

Acute Chest Pain

[Disclaimer](#)

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Red Flags

- Acute chest pain that is highly suspicious of acute coronary syndrome (ACS)
- Other life-threatening causes of acute chest pain e.g., aortic dissection, pulmonary embolism, oesophageal rupture, or pneumothorax
- Chest pain in the presence of abnormal vital signs or new ECG changes

Assessment

Apply **DRSABCD** throughout assessment. Ensure the [Advanced Life Support for Adults](#) algorithm is available in your clinic.

DRSABCD

- D** **Dangers**
- R** **Responsive**
- S** **Send** for help
- A** Open **Airway**
- B** Normal **Breathing**
- C** Start **CPR**
- D** Attach **Defibrillator** (AED)

1. Take a detailed history:
 - Ask about **pain history** and assess for symptoms as appropriate.

Pain history

A history of ACS often includes:

- *pain predominantly in the chest and lasting > 20 minutes*
- *pain which radiates to the arms, back or jaw*
- *associated sweating*
- *pain associated with exertion.*

However, these symptoms are not present in every case.

ACS is more likely if:

- *patients with stable angina who then have more frequent angina or angina with minimal/no exertion (crescendo angina).*
- *pain is similar to the patient's previous angina or myocardial infarction (MI) pain, and of extended duration (> 20 minutes).*

- Check **cardiovascular risk factors**.

Cardiovascular risk factors

- *Smoking*
- *Patient aged > 65 years*

- Hypertension
 - Diabetes
 - Dyslipidaemia
 - First degree relatives with premature coronary artery disease (men aged < 55 years and women aged < 65 years)
2. Examine the patient:
- Check:
 - general appearance, e.g. sweating, pale.
 - blood pressure, oxygen saturation, temperature, respiratory rate, pulse rate and rhythm.
 - peripheral pulses.
 - for signs of deep vein thrombosis.
 - Palpate chest, abdomen, and thoracic spine to see if this reproduces the pain.
 - Listen to the chest for heart murmurs, bruit, effusions, and rubs.
3. Perform an electrocardiogram (ECG), looking for new ECG changes suggestive of ACS, particularly of an ST elevation myocardial infarction (STEMI).
4. Specifically look for features of life-threatening diseases:
- **Acute coronary syndrome (ACS)**

ACS is more likely if:

 - pain is predominantly in the chest and lasts longer than 15 minutes.
 - pain radiates to the arm or shoulder.
 - associated sweating.
 - patients with previously stable angina have an abrupt deterioration of their angina, with recurrent episodes occurring frequently with little or no exertion.
 - pain is similar to the patient's previous angina or myocardial infarction (MI) pain and of extended duration (longer than 15 minutes).

ACS is less likely if:

 - pain occurs or worsens with inspiration, i.e. pleuritic.
 - pain can be reproduced by palpation.

Classic angina:

 - is characterised by retrosternal chest pain.
 - follows a predictable pattern on exertion.
 - is eased by rest.
 - may radiate to neck, jaw, arms.
 - is described as heavy, crushing, dull, burning.
 - **Oesophageal rupture**
 - Oesophageal rupture can be the result of:
 - medical instrumentation.
 - repeated episodes of retching or vomiting (Boerhaave's syndrome).
 - Boerhaave's syndrome typically:
 - involves sudden onset of severe chest pain after repeated episodes of retching and vomiting:
 - Pain may radiate to the back or to the left shoulder.
 - Swallowing often aggravates the pain.
 - affects middle-aged men with recent excessive dietary and alcohol intake.

- Chest X-ray may show signs (e.g. mediastinal air), but CT chest is required to confirm diagnosis.

- **Pneumothorax**

- Symptoms vary from mild dyspnoea with or without pleuritic chest pain to tension pneumothorax with cardiovascular compromise.
- Signs may include:
 - reduced chest wall movement on the affected side.
 - diminished breath sounds on the affected side.
 - surgical emphysema in the neck or over chest wall.
 - abnormal deviation of the trachea.

- **Pulmonary embolism (PE)**

Suspect PE if unexplained chest pain, dyspnoea, hypoxia, collapse or shock, raised jugular venous pressure (JVP), tachycardia, or arrhythmia.

- Maintain a high index of suspicion. If uncertain, request [emergency department referral](#).
- If PE has progressed to infarction, then haemoptysis, pleuritic chest pain, and pleural effusion may occur.
- See more on the [Pulmonary Embolism](#).

