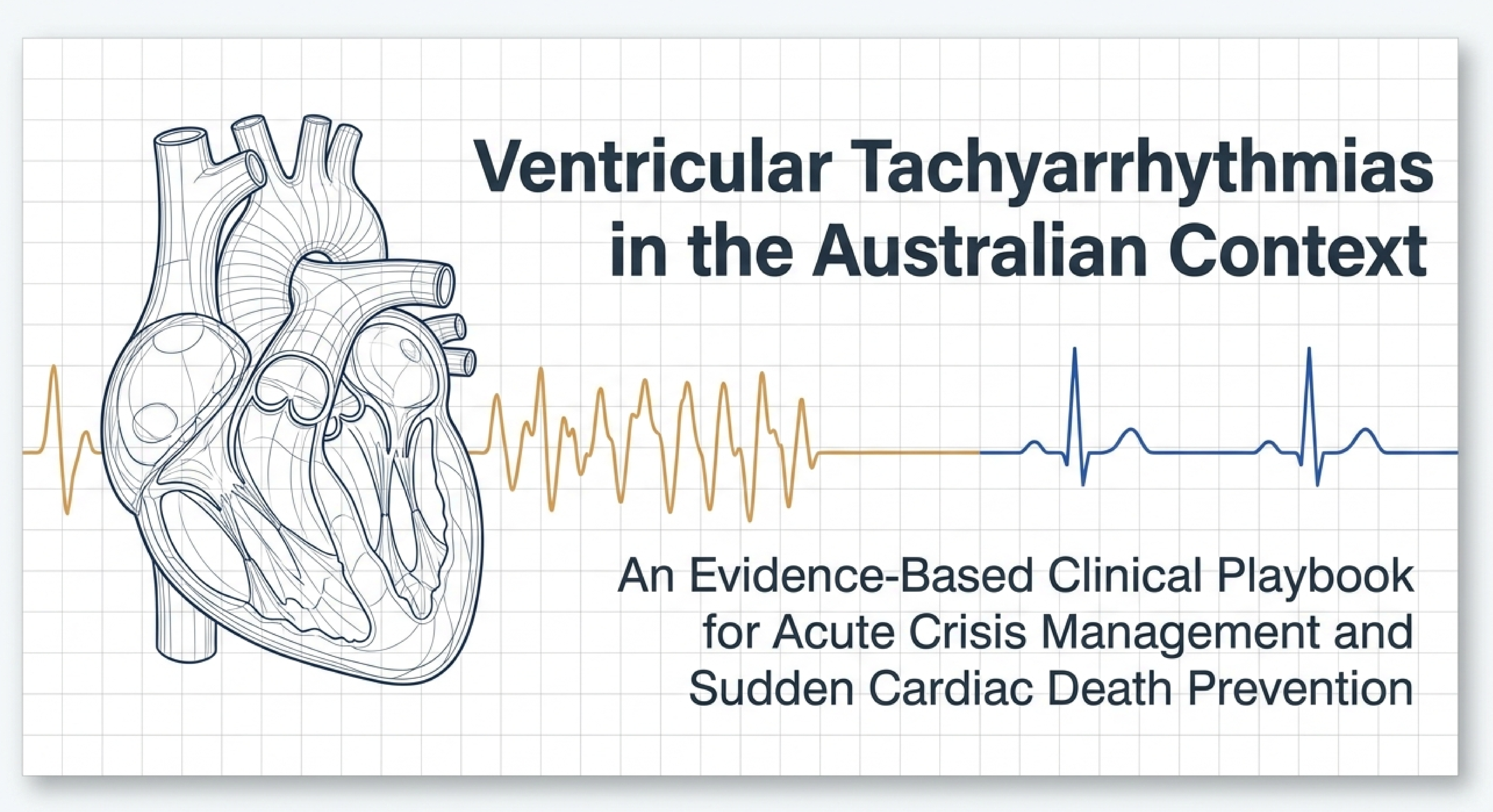

Ventricular Tachyarrhythmias in the Australian Context
An Evidence-Based Clinical Playbook for Acute Crisis Management and Sudden Cardiac Death Prevention

The National Burden of Sudden Cardiac Death Demands Immediate System Responses

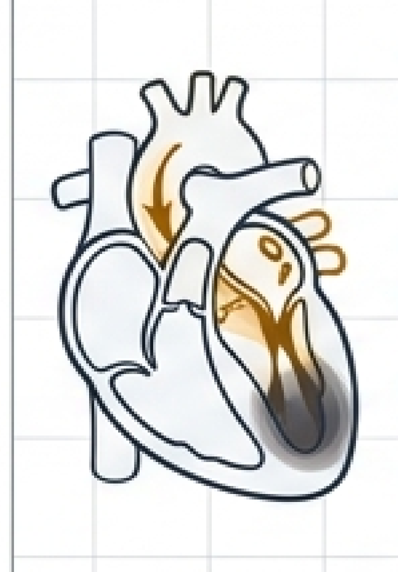
The Mortality Toll

20,000–30,000

Annual Sudden Cardiac Deaths in Australia.

