



The immediate management of  
**acute coronary syndromes**  
in primary care

*The majority of patients who present to general practice with chest pain are unlikely to have an acute coronary syndrome. However, all patients who present with current or recent symptoms consistent with a cardiac cause require immediate investigation and treatment. Additional interventions may be appropriate for patients where there will be a significant delay in transport to the nearest Emergency Department.*

### **Managing patients with possible acute coronary syndromes**

Acute coronary syndrome refers to a spectrum of unstable conditions where plaque rupture causes sudden occlusion of the coronary arteries. The spectrum ranges in severity from angina to transmural myocardial infarction. Patients may present to general practice currently experiencing chest pain or they may report recent symptoms, e.g. from the previous evening. In the majority of cases this is unlikely to be caused by an acute coronary syndrome, however, all patients who present with symptoms consistent with a cardiac cause require immediate investigation and treatment. Additional interventions, e.g. intravenous fibrinolysis, may be appropriate depending on the location of the practice, the availability of medicines and transport time to the nearest Emergency Department.

## Checklist: patient presenting with acute chest pain in primary care

1. Perform an ECG in all patients where the possibility of a cardiac cause of chest pain cannot be reasonably excluded
2. If a ST segment abnormality, particularly ST segment elevation, is detected or ECG is inconclusive but suspicion of a cardiac cause remains, refer to hospital immediately and alert the on-call cardiologist or emergency department consultant
3. While awaiting transfer:
  - Monitor blood pressure, heart rate and oxygen saturation
  - Give sublingual glyceryl trinitrate\* and IV morphine (if required) for pain relief
  - Give 300 mg aspirin
  - Give 300 mg clopidogrel if evidence of ischaemia on ECG or elevated troponin levels (see number 4)
  - Only administer oxygen if the patient is breathless, oxygen saturation is <93%, has heart failure or is in cardiogenic shock
4. A blood sample for measuring troponin levels may be considered if time and clinical circumstances permit
5. If transfer will be delayed for more than two hours and patient has ST segment elevation, initiate tenecteplase,\*\* followed by enoxaparin, if available

\* Sublingual GTN should be used with caution in some patients, e.g. those who are cardiovascularly unstable. See NZF for a full list of cautions and contraindications.

\*\* Tenecteplase is usually only available in rural practices.

## Investigate all patients with suspected cardiac chest pain

If a patient with a history of established cardiovascular disease, e.g. previous angina, presents with chest pain, it is likely that their symptoms have a cardiac origin. However, patient history can also suggest other causes for chest pain, such as gastro-oesophageal reflux disease (GORD) or it may be musculoskeletal in origin.

Symptoms suggestive of an acute coronary syndrome include:<sup>1</sup>

- Chest pain and/or pain in areas such as the upper arms, back or jaw, that lasts longer than 15 minutes
- Chest pain in combination with nausea and vomiting, sweating, breathlessness, and particularly a combination of all these symptoms
- Chest pain in combination with dizziness or feeling light-headed
- New onset chest pain, or a sudden deterioration in previously stable angina, with chest pain episodes lasting longer than 15 minutes, recurring frequently, following little or no exertion

Additional factors that increase the likelihood of a cardiac cause of chest pain are older age, male sex and a high number of predisposing clinical features, e.g. smoking, diabetes, obesity.<sup>2</sup>

Having a practice protocol that all staff can initiate for patients with suspected cardiac chest pain is likely to streamline management (see: "Have a practice protocol that all staff can initiate", opposite).