- **Thoracic aortic dissection**

Consider high-risk features:

- Conditions:
 - Marfan's syndrome
 - Known aortic valve disease or thoracic aortic aneurysm
 - Recent aortic manipulation
 - Family history of aortic disease
- History:
 - Chest or abdominal pain described as abrupt onset
 - Severe intensity
 - Ripping or tearing character
- Examination:
 - New or known aortic insufficiency murmur
 - Hypertension or shock state
 - Evidence of perfusion deficit
 - Pulse deficit
 - Systolic blood pressure deficit
 - Focal neurological deficit

5. Consider other causes:

- Respiratory causes, e.g. [pneumonia](#)
- **Pericarditis** – If suspected, seek cardiology advice.

Diagnosis requires at least 2 of the following:

- Chest pain – typically sharp and pleuritic, improved by sitting up and leaning forward
- Pericardial friction rub
- ECG changes – widespread concave S–T segment elevation or PR depression
- New or worsening pericardial effusion
- Other features may be present depending on underlying cause, including fever, flu-like symptoms, raised CRP and white blood count.

- *Pericarditis can be a cause of a raised troponin.*
- **Musculoskeletal causes**
Musculoskeletal causes are aggravated by physical activity, movement, or coughing. They are associated with tenderness and pain, which may be preceded by excessive coughing.

Consider:
 - *rib fracture.*
 - *costochondritis and Tietze's syndrome. The latter is more likely to be associated with swelling and affect the second and third costal cartilages.*
- **Gastrointestinal causes**
Gastrointestinal causes can be difficult to distinguish from cardiac chest pain.
 - *Check relation to food and gastrointestinal symptoms.*
 - *Consider gastro-oesophageal reflux disease (GORD), oesophageal spasm or reflux, biliary colic, or pancreatitis.*
- *Anxiety or panic attack*
- *Viral causes, e.g. herpes zoster (shingles), Bornholm disease (viral myalgia in chest and abdomen)*
- [Breast pain](#)

6. Investigate according to the most likely cause and whether the patient will be monitored in the community.
7. If acute chest pain that is highly suspicious of ACS, do not arrange a troponin test in general practice. In general, if there is enough suspicion to warrant troponin testing, the patient should be referred to an emergency department. Only consider **troponin testing** if all of the following criteria are met:
 - there are no high risk features.
 - the ECG is normal.
 - the low pre-test probability is low.
 - the patient has been carefully consented.
 - the patient will be able to comply with the requirements of troponin testing and follow-up in the community.
 - there is a robust system in place to follow up the results without delay, contact with the patient and to arrange urgent transfer to hospital if a positive test.

Troponin testing

- *Troponins:*
 - *In many cases sufficient clinical concern to warrant troponin testing may suggest the need for urgent transfer to the nearest Emergency Department until ACS has been excluded.*
 - *The role of troponin testing in the community setting is controversial and mandates that the testing clinician ensures reliable and safe follow-up of results and patient.*
 - *Troponins are the biochemical criteria for the diagnosis of an acute MI.*
 - *Laboratories now use the high sensitivity cardiac troponins (hs-TnT) assays.*
 - *Different laboratories use different assays. The results are not interchangeable, which can cause confusion, delays, and unnecessary admissions.*
 - *Follow-up troponin testing results appropriately.*

- Measurements:
 - A diagnosis of acute MI requires a change in troponin, with at least one elevated value (in the context of suspected cardiac ischaemia).
 - Elevated troponin may result from multiple non-cardiac causes e.g., sepsis, gastrointestinal bleed, pneumonia, pulmonary embolism, CKD, fluid overload states, vigorous exercise.
 - Changes in hs-TnT levels can be detectable immediately after injury or cardiac strain, but may take 3 to 12 hours to occur, peak at 24 to 48 hours, and last for up to 2 weeks. The subsequent change in level is an important indicator of an acute process, as opposed to chronic elevation e.g. in chronic renal failure.
 - A raised troponin (hs-TnT) result in a clinical context that is not suspicious of an ACS (i.e. in the absence of thoracic/arm pain) can be very difficult to interpret.
 - Absence of troponin elevation after 10 hours does not rule out ACS e.g., unstable angina, it just excludes an acute MI.
 - Any patient with suspicion of ACS needs follow-up testing to rule out unstable angina.
 - Troponins (hs-TnT) should not be routinely measured in patients with arrhythmia, syncope, and breathlessness without other features of ACS, such as chest pain being present.

Management

Practice Point

Consider factors before initiating transfer

Always consider co-morbidities and quality of life factors before initiating urgent transfer. The decision may be made to treat some of these patients as palliative or low risk.