Cardiovascular disease accounts for **25%** of all national deaths (AIHW).

The Substrate

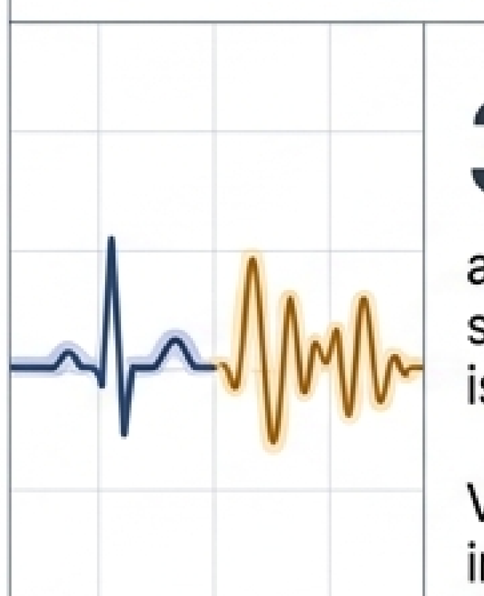


60–70%

of VT/VF events occur in patients with prior myocardial infarction or ischaemic cardiomyopathy.

Ischaemia is the undisputed primary enemy.

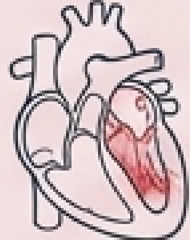
Out-of-Hospital Cardiac Arrest (OHCA)



30,000

annual OHCAs. Overall survival-to-discharge is only **10–12%**.

VF/pulseless VT occurs in **20–25%** of cases (Aus-ROC registry).



Aboriginal and Torres Strait Islander peoples experience sudden cardiac death at **2–3 times the rate** of non-Indigenous Australians, driven by rheumatic heart disease and remote geographic delays.

Identifying and Triaging Sustained Monomorphic Ventricular Tachycardia

Sustained Monomorphic VT (SMVT):
Uniform QRS lasting ≥30s or causing haemodynamic compromise.

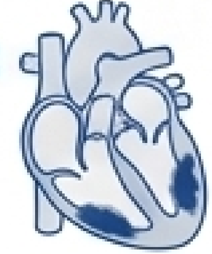
Unstable
Systolic BP <90 mmHg, altered consciousness, acute pulmonary oedema

ACTION:
Immediate synchronised cardioversion. Do not delay for pharmacology.

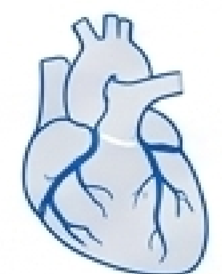
Stable
Systematic structural assessment required.

TTE (Echo):
Assess LVEF, wall motion, valves (Nationwide availability).

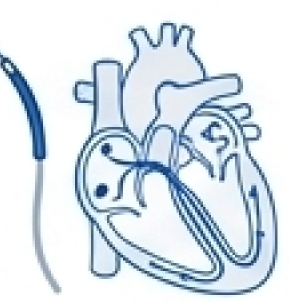
CMR (MRI with LGE):
Localise myocardial scar/fibrosis.



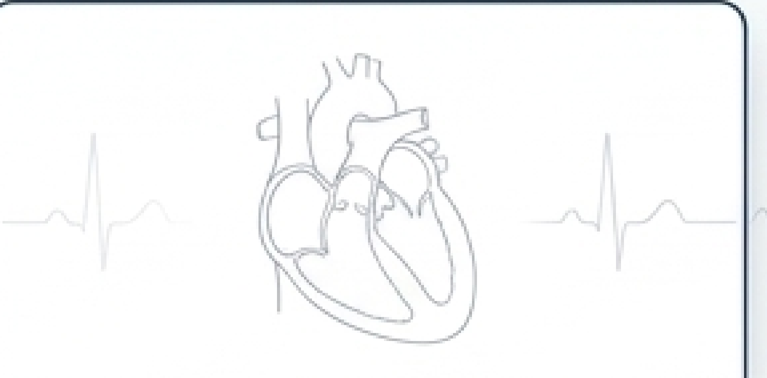
Angiography (CT or Invasive):
Exclude ischaemic aetiology.



EP Study:
Map circuits and identify ablation targets.



