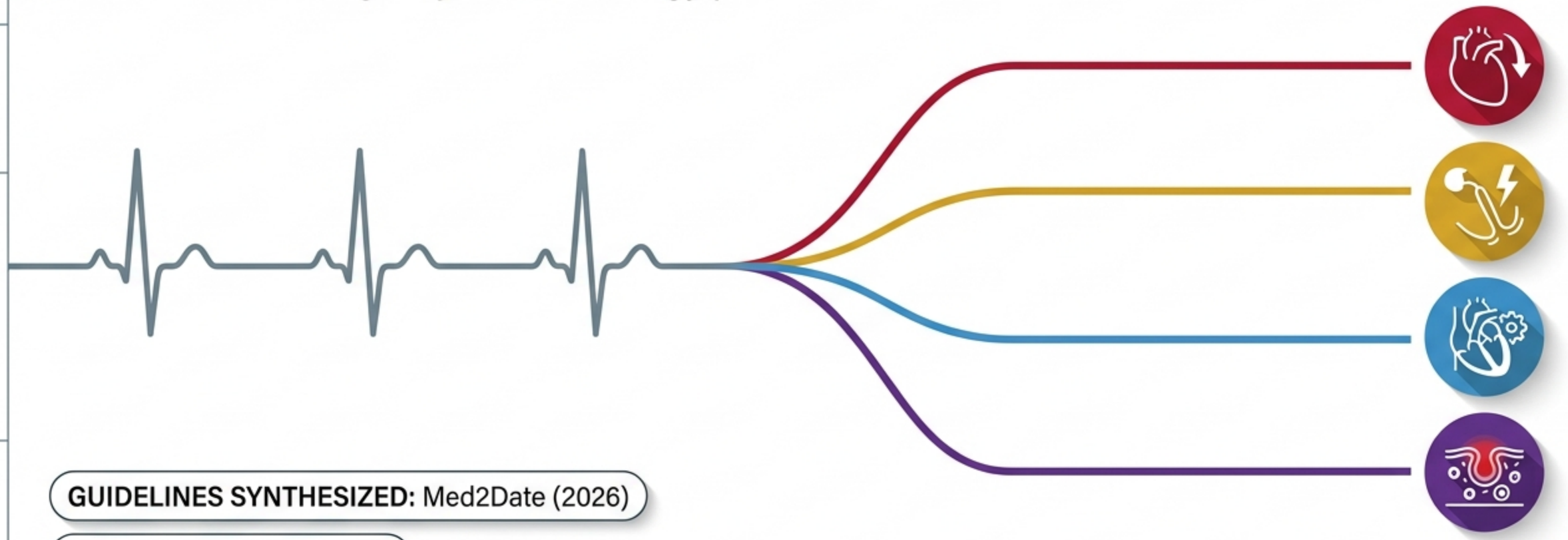
POST-MI COMPLICATIONS: THE CLINICAL PLAYBOOK

A systems-based diagnostic and management framework for Australian emergency and cardiology practice



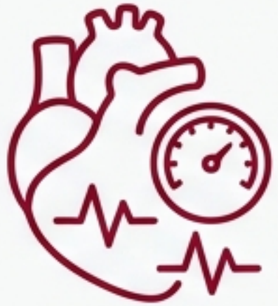
GUIDELINES SYNTHESIZED: Med2Date (2026)

EVIDENCE: ACS, ESC, AHA

The Australian Context

~57,000 ACS hospitalizations annually. 30% are STEMI.

In-hospital mortality is 5–7%, but spikes to 40–50% if cardiogenic shock develops.



Quadrant 1: The Pump (Haemodynamic)

Cardiogenic shock & mechanical failure.

Quadrant 2: The Wiring (Electrical)

Ventricular arrhythmias & conduction blocks.

Quadrant 3: The Structure (Mechanical)

