Guideline 14.3 – Acute Coronary Syndromes: Reperfusion Strategy

Summary

To whom does this guideline apply?

This guideline applies to adults.

Who is the audience for this guideline?

This guideline is for use by first responders and health professionals.

Summary of Recommendations

The Australian and New Zealand Committee on Resuscitation (ANZCOR) makes the following recommendations:

1. Timely diagnosis of ST-elevation myocardial infarction (STEMI) within 10 minutes of first medical contact using 12-lead electrocardiogram (ECG) is essential [Good Practice Statement].
2. ANZCOR recommends early reperfusion through a defined system of care with either percutaneous coronary intervention (PCI) or fibrinolytic therapy [Good Practice Statement].
3. ANZCOR suggests primary PCI (PPCI) is the preferred strategy and should be performed within 120 minutes of first medical contact [Good Practice Statement].
4. ANZCOR suggests if PPCI cannot be achieved within 120 minutes a strategy of fibrinolysis followed by immediate transfer to a PCI centre is recommended [CoSTR 2015, weak recommendation, very-low-quality evidence].
5. ANZCOR suggests after successful fibrinolysis, routine angiography within 2 to 24 hours is advised [CoSTR 2015, weak recommendation, very-low-quality evidence].
6. ANZCOR recommends immediate angiography and if indicated PCI, for STEMI patients with return of spontaneous circulation (ROSC) after cardiac arrest [CoSTR 2015, strong recommendation, low quality evidence CoSTR 2022 no change].
7. Urgent angiography in non ST-elevation myocardial infarction (NSTEMI) should be considered in patients with refractory chest pain, haemodynamic instability, evidence of hypoperfusion, life-threatening arrhythmia, heart failure, or high-risk ECG changes [Good Practice Statement].

1.0 | Introduction

ST-elevation myocardial infarction (STEMI) usually occurs due to the acute thrombotic occlusion of a major epicardial artery, secondary to the disruption/rupture of an atherosclerotic plaque.[1] Early reperfusion minimises myocardial necrosis and mortality. Restoring coronary blood flow and myocardial reperfusion either by PCI or fibrinolytic therapy has been demonstrated to improve outcomes in patients presenting within 12 hours of symptom onset and is recommended.[2, 3]

The development of clearly defined hospital STEMI networks and non-PCI centre bypass reduces treatment delays and improves times to reperfusion.[11, 12] There is a growing body of observational data suggesting out-of-hospital cardiac arrest (OHCA) patients should be considered for transport to a specialist cardiac arrest centre with primary percutaneous coronary intervention (PPCI) capacity as part of wider regional system of care for the management of patients with OHCA.[13, 14]

2.0 | Reperfusion Strategies

2.1 | Diagnosis of STEMI

The target time for diagnosis of STEMI is within 10 minutes of first medical contact, either in the Emergency Department (ED) or with an ambulance crew obtained 12-lead ECG performed in the pre-hospital environment. After a STEMI is confirmed the patient is sent for PPCI in the cardiac centre, urgently transferred to a cardiac centre for PPCI , or given thrombolysis.

2.2 | Primary Percutaneous Coronary Intervention (PPCI)

PPCI is the preferred reperfusion strategy with the best outcomes demonstrated in a number of large meta-analyses provided it is performed in a timely manner by an experienced team.[1, 15, 16, 17, 18, 19] If delay to treatment is similar the benefit is mostly driven by decreased mortality, reduced rates of recurrent myocardial infarction and of intracranial haemorrhage (ICH) in the PPCI treated patients compared to those receiving fibrinolysis. PPCI should be undertaken within 120 minutes of first medical contact, and if this time frame is not achievable at the receiving centre, or by transfer to an appropriate PCI centre then suitable patients should receive thrombolysis.