**A 12-lead ECG should be performed immediately in all patients** with symptoms suggestive of a recent or current acute coronary syndrome.<sup>2</sup> It is recommended that all general practices have ready access to an ECG machine for this purpose. The finding of a ST segment elevation on an ECG in a patient with a suspected acute coronary syndrome suggests occlusion of an epicardial artery.<sup>3</sup> A ST segment elevation acute coronary syndrome is defined as the presence of one of the following on ECG, in combination with the patient's clinical presentation:<sup>2</sup>

- $\geq 1$  mm ST elevation in at least two adjacent limb leads
- $\geq 2$  mm ST elevation in two contiguous precordial leads
- New onset bundle branch block

If a ST segment elevation is detected, the patient should be immediately referred to hospital, as in these patients, urgent fibrinolytic treatment has been associated with a reduction

in mortality.<sup>2</sup> If the patient's ECG is otherwise abnormal, and suspicion remains of a cardiac cause, then assume that the patient has an acute coronary syndrome and refer them to hospital. If the patient has a previous ECG on record, this is likely to be useful when assessing an atypical result.

**The risk of cardiac arrest is increased during or after an acute coronary syndrome** and a defibrillator and emergency resuscitation medicines, e.g. injectable adrenaline, should be close at hand. The patient's blood pressure, heart rate and oxygen saturation levels should be monitored and recorded.

**Additional investigations should not delay referral to secondary care.** Serum troponin testing is useful in primary care:

- When investigating patients presenting 24 – 72 hours after a single episode of chest pain, e.g. the "Monday morning" consultation
- As a follow-up investigation of unexplained chest pain when no ECG changes are present
- To investigate atypical symptoms of a possible acute coronary syndrome

Serum troponin levels may be assayed in a community laboratory or a blood sample sent with a patient who is being admitted urgently to hospital. The diagnostic accuracy of troponin testing has improved in recent years, particularly in the first hours following the onset of chest symptoms. A normal serum troponin level two to three hours after symptom onset means there is a low probability of myocardial infarction, although myocardial infarction cannot be completely excluded

until 9 – 12 hours following symptom onset; negative results may need to be repeated.<sup>4</sup> The criteria for myocardial infarction for high-sensitivity troponin T is  $\geq 15$  ng/L, with a rise and/or fall of  $\geq 50\%$  over three to six hours.<sup>5</sup> Differential causes of an elevated serum troponin include: decreased clearance due to renal dysfunction, atrial or ventricular tachycardia, pulmonary emboli with right ventricular infarction, chronic and severe congestive cardiac failure and myocarditis.<sup>5</sup> Creatine kinase muscle brain (CKMB) testing is no longer recommended for the diagnosis of myocardial infarction.<sup>5</sup>

Patients with slight elevations in serum troponin have rates of mortality at one and six months similar to patients who have experienced a major clinical myocardial infarction.<sup>2</sup> However, the presence of a ST segment elevation on ECG is more strongly predictive of an adverse outcome than an elevation in serum troponin.<sup>2</sup>

Full blood count, creatinine and electrolytes, glucose and lipids may also be useful tests and these can be performed on the same blood sample used to measure serum troponin, if time and clinical circumstance permit.<sup>5</sup>

### Treatment for all patients with acute coronary syndromes

All patients with an acute coronary syndrome require immediate referral to an Emergency Department. **Sublingual glyceryl trinitrate** is often used initially for symptom relief in patients with chest pain due to a cardiac cause. It should, however, be used with caution in some patients, e.g. those who are cardiovascularly unstable and those who have recently

### Have a practice protocol that all staff can initiate

If a patient presents to a general practice during an acute coronary syndrome, it may be a non-clinical member of staff who is their first point of contact. It is therefore important that all staff members are aware of the practice protocol for managing patients with unexplained chest pain, and know how to initiate the protocol.

Staff members should know which room in the practice is the most appropriate to locate patients requiring urgent

attention. Ideally this room will have an examination bed or couch with clear access on all sides and an ECG machine on hand, as well as convenient access for ambulance staff and equipment. All staff should be alerted to the location and status of the patient, who should not be left unattended.



used a PDE5-inhibitor such as sildenafil (see NZF for a full list of cautions and contraindications).<sup>6</sup> Blood pressure should be monitored regularly after glyceryl trinitrate has been used because, depending on the site of the suspected coronary event (e.g. inferior, right ventricular), the reduction in preload can result in the patient becoming rapidly hypotensive and intravenous fluids may be required to maintain adequate cardiac output.