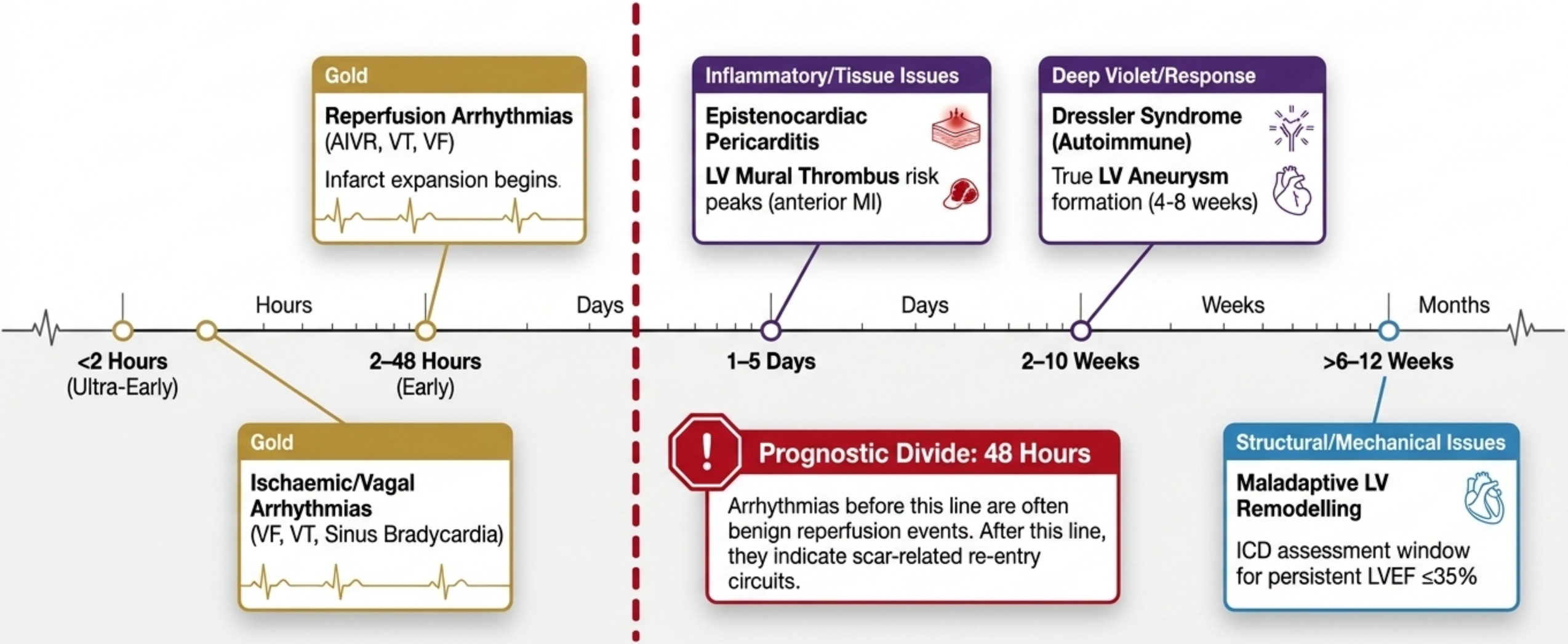
LV remodelling, aneurysms, mural thrombi.

Quadrant 4: The Tissue (Inflammatory)