2.2 | Primary PCI Strategy

Patient delays to first medical contact occur and PPCI will be effective up to 12 hours from symptom onset. PPCI may also be appropriate beyond 12 hours from symptom onset in the presence of hemodynamic instability, arrhythmias, or ongoing symptoms of ischaemia.[1]

To achieve the 120 minute reperfusion goal, target times from first medical contact to reperfusion (in PPCI defined as wire crossing the lesion/occlusion) is < 90 minutes for patients diagnosed elsewhere and then transported by ambulance to a PCI centre. A goal of < 60 minutes is set for patients presenting directly to a PCI centre.[1]

Access to PPCI may be limited in large parts of Australia and New Zealand and there are several strategies that can be undertaken to reduce the time delay to PPCI. These include developing hospital STEMI networks with clear reperfusion management pathways; pre-hospital 12-lead ECGs to facilitate earlier diagnosis; advanced notification of the results of the 12-lead ECG at the receiving institute for rapid reperfusion on arrival of the STEMI patient; availability of pre-hospital fibrinolysis; the bypassing of non-PCI centres when appropriate (if PPCI available within 120 minutes); and the bypassing of the emergency department in PCI centres.[4, 5, 6, 7, 8, 9, 10] In a fully integrated STEMI system of care, all patients diagnosed with STEMI in the pre hospital system should be transported to PPCI capable centre [CoSTR 2015, weak recommendation, low-quality evidence]. ANZCOR suggests a strategy of fibrinolysis followed by immediate transfer to a PCI centre if PPCI cannot be achieved within 120 minutes [CoSTR 2015, weak recommendation, moderate certainty evidence]. If fibrinolysis is successful a pharmaco-invasive strategy (defined as angiography within 2 to 24 hours after fibrinolysis) is preferred.

2.3 | Percutaneous Coronary Intervention (PCI) in cardiac arrest patients with Return of Spontaneous Circulation (ROSC)

ANZCOR recommends performing immediate angiography and if necessary, PCI, in patients with ST-elevation or STEMI equivalent changes (Refer to ANZCOR Guideline 14.1) on the standard 12-lead ECG who respond to cardio-pulmonary resuscitation with ROSC [CoSTR 2015, strong recommendation, low quality evidence. CoSTR 2022 no additional randomised data]. Post arrest coma is common and should not be a contraindication to angiography and PCI. Evolving evidence has demonstrated a role for extracorporeal membrane oxygenation (ECMO) to facilitate revascularisation among patients without ROSC.[1] In patients without ST elevation on ECG following cardiac arrest, and no features of shock or requirement of inotropic support for haemodynamic instability, recent randomized trials have demonstrated no benefit with early angiography[20, 21] Therefore, these patients can be managed medically initially, with non-urgent angiography as indicated, later during the admission once stabilised. An early or a delayed approach to angiography is reasonable [CoSTR 2022, weak recommendation, low-certainty evidence]. Several complex clinical factors may influence the decision to proceed to angiography and intervention. These include patient age, the presenting rhythm, whether the arrest was witnessed, the requirement for haemodynamic support and the known presence of

co-morbidities such diabetes mellitus, renal failure, and chronic heart failure. In inpatients with evidence of shock or need for inotropic support post cardiac arrest we support urgent PCI. Decisions around optimal timing of PCI need to be made around other evidence-based strategies in post arrest care, e.g. temperature control (Refer to ANZCOR Guideline 11.8).

2.4 | Fibrinolytic Therapy

- Fibrinolytic therapy is indicated among patients with STEMI, (including posterior) or clear new Left Bundle Branch Block. If PPCI is not available within 120 minutes of first medical contact then fibrinolysis should be considered, this can be administered up to 12 hours from symptom onset. Tenecteplase is the most widely used fibrinolytic in STEMI.

Early administration is paramount as clinical benefits lessen with increasing time from symptom onset.[1, 22] Target time for administration in emergency medical services (EMS) systems of care should include the potential for prehospital thrombolysis, which has been shown to decrease mortality by 17% in meta-analysis., compared to delay and in hospital administration.[23, 24, 25]

In complex uncertain cases, including issues around delayed presentation, discussion with local cardiac experts on optimal management may include deferral of thrombolysis and transfer to cardiac centre for PCI.