The Pharmacological Dashboard for Ventricular Arrhythmia Management



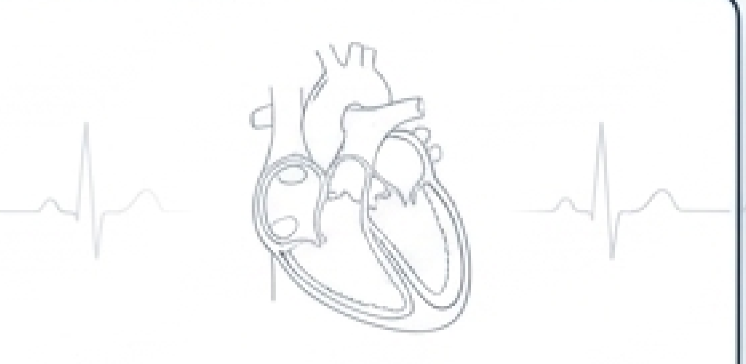
Amiodarone (Class III)

Loading: 300 mg IV over 20–30 min, then 900 mg/24h.

Maintenance: PO titrating to 200 mg daily.

Toxicity: TFTs, LFTs, PFTs, slit-lamp exam.

Status: PBS General Benefit.



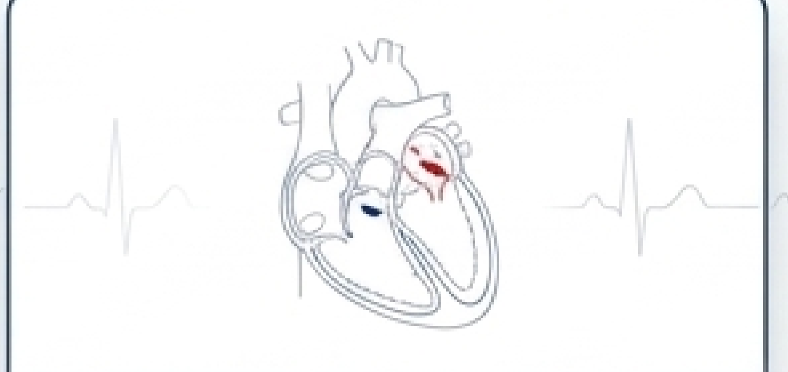
Sotalol (Class III)

Dose: 80–160 mg PO BD.

Caution: Contraindicated if QTc >500 ms. Initiate in hospital.

Renal: Extend interval if eGFR 30–60.

Status: PBS General Benefit.

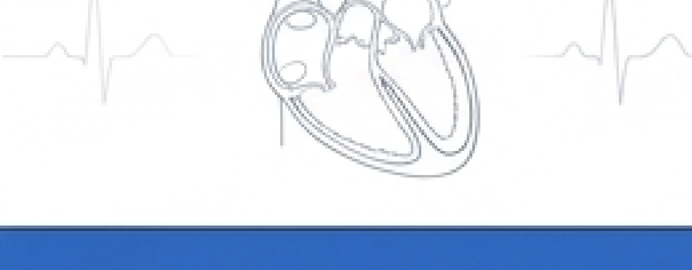


Flecainide (Class IC)

Dose: 50–200 mg PO BD.

CRITICAL WARNING: Contraindicated in structural heart disease (increased mortality per CAST trial).

Status: PBS General Benefit.



Mexiletine (Class IB)

Dose: 200 mg PO TDS.

Use: Adjunctive therapy for refractory VT or channelopathies.

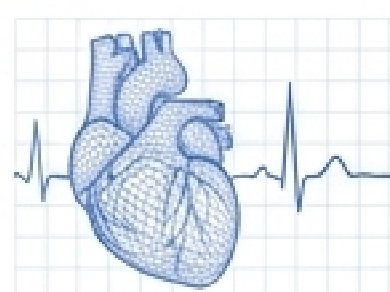
Status: Not PBS-listed (Requires TGA Special Access Scheme).

The Polymorphic VT Bifurcation Requires Immediate QT Interval Assessment

Assess Bazett QTc

Normal QT

QTc <440ms (M) / <460ms (F)



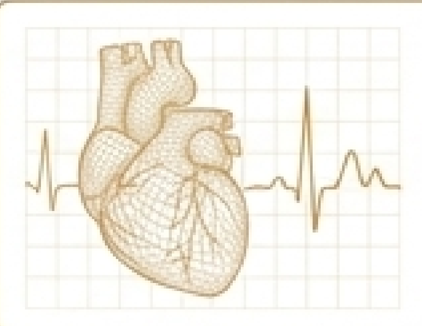
Mechanism: Primarily acute myocardial ischaemia.