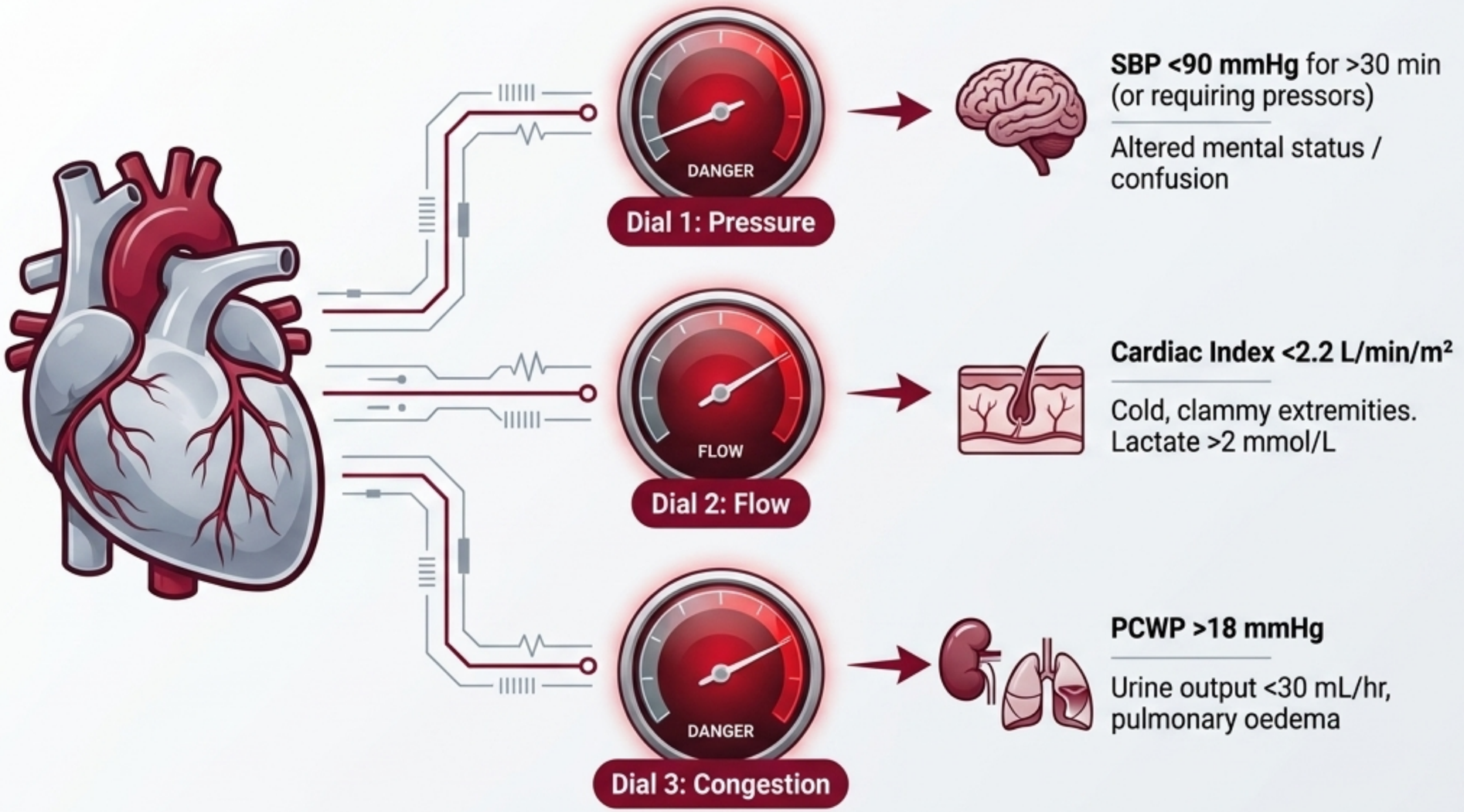
Epistenocardiac pericarditis & Dressler syndrome.

Time-Critical Red Flag: New systolic murmur + haemodynamic drop + recurrent chest pain = suspect mechanical rupture. Mandates emergent echo and cardiothoracic transfer.

Post-MI Complication Timeline



Cardiogenic Shock: The Haemodynamic Equation



SBP <90 mmHg for >30 min (or requiring pressors)

Altered mental status / confusion

Cardiac Index <2.2 L/min/m²

Cold, clammy extremities. Lactate >2 mmol/L

PCWP >18 mmHg

Urine output <30 mL/hr, pulmonary oedema

SCAI Shock Stages

A (At Risk)
↓
B (Beginning)
↓
C (Classic)
↓
D (Deteriorating)
↓
E (Extremis)

Rule: Escalation from **C** to **D** mandates immediate consideration of **Mechanical Circulatory Support.**

The 4-Step Shock Resuscitation Algorithm

Step 1: Recognise & Resuscitate

Identify SCAI stage. Secure airway if GCS drops. Obtain arterial access. Commence **Noradrenaline ± Dobutamine**.

Step 2: Emergent Echo & PCI

Bedside TTE to exclude mechanical complications (VSD, papillary rupture). **Activate Cath Lab.**

SHOCK trial shows 6-month mortality benefit (50.3% vs 63.1%) with early revascularisation.

Step 3: Escalate MCS

Refractory despite dual vasoactives? Insert IABP or Impella.
Progressive deterioration? Contact ECMO retrieval service.

Step 4: Multi-Disciplinary Review

Define goals of care. Involve Heart Failure, Cardiothoracics, and ICU.
Assess transplant candidacy.

The Vasoactive Arsenal Matrix

Noradrenaline (Levophed®)

Role: First-line vasopressor

Dose: 0.1–0.5 mcg/kg/min IV

Indication: SBP <90. Preferred over adrenaline (SOAP II data).

PBS: General

Dobutamine (Dobutrex®)

Role: First-line inotrope

Dose: 2.5–20 mcg/kg/min IV

Indication: Low output, adequate BP (≥90). Can combine with Norad.

PBS: General

Adrenaline (Epinephrine)

Role: Second-line rescue

Dose: 0.01–0.5 mcg/kg/min IV

Caution: Increases myocardial O2 demand, lactate, and tachyarrhythmias.

