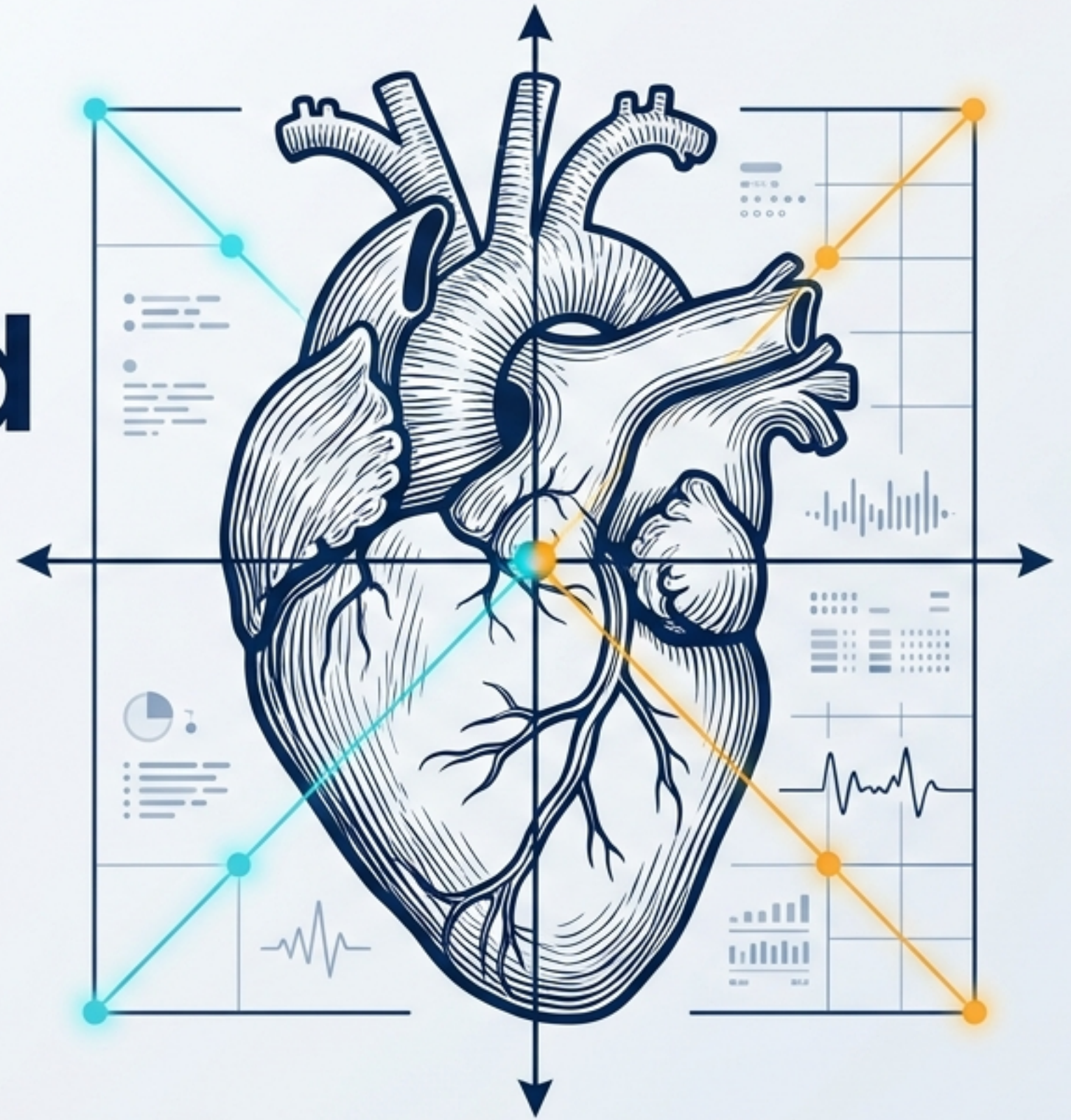


Acute Decompensated Heart Failure

In-Hospital Management,
Pharmacotherapy, and
Clinical Guidelines

An Evidence-Based Clinical Reference
for Australian Healthcare Professionals.



The Australian Epidemic of Heart Failure

480,000+

Estimated prevalence in Australia, rising sharply with age—up to 10-15% of those ≥ 75 years.