Action:

- Anti-ischaemic therapy
- Emergency coronary angiography
- Beta-blockers
- Amiodarone or lidocaine (1–1.5 mg/kg IV)

Prolonged QT

QTc ≥500ms



Mechanism: Torsades de Pointes (TdP). High Risk.

Action:

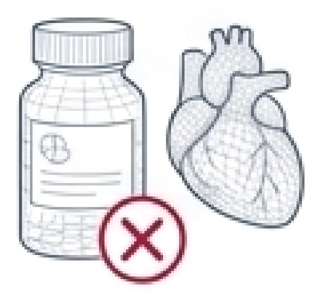
- Cease all offending drugs immediately (check CredibleMeds database for macrolides, psychotropics, antiemetics).
- Correct K+ (>4.5) and Mg2+ (>1.0).
- Continuous telemetry mandatory.

Reversing Torsades de Pointes Demands Rapid Membrane Stabilisation

The TdP Twist

P
QRS
4
0
1
2
T
R
R-on-T Phenomenon

1. Cease Agents



Immediate halt of all suspected agents (sotalol, haloperidol, escitalopram).

2. IV Magnesium Sulphate

First-line therapy. 2g (8 mmol) IV over 5–10 min, regardless of serum Mg level. Mechanism is membrane stabilisation, not replacement.

3. Increase Heart Rate

Isoprenaline (2–10 mcg/min) or transvenous pacing (90–110 bpm) to physically shorten the QT interval.

4. Defibrillate

If degenerating to VF, deliver immediate unsynchronised shock.

The Premium Clinical Playbook

Execution of the Out-of-Hospital Cardiac Arrest Defibrillation Protocol

1 — Minute 0

Early Recognition & 000. Send for public-access AED.

2 — Minute 1+

High-Quality CPR. 100–120 compressions/min, 5–6 cm depth, full recoil, 30:2 ratio.

Delaying defibrillation reduces survival by 7–10% per minute.

3 — First Shock

Early Defibrillation (150–200J biphasic).

Resume CPR immediately for 2 minutes.

4 — Advanced Life Support (ALS)

- **After 2nd shock:** Adrenaline 1 mg IV (repeat every 3-5 mins).
- **After 3rd shock:** Amiodarone 300 mg IV (second dose 150 mg if needed).

Identify Reversible Causes

The 4Hs:

- Hypoxia
- Hypovolaemia
- Hypo/Hyperkalaemia
- Hypothermia

The 4Ts:

- Tension pneumothorax
- Tamponade
- Toxins
- Thrombosis

Premium Clinical Playbook

Post-Resuscitation Targeted Temperature Management Stabilizes the Neurological Substrate

Patient Core Temperature (°C)

38
36
34
32
30

The Target Zone

0 12 24 36 48 60 72

Time (hours)

The Target Zone

Maintain 32–36°C for ≥24 hours post-ROSC for comatose patients (VF/pVT initial rhythm).

The Rewarming Phase

Controlled rewarming at 0.25–0.5°C/hour.

Maintain strict normothermia (<37.7°C) for 72 hours post-arrest.

Monitoring Methods

Surface cooling (Arctic Sun) or endovascular cooling catheter.