Symptom relief with glyceryl trinitrate lasts less than one hour and usually does not provide sufficient pain relief in patients experiencing an active myocardial infarction. An additional analgesic e.g. morphine (see below), may be required.<sup>2,3</sup>

Patients who have known angina will already be familiar with using glyceryl trinitrate for the relief of anginal pain:<sup>2</sup>

1. One to two sprays of glyceryl trinitrate under the tongue at symptom onset
2. A further two doses (of one to two sprays), at five minute intervals, if necessary
3. If symptoms have not resolved five minutes after taking the third dose, i.e. 15 minutes from onset, an ambulance should be called

**Intravenous (IV) morphine** is effective for severe pain in a patient with an acute coronary syndrome.<sup>1,3</sup> For example, give morphine 5–10 mg IV at 1–2 mg/minute, repeat if necessary; morphine 2.5–5 mg for older or frail patients.<sup>6</sup>

**An IV antiemetic**, e.g. metoclopramide 10 mg or cyclizine 25 mg, is usually administered at the same time as, or immediately prior to, IV morphine.<sup>3</sup>

**Dispersible aspirin** 300 mg, should be given to all patients with an acute coronary syndrome, including those already taking aspirin; if enteric coated aspirin is the only formulation available the patient should chew the tablet.<sup>2</sup> Treatment with aspirin 75–150 mg, daily, is then continued indefinitely in all patients unless there are contraindications.<sup>2,3</sup> The immediate and continued use of aspirin in the weeks following an acute coronary syndrome, compared with placebo, approximately halves the rate of further cardiovascular events (absolute risk reduction 5.3%) in patients with unstable angina and reduces this risk by almost one-third (absolute risk reduction 3.8%) in patients with acute myocardial infarction.<sup>2</sup>

**Clopidogrel** 300 mg (75 mg for patients aged over 75 years) given immediately along with aspirin, 300 mg, is recommended

for patients with an acute coronary syndrome who also have evidence of ischaemia on ECG or elevated serum troponin levels.<sup>2,3</sup> Clopidogrel is then continued at a dose of 75 mg, daily (with aspirin), for these patients.<sup>2</sup> N.B. Clopidogrel may not be routinely available in general practices as it is not able to be obtained under a Practitioner's Supply Order.

**Oxygen treatment should not be routinely administered**  
**DO NOT administer oxygen to patients with an ST elevation acute coronary syndrome unless they:**<sup>3</sup>

- Are breathless
- Are hypoxic, i.e. oxygen saturation < 93%
- Have heart failure
- Are in cardiogenic shock

Despite being recommended for many years, there is no evidence from randomised controlled trials supporting the routine use of oxygen in patients with acute myocardial infarction.<sup>2</sup> In patients with a myocardial infarction and an oxygen saturation > 93%, oxygen treatment may actually increase left ventricular afterload due to arterial vasoconstriction.<sup>3</sup>

A Cochrane review of four trials, including 430 patients, found non-significant evidence that compared to breathing air normally, oxygen administration may be harmful to patients with acute myocardial infarction.<sup>7</sup> The same review concluded that the use of oxygen did not appear to reduce pain because it was not associated with a reduction in analgesia used, although, there was a high risk of bias due to the small sample size.<sup>7</sup>

The Air Versus Oxygen In myocarDial infarction (AVOID) study enrolled approximately 500 patients with an acute ST elevation myocardial infarction within the preceding 12 hours.<sup>8</sup> Results from AVOID have been presented at a conference, but are yet to be published. It is reported that if patients with symptoms of a ST elevation myocardial infarction, who are not hypoxic, are given oxygen for as little as 15 minutes they are at risk of hyperoxia.<sup>9</sup> This can cause a reduction in coronary blood flow ultimately leading to an increase in the size of the cardiac infarct.<sup>9</sup>

A large scale randomised controlled trial is urgently needed to establish whether oxygen treatment is harmful in patients with an acute coronary syndrome.