PBS: General

Milrinone (Primacor®)

Role: Inodilator (PDE-III)

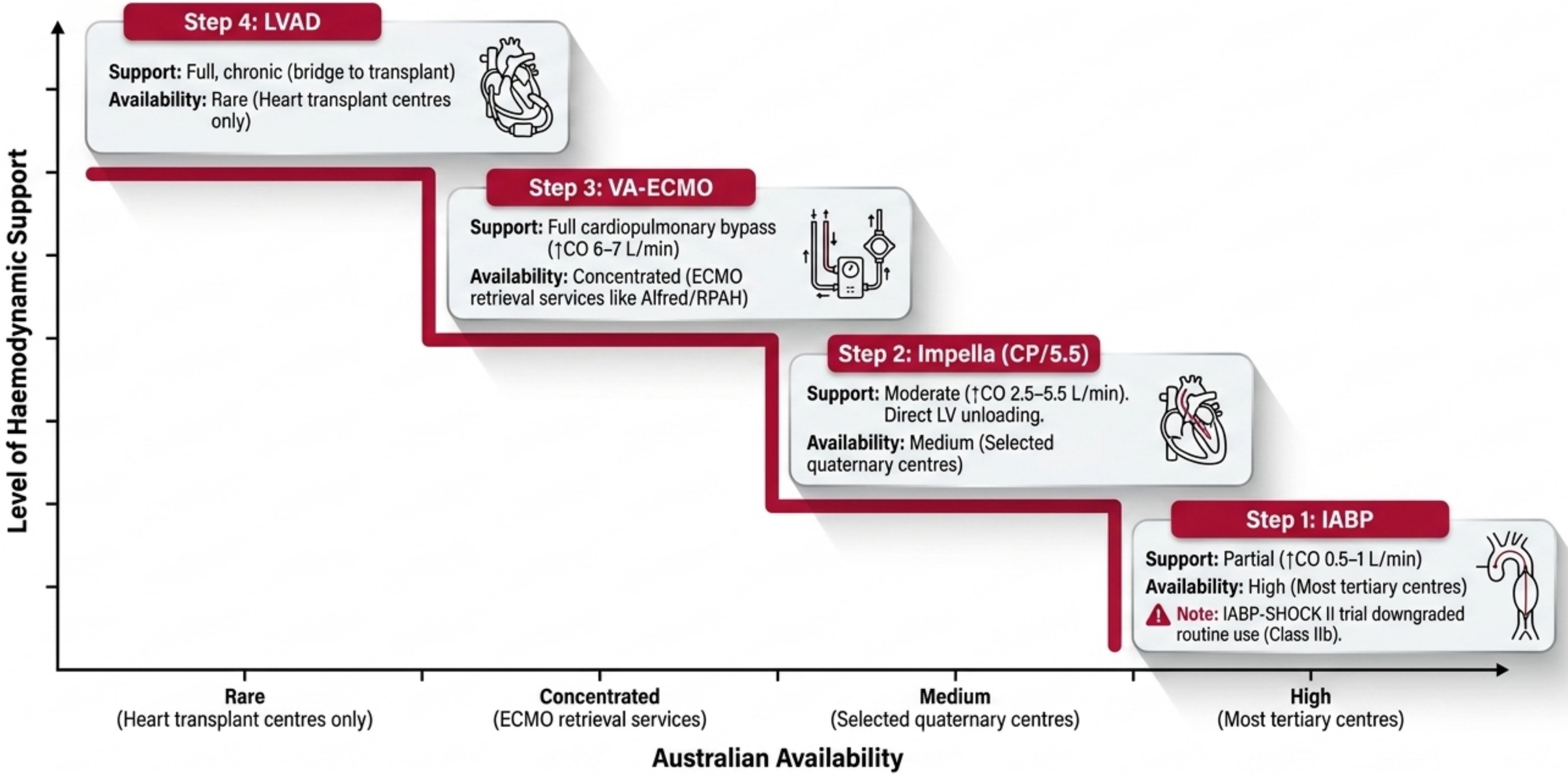
Dose: 0.125–0.75 mcg/kg/min IV

Caution: Causes hypotension.

