional investigations (e.g. fractional flow reserve or intra-vascular ultrasound) to evaluate angiographic findings and guide treatment decisions [14].

Following assessment of left ventricular function and coronary angiography, patients may be considered for coronary revascularisation by either percutaneous coronary intervention (PCI) or CABG [1].

10.2.2 Multi-disciplinary team review
Ensure that there is a regular multidisciplinary team (MDT) meeting to discuss the risks and benefits of continuing drug treatment, or the need for treatment with revascularisation techniques, in the following patients [14]:
• Patients with left main stem or anatomically complex three-vessel disease.
• Patients in whom there is doubt about the best method of revascularisation because of the complexity of the coronary anatomy, the extent of stenting required, or other relevant clinical factors and comorbidities.
• The MDT team should include cardiac surgeons and interventional cardiologists.

Ensure people with stable angina receive balanced information and have the opportunity to discuss the benefits, limitations and risks of continuing drug treatment, CABG and PCI to help them make an informed decision about their treatment.

NB: Rehabilitation programmes should be implemented after revascularisation for patients with stable angina [1].

10.2.3 Percutaneous coronary intervention
Percutaneous coronary intervention (PCI) [1,19,20]:
• PCI should be offered where medical therapy has failed, where the patient is deemed to be suitable.
• If PCI is selected as the appropriate procedure, stents should be used routinely:
  o Drug-eluting stents reduce restenosis and have thereby reduced re-intervention rates.

10.2.4 Coronary artery bypass grafting
Coronary artery bypass grafting (CABG) [1,9]:
• Is an excellent symptomatic treatment and has also been shown to convey prognostic benefit in patients with significant left main stem and triple vessel coronary disease.
• Offer patients undergoing CABG, screening for anxiety and depression pre-surgery and during the following year as part of their postsurgical assessment, rehabilitation and coronary artery disease secondary prevention.

10.3 No response to treatment
Offer people whose stable angina has not responded to drug treatment and/or revascularisation comprehensive re-evaluation and advice, which may include [14]:
• Explore the person's understanding of their condition.

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• Explore the impact of symptoms on the person’s quality of life.
• Review the diagnosis and consider non-ischaemic causes of pain.
• Review drug treatment and consider future drug treatment and revascularisation options.
• Acknowledge the limitations of future treatment.
• Explain how the person can manage the pain themselves.
• Pay specific attention to the role of psychological factors in pain.
• Encourage development of skills to modify cognitions and behaviours associated with pain.

In patients with normal coronary arteries on angiogram and continuing anginal symptoms, consider a diagnosis of microvascular angina [14].

11 Follow up

Patients presenting with angina and with a diagnosis of coronary artery disease should receive long term structured follow-up in primary care [2].

Follow-up [10]:
• Review the person every 6 months to one year, depending on the stability of their angina and their co-morbidities.
• Check for symptoms of angina at rest, or with exercise:
  o If the person is taking optimal anti-anginal treatment, but has persistent symptoms or deteriorating exercise tolerance - consider specialist review.
• Identify any modifiable cardiovascular risk factors.
• Check for any complications of angina or treatment [2,21]:
  o Check the heart rate and BP.
  o Check for signs and symptoms of heart failure.
  o Screen for low mood or depression using the two-question test:
    ▪ During the past month, have you often been bothered by feeling down, depressed, or hopeless?
    ▪ During the past month, have you often been bothered by having little interest or pleasure in doing things?
• Check compliance, and identify and manage drug interactions.
• Consider referral to a cardiac rehabilitation programme, if available:
  o Comprehensive rehabilitation should be offered to patients who have undergone coronary revascularisation.

Provide information on angina [2,14]:
• Provide written information if this has not already been given.
• Explain when to seek further medical advice (such as worsening symptoms).
12 References


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