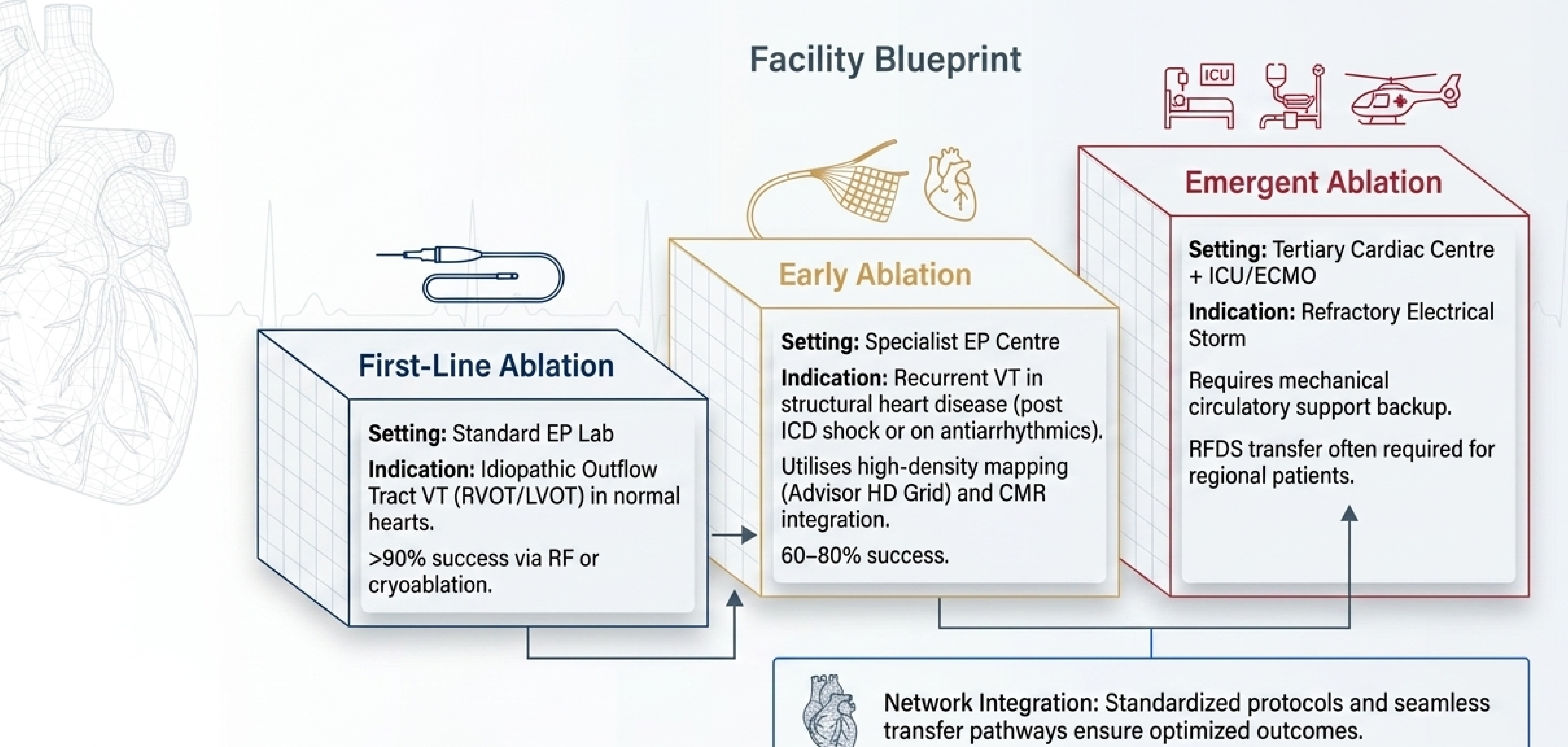
Continuous core temp via oesophageal, bladder, or intravascular lines.

Clinical Update (The TAME Trial 2023)

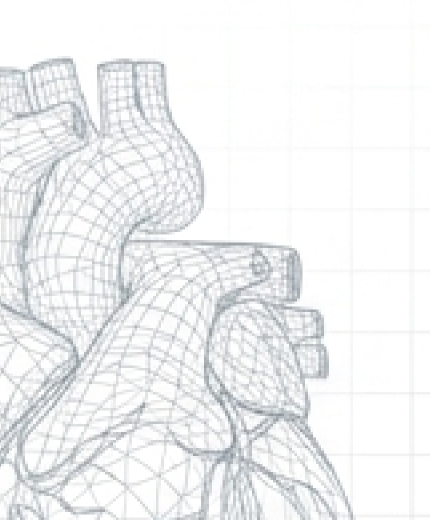
Routine pre-hospital rapid infusion of cold fluids is no longer recommended.

Strict normothermia (avoiding active fever >37.7°C) may be as effective as deep hypothermia (33°C).

Deploying Catheter Ablation Across the Health System Network



Primary and Secondary Prevention ICD Implantation Logic



Secondary Prevention

Survived VF arrest (no reversible cause) **OR sustained haemodynamic VT with LVEF ≤50%**?

If YES → ICD Indicated (Class I)

Inherited Syndromes

High-risk Brugada, CPVT, ARVC with syncope on beta-blockers?

If YES → ICD Indicated

Primary Prevention

Is the patient on **Optimal Medical Therapy** (GDMT including ARNi, beta-blocker, MRA, SGLT2i) for ≥3 months?

If **NO** → Optimise and re-evaluate.

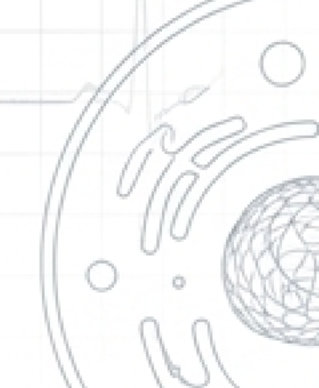
LVEF Assessment

After GDMT, is **LVEF ≤35%** and **NYHA II-III**?