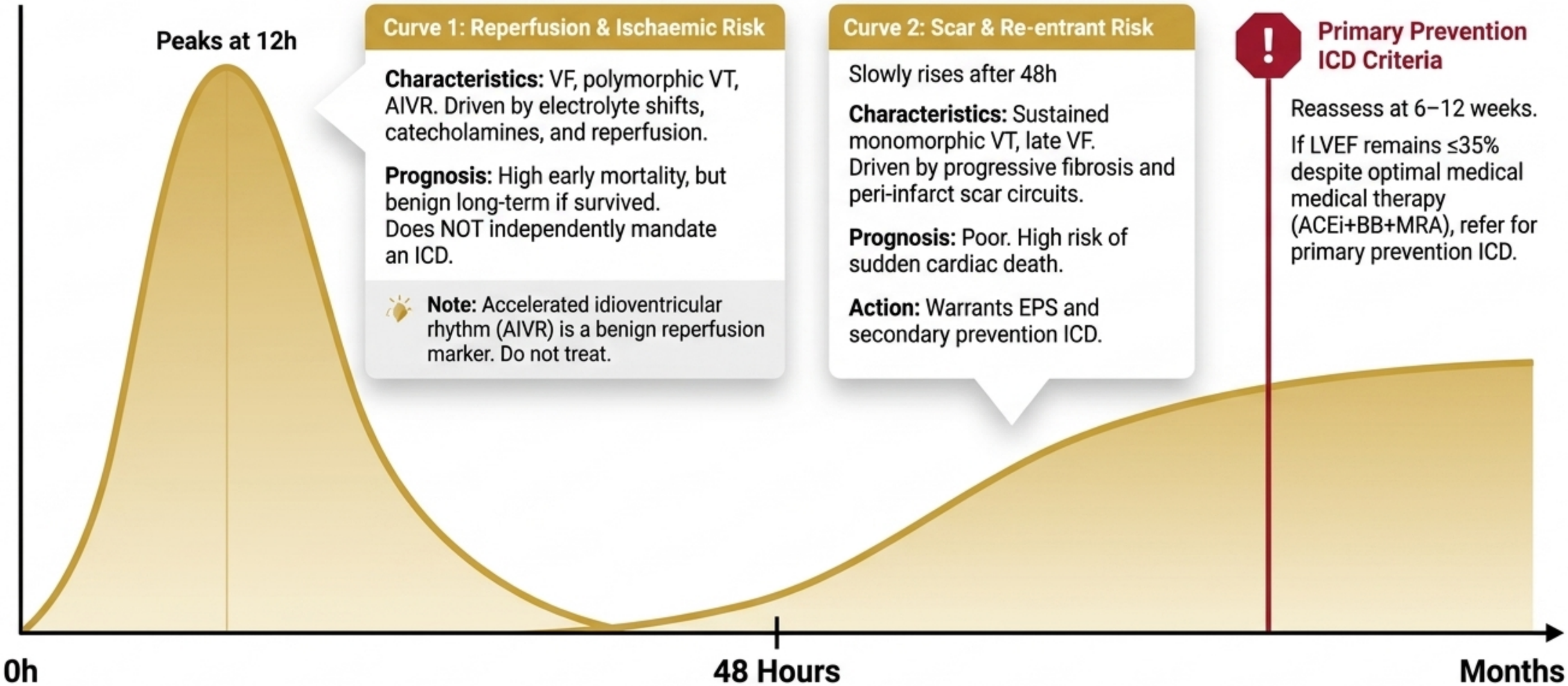
Renal Adjust: Reduce 50% if eGFR <30.

PBS: ❗ Authority Required

The Mechanical Circulatory Support (MCS) Ladder



Ventricular Arrhythmias: The Bimodal Risk Curves



Arrhythmia Resuscitation Protocols

Pulseless Arrest (VF / Pulseless VT)

- **Early Defibrillation** (biphasic 150-200J).
- **Adrenaline** 1 mg IV every 3-5 mins.
- **Amiodarone** 300 mg IV bolus (repeat 150 mg).
- **Correct reversible causes:** K^+ >4.0, $MgSO_4$ 2g IV.

Stable Monomorphic VT

Amiodarone (Cordarone X®)

- Role: **First-line**
- Dose: 150 mg IV over 10 min, then 1 mg/min (6h), 0.5 mg/min (18h).
- Monitor QTc. ✓ No renal adjustment.