There are several contraindications to fibrinolysis that healthcare practitioners need to be aware of:

2.4.1 Absolute contraindications

- Haemorrhagic stroke or stroke of unknown origin at any time
- Ischaemic stroke in the preceding 6 months
- Central nervous system damage, neoplasms, or arteriovenous malformation
- Recent major trauma/surgery/head injury (within the preceding month)
- Gastro-intestinal bleeding within the last month
- Known bleeding disorder (excluding menses)
- Aortic dissection
- Non-compressible punctures within the past 24 hours (e.g. lumbar puncture, liver biopsy).

2.4.2 Relative contraindications

- Transient ischaemic attack in preceding 6 months
- Oral anticoagulant therapy
- Pregnancy or within 1-week post-partum
- Prolonged or Traumatic resuscitation
- Refractory hypertension (systolic blood pressure >180mmHg and/or diastolic blood pressure >110mmHg)
- Advanced liver disease
- Infective endocarditis
- Active peptic ulcer.

2.5 | Transfer post thrombolysis (Pharmaco-invasive strategies)

2.5.1 Rescue PCI

Urgent angiography and rescue PCI is indicated if fibrinolysis is unsuccessful (defined as persistent ST-segment elevation > 50% at 60 to 90 minutes) or if there are worsening symptoms or hemodynamic or electrical instability.[26] Re-administration of fibrinolysis is not effective and therefore not recommended.[26]

2.5.2 Routine early angiography strategy after successful thrombolysis

Patients with successful fibrinolysis who are not treated at a PCI capable centre should be routinely transferred for angiography and PCI performed within 2 to 24 hours after fibrinolysis. Multiple studies including meta-analyses have demonstrated early angiography within 24 hours reduces recurrent ischemia and reinfarction [CoSTR 2015, weak recommendation, very-low-quality evidence].[27]

2.6 | Cardiac Arrest/Shock Centres

A cardiac arrest/shock centre is a hospital that has the facilities to provide a comprehensive package of post resuscitation care including PCI and targeted temperature management in the intensive care unit (ICU). There is evidence from observational studies that such centres have better initial survival and better neurologically intact survival.[13] The evidence supporting triaging to such centres is however weak with an absence of randomised studies supporting such a strategy.[14] It is reasonable for each local network to consider transporting patients with OHCA or cardiogenic shock directly to a more specialised cardiac arrest/shock centre (Refer to ANZCOR Guideline 11.7).

2.7 | PCI in NSTEMI

In patients with non-ST elevation myocardial infarction (NSTEMI), an early invasive strategy (<24h) of coronary angiography and PCI is recommended in patients with high-risk features (including a confirmed diagnosis of NSTEMI, dynamic ST-T segment changes suggestive of ischemia, transient ST elevation, or GRACE score >140).[28]

Urgent angiography should be considered among patients with refractory chest pain despite medications; haemodynamic instability or evidence of hypoperfusion; life-threatening arrhythmia; heart failure clearly due to NSTEMI; or in patients with high-risk ECG changes.[28]

Abbreviations

Abbreviation	**Meaning/Phrase**
ACS	Acute coronary syndrome
ANZCOR	Australian and New Zealand Committee on Resuscitation
ARC	Australian Resuscitation Council
CoSTR	Consensus on Science with Treatment Recommendations
ECG	Electrocardiograph
ECMO	Extracorporeal membrane oxygenation
ED	Emergency department
EMS	Emergency medical services
ICH	Intracranial haemorrhage
ICU	Intensive care unit
NSTEMI	Non-ST elevation myocardial infarction
OHCA	Out of hospital cardiac arrest
PCI	Percutaneous coronary intervention

PPCI	Primary percutaneous coronary intervention
ROSC	Return of spontaneous circulation
STEMI	ST elevation myocardial infarction

About this Guideline

Search date/s	This review was completed in October 2023
Questions/PICOs:	This guideline has been developed from the previous ANZCOR guideline 2016 and questions included in the ILCOR 2015 and 2022 CoSTR
Method:	Literature review of the most recent acute coronary syndrome and related guidelines from the Australian Heart Foundation / Cardiac Society of Australia and NZ (2016), the European Society of Cardiology (2020) in addition to related ILCOR reviews to produce a locally relevant document.
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Other consultation:	N/A
Worksheet:	N/A
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Guideline superseded:	Guidelines 14.0, 14.1, 14.1.2, 14.2, 14.3

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