62,000

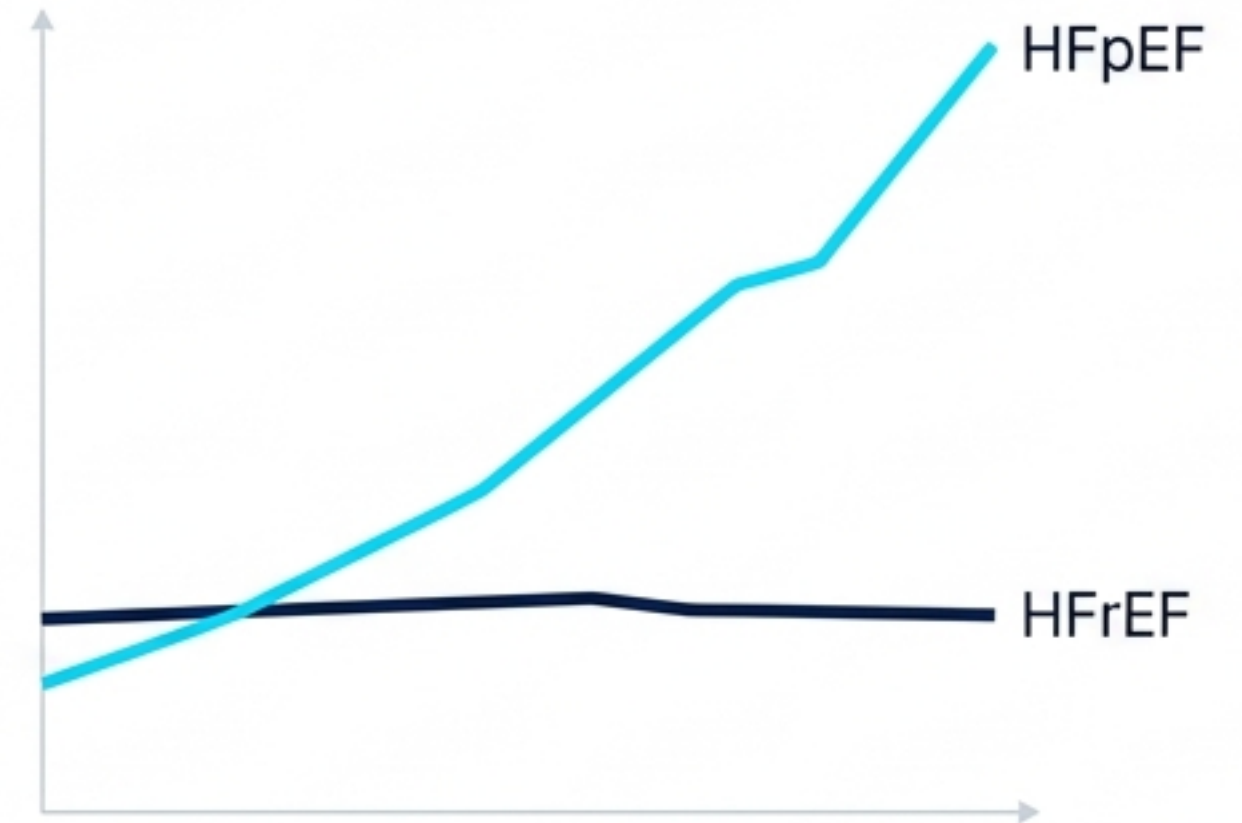
Annual hospitalizations with a principal diagnosis of heart failure.

20-30%

30-day readmission rate, a key quality indicator for hospitals.

\$2.7 Billion


Annual cost to the Australian healthcare system.