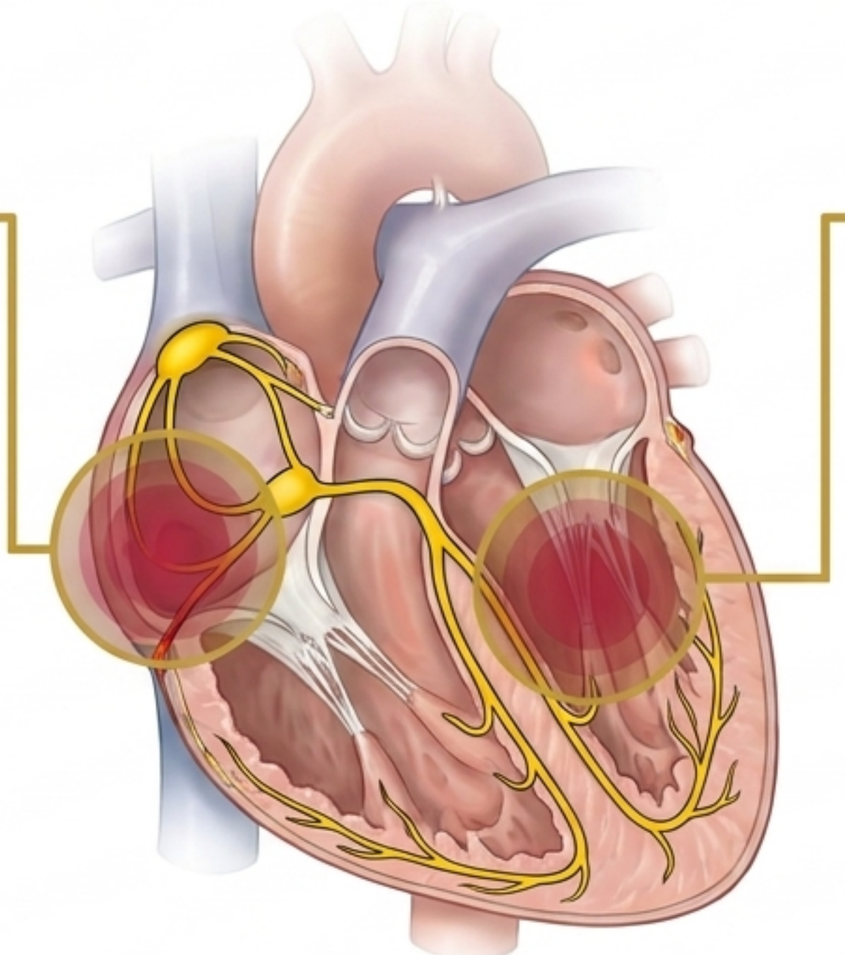
Lidocaine

- Role: **Second-line** (ischaemia-related)
- Dose: 1–1.5 mg/kg IV bolus, then 1-4 mg/min.
- Caution: Reduce infusion if eGFR <30 (seizure risk).

Conduction Disturbances: Anatomical Mapping

Zone 1: Inferior MI
(Right Coronary Artery territory)

- **Highlights:** The AV Node.
- **Mechanism:** Reversible ischaemia or vagal tone.
- **Result:** 1st-degree, Wenckebach, or narrow-QRS Complete Heart Block. Usually transient.
- **Pharmacology:** Atropine (500 mcg IV) is effective here.



Zone 2: Anterior MI
(Left Anterior Descending territory)

- **Highlights:** The Bundle of His and Purkinje fibres (deep septal tissue).
- **Mechanism:** Extensive, irreversible septal necrosis.
- **Result:** Mobitz II, wide-QRS Complete Heart Block, new RBBB. Ominous sign.
- **Pharmacology:** Atropine is **INEFFECTIVE** for infranodal block.

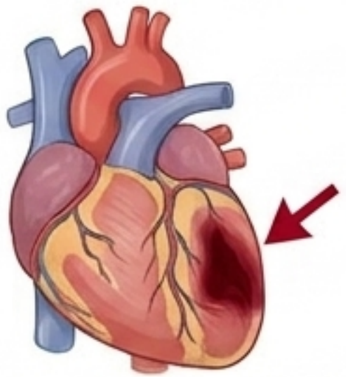
The Pacing Prognosis Table

Conduction Disturbance	Clinical Significance & Pacing Action
1st-degree AV block	**Benign (monitor).**
2nd-degree Type I (Inferior/AV Node)	**Transient, benign.** Standby transcutaneous pacing if symptomatic HR <50.
2nd-degree Type II (Anterior/His-Purkinje)	**Ominous.** Prophylactic Temporary Transvenous Pacing indicated.
Complete Heart Block (Inferior)	**Transient** (1-2 weeks). Temporary pacing if HR <40, compromised, or >3 sec pauses.
Complete Heart Block (Anterior)	**High mortality**. Immediate Temporary Transvenous Pacing; Permanent Pacemaker likely required.

Technical Callout: **Transcutaneous** = non-invasive, requires sedation (Fentanyl + Midazolam).
Transvenous = fluoroscopic/echo guidance, via RIJ/Subclavian.