**Transfer all relevant information with the patient**

General practitioners can improve the treatment that patients with an acute coronary syndrome receive by ensuring that all

**Table 1:** Major and relative contraindications to fibrinolytic treatment in patients with a ST segment elevation acute coronary syndrome.<sup>3</sup>

Major contraindications to fibrinolytic treatment	Relative contraindications to fibrinolytic treatment
<ul style="list-style-type: none"> <li>■ Severe uncontrolled hypertension, i.e. blood pressure &gt; 180/110 mmHg</li> <li>■ Dementia</li> <li>■ Suspected aortic dissection</li> <li>■ Cerebral aneurysm, arteriovenous malformation or intracranial neoplasm</li> <li>■ Major trauma within six weeks</li> <li>■ Head trauma or brain surgery within six months</li> <li>■ Active bleeding or known bleeding disorder</li> <li>■ Traumatic cardiopulmonary resuscitation within three weeks</li> <li>■ Previous haemorrhagic stroke or stroke of unknown origin</li> <li>■ Ischaemic stroke within one year</li> <li>■ Gastrointestinal bleeding with one year</li> <li>■ Other internal bleeding within six weeks</li> <li>■ Non-compressible vascular punctures within 24 hours, e.g. central venous lines, liver biopsy</li> </ul>	<ul style="list-style-type: none"> <li>■ Treatment with warfarin, dabigatran, rivaroxaban or other anticoagulants</li> <li>■ Previous streptokinase treatment</li> <li>■ Transient ischemic attack (TIA) within the last six months</li> <li>■ An increased tendency to bleed</li> <li>■ Severe kidney impairment, i.e. glomerular filtration rate &lt; 30 mL/min</li> <li>■ Advanced liver disease, e.g. bilirubin level elevated or liver enzymes greater than five times normal</li> <li>■ Internal bleeding within the last six months</li> <li>■ Pregnancy or less than one week postpartum</li> <li>■ Lumbar puncture with the last month</li> <li>■ Acute pancreatitis</li> <li>■ Acute peptic ulceration</li> <li>■ Infective endocarditis</li> <li>■ Intracardiac thrombi</li> <li>■ Active cavitating pulmonary tuberculosis</li> </ul>

relevant information from the patient's record is available to staff as soon as they arrive at hospital. If the patient's ECG shows a ST segment elevation, the on-call cardiologist or emergency department consultant should be alerted to prevent delays in accessing the catheterisation laboratory. Include the following information where possible:

- Time of onset of symptoms and duration
- Previous and current ECGs
- Current blood pressure, heart rate and oxygen saturation levels
- A list of any medicines given acutely, including time and dose
- Co-morbidities
- All medicines currently prescribed as well as any over-the-counter products
- Allergies
- Any relevant person details such as an advanced care plan
- Any relevant family history

### If the patient cannot be transported to hospital immediately

If there will be a significant delay, i.e. more than two hours, in transporting patients with an acute coronary syndrome to hospital then it is appropriate to discuss the patient with an emergency medicine consultant or a cardiologist who may suggest additional interventions, if the required medicines are available. Patients presenting in rural areas are most likely to be considered for these additional treatments.