1. Phone an ambulance on **000** and transfer to the nearest [Emergency Department](#) for immediate assessment if:
 - suspected pulmonary embolism or aortic dissection.
 - suspected ACS with any of:
 - severe or ongoing chest pain
 - chest pain lasting 10 minutes or more
 - chest pain that is new at rest, or with minimal activity
 - chest pain with **abnormal vital signs** or **new ECG changes**

Abnormal vital signs

- Severe dyspnoea
- Syncope or pre-syncope
- Respiratory rate > 30 breaths per minute
- Tachycardia > 120 beats per minute
- Systolic blood pressure < 90 mmhg
- Heart failure or suspected pulmonary oedema

New ECG changes

- ST elevation or depression
- Complete heart block
- New left bundle branch block

• **Suggested STEMI**

ECG findings that suggest a STEMI (ST-segment elevation myocardial infarction):

- ST elevation ≥ 1.0 mm in 2 or more limb leads and augmented limb leads – I, II, III, AVR, AVL, AVF
 - ST elevation ≥ 2.0 mm in 2 or more precordial leads – V1 to V6
 - Presumed new left bundle branch block (LBBB)
- If uncertain about ECG findings, seek cardiology advice and **transmit the ECG image**. Accurate ECG interpretation will assist in risk stratification and determining eligibility for **revascularisation options**.

Transmit ECG image

An image received via smartphone is preferable to a faxed image, which provides the poorest quality.

To transmit an ECG image:

1. Arrange with the registrar or consultant an agreed transmitting mechanism (e.g., smartphone) and a contact number for sending the ECG image.
2. Mutually agree on a follow-up mechanism to ensure ECG is received, read, and reported back to the general practitioner, so that the result is not lost to follow-up.

Revascularisation options

These include primary percutaneous intervention (PCI), prehospital thrombolysis (PHT), and administration of thrombolytic.

- Many acute care centres have prehospital thrombolysis available and the GP on call should follow the local protocol while awaiting the arrival of the ambulance.
- Ambulance Officers will acquire and transmit an ECG electronically to the receiving hospital on-call cardiology registrar to allow:
 - prehospital assessment for primary angioplasty (PAPA), or
 - prehospital thrombolysis (PHT), if not already started.
- The aim of PHT is to reduce the time from onset of myocardial infarction to coronary reperfusion.
- Patient will bypass the emergency department and be directly taken to an available cardiac catheter laboratory for primary angioplasty if:
 - ST-segment elevation myocardial infarction (STEMI) is confirmed, and
 - the patient presents within 12 hours of symptom onset, and
 - patient can undergo primary percutaneous intervention (PCI) within 90 minutes of first medical contact, and
 - is within 60 minutes safe travel to the receiving hospital.
- If patient is outside 60 minutes safe travel to the receiving hospital, or the catheter laboratory is unavailable, paramedics will commence PHT if the patient meets criteria for thrombolysis en route to the emergency department.

- Do not arrange a troponin test.

2. Manage according to risk category:

High

Features:

- Ongoing chest pain
- Recent history of effort angina
- Deterioration of previously stable angina, or where the pain is similar to previous unstable angina or myocardial infarction (MI)
- New ECG changes

Management:

- Acute admission – phone an ambulance on **000**, or **Adult Retrieval Victoria (ARV)** on **1300-368-661**.

Adult Retrieval Victoria (ARV)

- For immediate advice or support, call **1300-368-661**.
- Refer online via the [ARV website](#).

All enquiries and requests for service go to an ARV physician critical care coordinator once basic case information has been provided.

Immediate management.

- Give aspirin 300 mg to chew and swallow.
- Pain relief – either glyceryl trinitrate (GTN) spray (if no **contraindications**), sublingual tablet, or intravenous (IV) morphine 2.5 mg aliquots until analgesia is achieved. If using GTN spray or tablets, repeat every 5 minutes for a maximum of 3 doses as long as blood pressure is > 90 mmHg.

Contraindications

Contraindications to use of GTN:

- Known hypersensitivity
 - Systolic blood pressure < 110 (tablet)
 - Systolic blood pressure < 90 (patch)
 - Sildenafil "Viagra" or Vardenafil "Levitra" administration in the previous 24 hours, or Tadalafil "Cialis" administration in the previous 4 days (PDE5 inhibitors)
 - Heart rate > 150
 - Bradycardia HR < 50 (excluding autonomic dysreflexia)
 - Ventricular tachycardia
 - Inferior STEMI with systolic BP < 160
 - Right ventricular infarct
- Oxygen – routine oxygen has not been shown to be beneficial and may be harmful.
 - Only give oxygen if oxygen saturation is < 94%, aiming for 94 to 98%.
 - If COPD and risk of hypercapnia, aim for oxygen saturation of 88 to 92%.
 - If oxygen is needed, use low flow via nasal prongs.
 - If oxygen saturation remains < 94%, change to a mask with higher flow rates.
 - Prehospital thrombolysis may be administered in an acute care centre by the General Practitioner if the patient is assessed as meeting criteria. Local protocols should be followed.