If YES

(Ischaemic ≥40 days post-MI or Non-ischaemic)

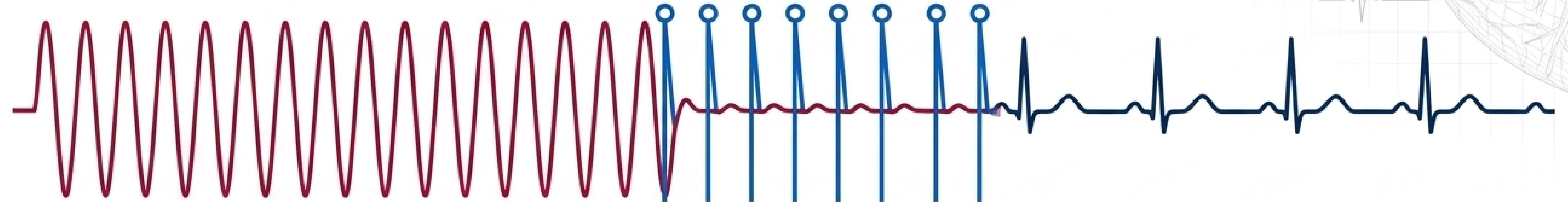
→ ICD Indicated (Class I)



Modern ICD Programming Minimizes Inappropriate Therapies Through Interception

ATP Interception Model

Burst ATP – Anti-Tachycardia Pacing at 88% cycle length



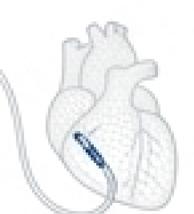
Shock Capacitor

ATP intercepts arrhythmia before shock delivery.

Single-Zone Programming

Monitor zone with ATP before shock at ≥200 bpm.

No therapy <200 bpm.



Detection Duration

Prolonged detection (30/40 intervals or ≥6-12s) allows self-termination, avoiding painful, unnecessary shocks.

Subcutaneous ICD (S-ICD)

Uses a conditional zone (200-250 bpm with morphology discrimination).

Cannot deliver ATP, but avoids transvenous lead complications.

Troubleshooting the Discharging ICD

Alert Type	Aetiology	Management
Appropriate Shock	True VT/VF detected.	Optimise **antiarrhythmic therapy**, consider catheter **ablation**, reassess device programming.
Inappropriate SVT Shock	AF, flutter, AVNRT crossing rate zones.	**Rate control**, **SVT ablation**, reprogram **discriminators** (sudden onset/morphology).
T-Wave Oversensing	Tall T-waves double-counted as R-waves; hyperkalaemia.	Reprogram **sensitivity vector**; **correct electrolytes**.
Lead Fracture / Noise	Insulation breach or physical artifact.	**Urgent lead revision**; evident via **impedance monitoring** on remote follow-up.

Multidisciplinary Management of the Electrical Storm

Definition: ≥3 episodes of VT/VF within 24 hours requiring intervention. **15–25% in-hospital mortality.**

1. Haemodynamic Support

ICU admission. Consider Impella/ECMO for refractory hypotension. Correct ischaemia/electrolytes.

2. Intravenous Amiodarone

300 mg over 20-30 min, then 900 mg over 24 hours.

3. Sympathetic Blockade

IV metoprolol, propranolol, or esmolol (ultra-short acting for haemodynamic concern).

4. Deep Sedation

Propofol/ketamine intubation to forcefully blunt the catastrophic catecholamine surge.

5. Urgent EP Rescue

Catheter ablation under circulatory support. Consider stellate ganglion block.