Left Ventricular Remodelling: The Vicious Cycle

1. Transmural Infarct



Localized necrosis

2. Infarct Expansion Hypertrophy

Thinning/stretching in first 72h

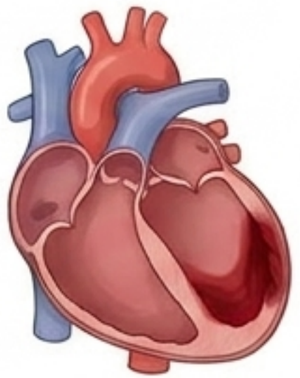
Pharmacological Shields

- ACEi, Beta-Blockers, MRAs

3. Eccentric Hypertrophy

Healthy tissue compensates

4. Ventricular Dilation



Spherical geometry increases wall stress via Laplace Law.

5. Neurohormonal Activation

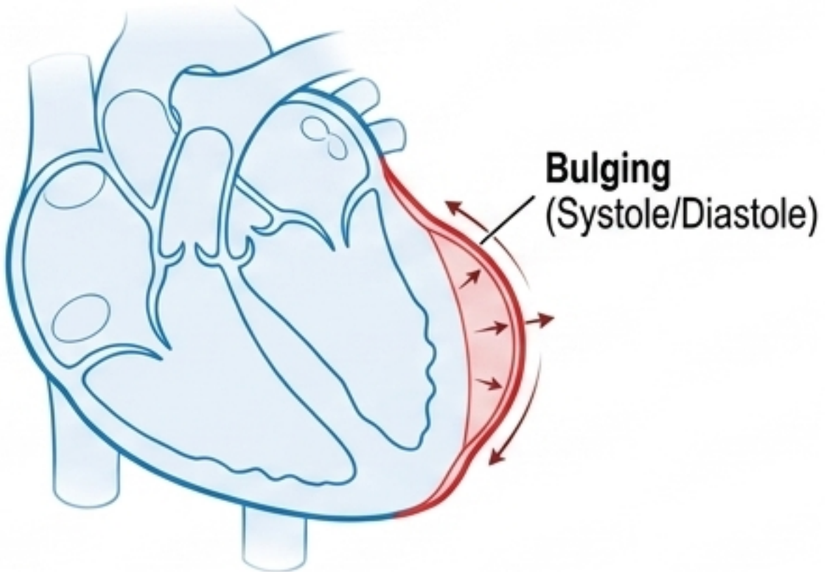
RAAS/Sympathetic surge

Pharmacological Shields (Anti-Remodelling Therapy)

ACE ACE INHIBITORS	BETA- BETA-BLOCKERS	MRAs	ARNI	SGLT2i
Perindopril (8mg) or Ramipril (10mg)	Carvedilol (target 25-50mg BD)	Eplerenone (target 50mg/day)	Sacubitril/Valsartan	Dapagliflozin (10mg/day)
Evidence Start within 24-72 hrs (SAVE/AIRE trials, 20-25% mortality reduction).	**Evidence** Evidence Reduces recurrent MI/mortality (CAPRICORN trial).	**Evidence** Indicated if LVEF ≤40% + HF/Diabetes (EPHESUS trial). Contraindicated if eGFR <30.	**Evidence** Switch from ACEi (**36h washout**) if HFrEF develops (PARADIGM-HF trial).	**Evidence** If LVEF ≤40% (DAPA-HF trial). Initiate if eGFR ≥20.

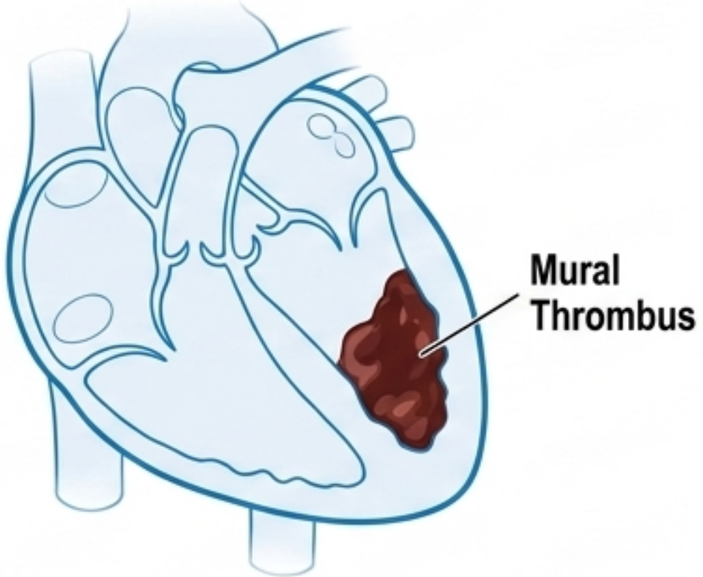
Mechanical Sequelae: Aneurysm & Thrombus

True LV Aneurysm



- **Pathology:** Localized thinning/bulging during systole/diastole.
- **Timing:** 4-8 weeks post-large anterior STEMI (5-10% incidence).
- **ECG Clue:** Persistent ST elevation in anterior leads >2 weeks post-MI.
- **Risk:** Heart failure, scar VT.