- Arrange [admission](#).
- If abnormal ECG, fax to the [Emergency Department](#) before patient arrives at the hospital.
- Ensure that a written record of all medications given accompanies the patient to the hospital.
- Monitor and record ECG, pulse, blood pressure, and O₂ saturation every 30 minutes if transfer is delayed. If ongoing or recurrent chest pain, repeat ECG every 15 minutes until chest pain is relieved.

Intermediate

Features:

- No high risk features
- Known ischaemic heart disease (IHD) e.g. previous myocardial infarction (MI), revascularisation, or known CAD on coronary angiography (> 50% stenosis)
- ≥ 3 risk factors for coronary artery disease:
 - increasing age e.g. aged > 65 years
 - hypertension
 - diabetes
 - dyslipidaemia
 - current or recent smoking
 - first degree relatives with premature coronary artery disease (men aged < 55 years and women aged < 65 +years).
- Atypical chest pain in a type 2 diabetic or a woman aged > 65 years

Management:

- Use clinical judgement and either treat as high risk or low risk.
- Most will usually require **immediate treatment** and acute admission.
- Consider co-morbidities and **quality of life factors** before initiating urgent transfer.

Quality of life factors

Consider if the patient:

- has an advance care plan.
- is older.
- is an aged-care facility resident.

Low

Features:

- No high or intermediate risk features
- Clinician "unease" about the patient and presentation.

Management:

- Consider **troponin testing** only if criteria are met and arrange urgent transfer to hospital in the case of a positive test. Assess the risk to the patient while awaiting results.
- Further investigation may be required, e.g. non-invasive testing such as stress echocardiogram.
- Consider urgent or routine cardiology referral if new or recurrent cardiac chest pain without any current acute concerning features.

Unlikely to be ACS

Features:

- No high or intermediate risk features and clinically unlikely to be ACS

Management:

- Measuring troponins is not advised.

- Treat the most likely cause.
- If a troponin is inadvertently measured in this group, consider the clinical context when interpreting the **causes of troponin elevation**. AMI may not be the most likely cause.

Causes of troponin elevation

Cardiac:

- Injury related to primary myocardial ischaemia
- Tachy-, or bradyarrhythmias
- Aortic dissection or severe aortic valve disease
- Hypertrophic or stress (Takotsubo) cardiomyopathy
- Coronary spasm
- Cardiac contusion, surgery, ablation, pacing, or defibrillator shocks
- Hypertension with or without left ventricular hypertrophy (LVH)
- Myocarditis
- Heart failure and fluid overload
- Cardiotoxic agents e.g., anthracyclines, herceptin

Respiratory:

- Severe respiratory failure
- Severe pulmonary embolism
- Pulmonary hypertension
- Pneumonia

Shock – cardiogenic, hypovolaemic, or septic shock

Other:

- Severe anaemia
- Gastrointestinal bleeding
- Rhabdomyolysis
- Sepsis and critically ill patients
- Renal failure
- Severe acute neurological diseases e.g., stroke, subarachnoid haemorrhage
- Infiltrative diseases e.g., amyloidosis, sarcoidosis
- Strenuous exercise

Referral

- Phone Ambulance Victoria on **000** for direct transfer to the nearest [Emergency Department](#) if:
 - suspected pulmonary embolism or aortic dissection.
 - suspected ACS with any of:
 - severe or ongoing chest pain
 - chest pain lasting 10 minutes or more
 - chest pain that is new at rest, or with minimal activity.
 - chest pain with **abnormal vital signs** or **new ECG changes**
- For interhospital transfer, or transfer from an acute care centre, contact [Adult Retrieval Victoria](#) on **1300-368-661**.
- Consider urgent or routine cardiology referral if new or recurrent cardiac chest pain without any current acute concerning features.

Information

For health professionals

Further information

- Agency for Clinical Innovation (ACI) – [Pre-Thrombolysis Checklist](#)
- Ambulance Victoria – [Clinical Practice Guidelines](#)
- Australian Resuscitation Council/New Zealand Resuscitation Council – [Basic Life Support](#)
- Heart Foundation – [Acute Coronary Syndromes \(ACS\) Clinical Guidelines](#)
- The Cardiac Society of Australia and New Zealand – [Position Statements for Clinical Practice](#)
- The Medical Journal of Australia:
 - [Should General Practitioners Order Troponin Tests?](#)
 - [The Approach to Patients with Possible Cardiac Chest Pain](#)

For patients

- Better Health Channel – [Chest Pain](#)
- Heart Foundation:
 - [Aboriginal Health: For You](#) [Aboriginal and Torres Strait Islander resources]
 - [Heart Attack](#) [Aboriginal and Torres Strait Islander fact sheet]
 - [Information in Your Language](#) [action plans and fact sheets]
- Murray HealthPathways – [Information for Patients Awaiting Blood Test Results for Acute Chest Pain](#)
- NSW Health – [Angina/Chest Pain Action Plan](#)

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