### Fibrinolysis is recommended in patients with myocardial infarction if there is a transportation delay

The benefit of fibrinolysis for patients with a ST elevation myocardial infarction declines significantly with time from symptom onset. New Zealand guidelines recommend that patients with a ST elevation acute coronary syndrome be considered for pre-hospital fibrinolysis if percutaneous coronary intervention cannot be performed within two hours, in the absence of contraindications (Table 1).<sup>3</sup> Fibrinolytic medicines are not routinely available in general practice, however, tenecteplase (TNK-tissue-type plasminogen

activator) may be available in some rural general practices. A recommended treatment regimen is tenecteplase, IV injection, initiated within six hours of symptom onset, 30 – 50 mg over ten seconds according to body weight:<sup>3,10</sup>

- < 60 kg: 30 mg
- 60 – 69 kg: 35 mg
- 70 – 79 kg: 40 mg
- 80 – 89 kg: 45 mg
- ≥ 90 kg: 50 mg

It is recommended that the generic name “tenecteplase” be used whenever this medicine is administered.<sup>6</sup> Serious errors have occurred when fibrinolytic medicines have been mistakenly given at the wrong dose when the shortened abbreviation tPA has been used; this may refer to tenecteplase or alteplase, which have different dosing regimens.<sup>6</sup> Tenecteplase should not be mixed with solutions containing dextrose and any IV lines should be flushed before and after administration of tenecteplase.<sup>10</sup>

Enoxaparin (Clexane) 30 mg, is then given as an IV bolus, after tenecteplase, in patients aged under 75 years.<sup>3</sup> Fifteen minutes after the IV bolus, enoxaparin is given subcutaneously at 1 mg/kg (up to a maximum of 100 mg) every 12 hours, for at least 48 hours (often continued for several days).<sup>3</sup> Patients aged over 75 years are recommended not to receive the IV bolus of enoxaparin, due to the increased risk of bleeding. Instead, patients aged over 75 years are administered enoxaparin subcutaneously (SC), 0.75 mg/kg (up to a maximum of 75 mg) every 12 hours.<sup>3</sup>

### Medicines frequently initiated following admission to a coronary care unit

Most patients treated for an acute coronary syndrome will be offered dual antiplatelet treatment for one year following discharge to reduce current events, after which point aspirin alone is recommended.<sup>3,5</sup> The majority of these patients will

have undergone a coronary stenting procedure and dual antiplatelet treatment also reduces the likelihood of stent thrombosis.

Long-term angiotensin converting enzyme (ACE) inhibitor treatment may be initiated within a few days of admission for an acute coronary syndrome when mortality is highest.<sup>2</sup> An angiotensin II receptor blocker (ARB) is recommended if ACE inhibitors are not tolerated.<sup>5</sup> All patients who are discharged following an acute coronary syndrome complicated by heart failure or pulmonary oedema are likely to be prescribed an ACE inhibitor or ARB, and a beta-blocker and spironolactone.<sup>3</sup> Loop diuretics are also commonly prescribed in this situation.

Beta-blockers, in patients with unstable angina, reduce the likelihood of progression to myocardial infarction by 13%.<sup>2</sup> In patients with ST elevation acute coronary syndromes beta blockade reduces mortality, re-infarction and cardiac arrest.<sup>2</sup> However, the early and aggressive use of beta-blockers in all patients with an ST elevation myocardial infarction is not as widely recommended as it once was.<sup>11</sup> In patients with an acute coronary syndrome, and fast atrial fibrillation or markedly raised blood pressure, beta blockers may be appropriate in an acute setting.

Patients who require anticoagulation to be initiated, e.g. patients who develop atrial fibrillation, may begin treatment with aspirin and clopidogrel or ticagrelor, plus warfarin or dabigatran.<sup>5</sup> However, the patient’s risk of bleeding is relatively high with this treatment combination and ticagrelor or clopidogrel is generally withdrawn at one month and treatment continued with aspirin plus warfarin or dabigatran.

Statin treatment is begun one to five days after the onset of coronary symptoms, which results in an absolute risk reduction of 2.6% in adverse events due to recurrent ischaemia at four months.<sup>2</sup> For example, simvastatin or atorvastatin may be administered within 24 hours of onset of an acute coronary syndrome in patients not already taking a statin.<sup>2,3</sup>



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