LV Mural Thrombus



- **Pathology:** Clot formation on apical akinesis.
- **Incidence:** 5-15% of anterior STEMI. Echo screening mandated at 3-5 days.
- **Management:** Warfarin (INR 2.0-3.0) for 3-6 months.
  DOACs emerging but not standard.

Triple Therapy Alert

Stent + Thrombus = Aspirin + Clopidogrel + Warfarin (1-3 months), then dual, then Warfarin alone. High bleed risk: PPI co-prescribe.

The Post-MI Chest Pain Diagnostic Matrix

Feature	Epistenocardiac Pericarditis	Dressler Syndrome	Recurrent Ischaemia
Timing	1-5 days	2-10 weeks	Any time
Pain	Sharp, pleuritic, worse supine	Pleuritic	Crushing, retrosternal
ECG	Diffuse concave ST elevation, PR depression	Diffuse ST elevation	Territorial ST elevation, reciprocal changes
Echo	Small effusion	Moderate/large effusion, tamponade possible	New wall motion abnormality
Path/Labs	CRP Elevated	Autoimmune	Troponin new rise/fall pattern

Clinical Rule: When in doubt, treat as recurrent ischaemia and activate Cath Lab.

Inflammatory Management & Clinical Pitfalls

The "Do Use" Protocol

High-Dose Aspirin

- 650–1000 mg TDS for 1-2 weeks, taper over 2-4 weeks.
- Preferred because it does not impair scar healing.
- Co-prescribe PPI.

Colchicine

- 0.5 mg BD for 3 months (COPE trial).
- Halves recurrence risk.
- Adjust if eGFR <30.

DO NOT USE

NSAIDs (Ibuprofen, Naproxen)
Impairs myocardial scar formation, increases risk of early free-wall rupture.

Corticosteroids
Impairs healing, increases aneurysm risk. Last resort only.

Anticoagulants
High risk of haemopericardium/tamponade if prescribed concurrently.

Adapting Care for Special Populations

Pregnancy

- ACEi/ARB/ARNI are teratogenic (use hydralazine + nitrates).
- Warfarin is teratogenic (use LMWH).
- Amiodarone is contraindicated (foetal thyroid toxicity).

The Elderly (≥75)

- Higher baseline conduction disease = lower pacing threshold.
- Triple therapy bleed risk extreme (prefer 1-month triple).

Renal Impairment

- Eplerenone contraindicated if eGFR <30.
- Milrinone & Colchicine doses halved.
- Dabigatran avoided (use Apixaban).

Hepatic Impairment

- Amiodarone hepatotoxic (avoid in Child-Pugh C).
- Warfarin sensitivity increased (impaired clotting factor synthesis).

Closing the Gap: Aboriginal & Torres Strait Islander Health

Retrieval Logistics

Remoteness (MM 5-7) dictates early RFDS activation for Shock/MCS.

Diagnostic Masking

High rates of RHD overlap—valvular disease may mimic/mask MI complications on Echo.

The Burden:
AMI rates are 1.7x higher, occurring ~10 years younger, with higher CS/mechanical complication rates.

PBS Access

Ensure ‘Closing the Gap’ PBS co-payment status is documented for affordable secondary prevention meds.

Cultural Safety

Involve Aboriginal Health Workers / Liaison Officers.
Adjust rehab via ACCHOs (yarning circles, telehealth).

The Clinical Dashboard: **Escalation Triggers**

Pump (Red): Escalate from SCAI C to D?	**Action: Immediate Impella / ECMO** retrieval call.
Electrical (Yellow): VF/VT occurring >48 hours?	**Action: Electrophysiology consult for ICD.**
Electrical (Yellow): Anterior MI + new RBBB or Complete Heart Block?	**Action: Immediate Transvenous Pacing** (Atropine will fail).
Structure (Blue): New systolic murmur + haemodynamic drop?	**Action: Emergent Echo for VSD/Papillary rupture, prep for cardiothoracics.**
Tissue (Purple): Pleuritic pain at day 3?	**Action: Prescribe High-dose ASA + Colchicine. STOP NSAIDs/Steroids.**