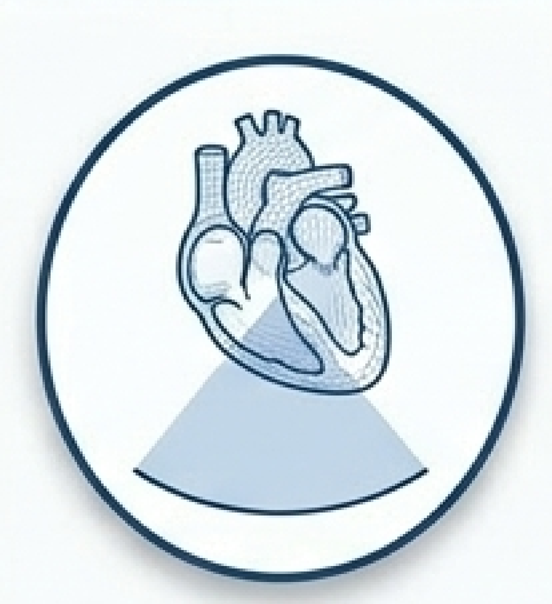
Decoding Inherited Arrhythmia Syndromes

Brugada Syndrome	CPVT	ARVC	Congenital LQTS
• **Mutation:** SCN5A (20-30%). • **Hallmark:** Type 1 coved ST elevation V1-V3. • **Trigger:** Fever, large meals, sodium channel blockers. • **Therapy:** ICD, avoid fever, Quinidine.	• **Mutation:** RYR2 (~60%). • **Hallmark:** Normal resting ECG; Bidirectional VT on exercise. • **Trigger:** Exercise, emotion. • **Therapy:** Nadolol + Flecainide. Strict sport avoidance.	• **Mutation:** Desmosomal (PKP2). • **Hallmark:** Fibro-fatty RV replacement, epsilon waves. • **Trigger:** High-intensity endurance exercise. • **Therapy:** Beta-blockers, Sotalol, Epicardial ablation.	• **Mutation:** LQT1 (exercise), LQT2 (alarms), LQT3 (sleep). • **Hallmark:** QTc >500ms. • **Therapy:** Beta-blockers, Left cardiac sympathetic denervation (LCSD).

The Structural and Electrical Investigation Toolkit

The Baseline (ECG & Telemetry)

QTc measurement, bundle branch morphology, Holter/loop recording to document arrhythmia burden and correlate with symptoms.

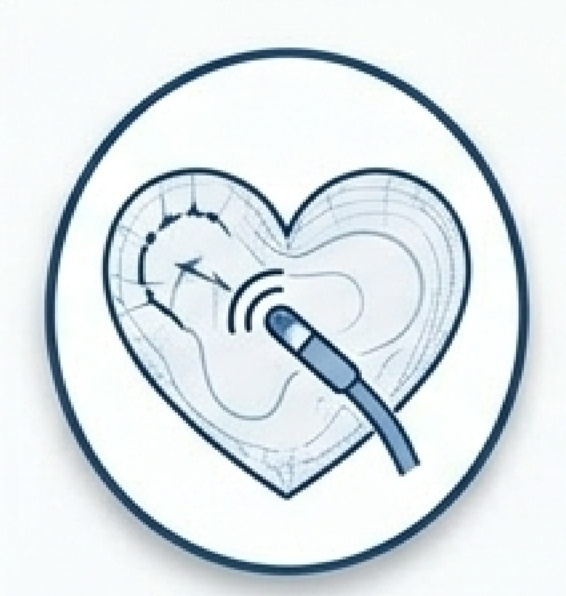


The Anatomy (Echocardiography)

Nationwide MBS access. Defines LVEF, RV structure (RVOT dimensions for ARVC), and valvular integrity.

The Substrate (Cardiac MRI)

Essential for tissue characterisation. Late gadolinium enhancement (LGE) precisely maps myocardial scar and fibro-fatty infiltration.



The Circuit (EP Study & Provocation)

Inducibility testing. Ajmaline/Flecainide provocation for Brugada (via SAS). Exercise testing specifically for CPVT diagnosis.

The SCD Risk Stratification Funnel Unifies Diagnostic Pathways

Data Streams

Structural Imaging
(CMR Scar Burden,
Echo LVEF)

Electrophysiological Data
(Inducible VT,
Holter Burden)

Clinical & Genetic Scores
(Schwartz Score for LQTS,
Shanghai Score)

Clinical Assessment Filter
Patient frailty, NYHA class,
≥3 months of optimal
medical therapy.

Does this patient require an ICD for survival?

Modifying Treatment Parameters for Special Populations

Pregnancy

- Synchronised cardioversion is safe.
- Metoprolol/labetalol preferred (Category C). Avoid atenolol.
- ICD implantation feasible with foetal shielding.
- LQT2 at high risk postpartum.

Paediatrics

- Outflow tract VT highly amenable to ablation (>85% success).
- Subcutaneous ICDs preferred to avoid transvenous lead growth issues.
- Weight-based dosing critical.

Renal Impairment

- High risk of pro-arrhythmic electrolyte shifts (K^+, Mg^{2+}).
- Sotalol requires mandatory dose reduction/avoidance if eGFR <30.
- High TdP risk.
- Dialysis alters ICD infection risk.

Hepatic & Elderly

- Amiodarone heavily hepatically metabolised; avoid in Child-Pugh C.
- Elderly face high amiodarone toxicity and high risk of falls causing inappropriate ICD shocks.

Geographical Disparities and First Nations Health Considerations

First Nations Burden

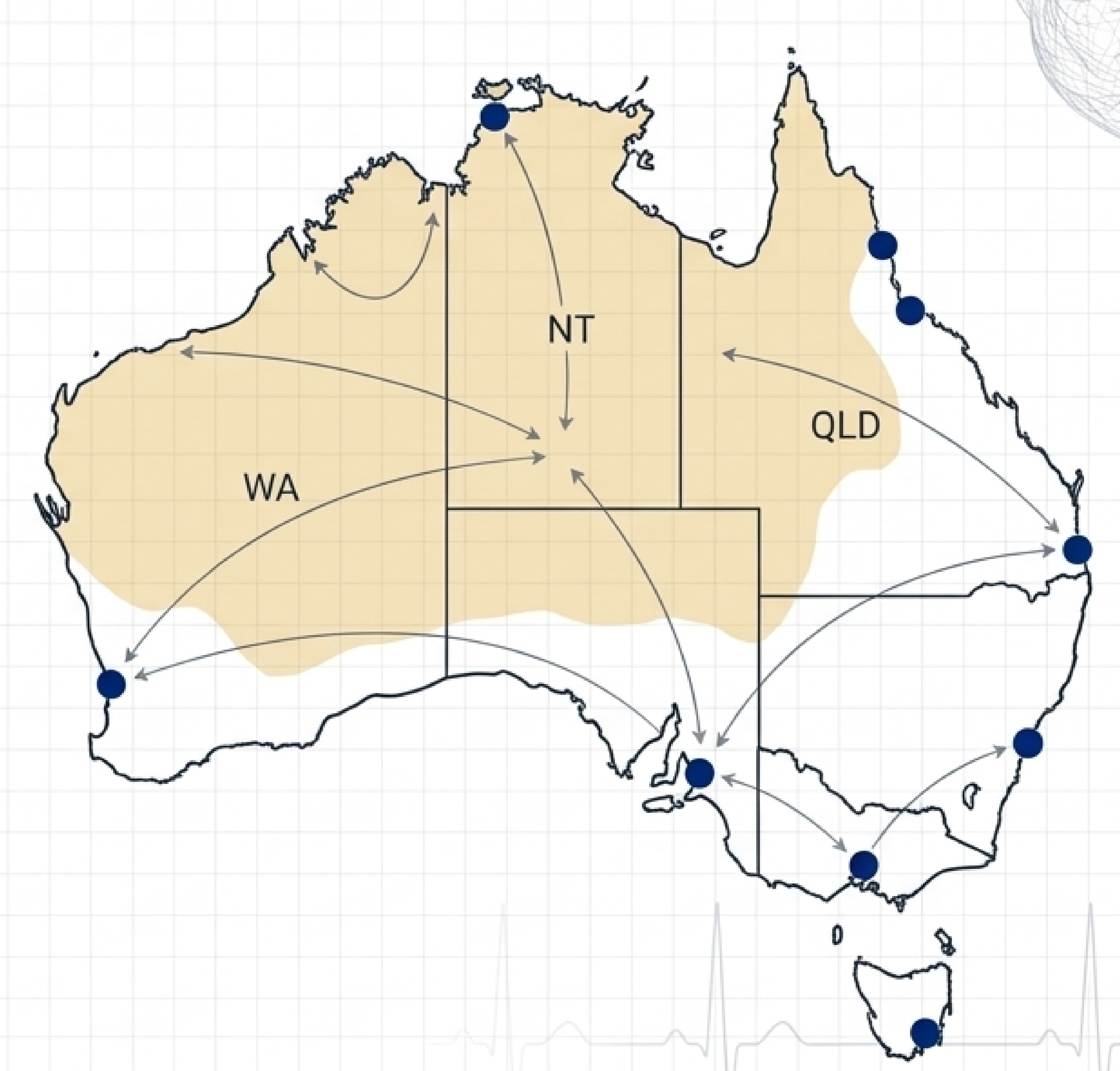
2–3x higher rate of SCD. Driven heavily by Rheumatic Heart Disease (RHD) substrate and high rates of non-ischaemic cardiomyopathy.

The Access Gap

Catheter ablation and ICD implantation are geographically constrained. Remote communities rely on public-access AED expansion, RFDS retrieval, and the Closing the Gap (CTG) PBS co-payment measure.

Cultural Safety

Coordinate with Aboriginal Medical Services (AMS). Accommodate Sorry Business in follow-up scheduling. Use family-based approaches for genetic cascade screening.



Premium Clinical Playbook

Long-Term Device Surveillance and Psychosocial Integration

Remote Monitoring Networks

- Daily transmissions via Medtronic CareLink, Abbott Merlin, etc.
- Ensures early detection of VF, lead alerts, and heart failure metrics.
- Vital for remote Australian continuity of care.

Driving Restrictions (Austroads)

- Primary prevention ICD: No restriction.
- Secondary prevention ICD: Cease driving ≥2 weeks post-implant.
- **Post-Shock:** Cease driving for ≥6 months. Commercial licenses generally disqualified.

The Psychological Impact

ICD shocks induce severe anxiety, PTSD, and depression.

Routine PHQ-9/GAD-7 screening is mandatory. Refer to cardiac psychology and patient networks like SADS Australia.

Physical survival must be matched by psychological recovery.