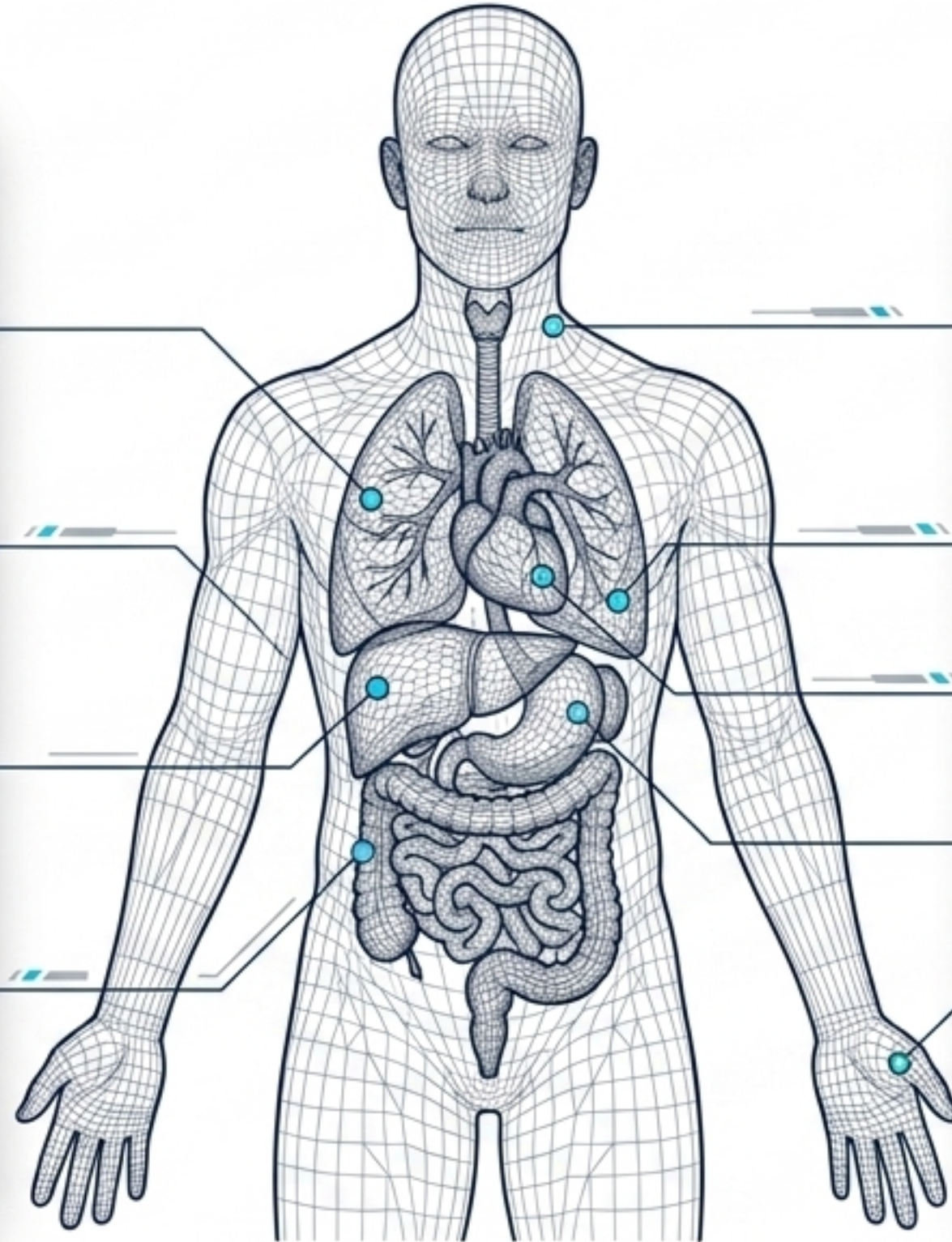


Demographics are shifting. Half of hospitalizations involve HFrEF, but HFpEF is rapidly growing, particularly among older, female, and hypertensive populations.






Clinical Recognition of Acute Decompensation

Symptoms (Subjective)

- Acute dyspnea (at rest or minimal exertion)
- Orthopnea / Paroxysmal nocturnal dyspnea
- Fatigue and acute exercise intolerance
- Rapid weight gain over preceding days 



Signs (Objective)

- Elevated Jugular Venous Pressure (JVP)  
- Bibasilar lung crackles 
- S3 gallop on auscultation 
- Hepatomegaly
- Peripheral edema & cool extremities (indicates low-output state) 

Natriuretic Peptides Define Diagnostic Probability



Biomarker	Exclusion Threshold	Likely ADHF
BNP	< 100 pg/mL	> 400 pg/mL
(Grey zone: 100-400)		
NT-proBNP	< 300 pg/mL	> 2000 pg/mL
(Age-adjusted: ≥ 75 yrs > 450; 50-75 yrs > 900)		

Clinical Context & Caution



- **Obesity:** Adipose clearance lowers BNP (falsely low).
- **Flash Pulmonary Edema:** Insufficient time for BNP to rise.
- **Renal Impairment (eGFR < 60):** Elevates NT-proBNP.
- **Atrial Fibrillation:** Independently elevates both BNP and NT-proBNP.

The Essential Diagnostic Investigation Panel



12-Lead ECG

Focus: Identify triggers like **Atrial Fibrillation** or ischemic changes. Assess QRS duration for **CRT** candidacy.



Chest X-Ray

Focus: Confirm **pulmonary congestion**, pleural effusions, and cardiomegaly. Rule out pneumonia or pneumothorax.



Essential Bloods

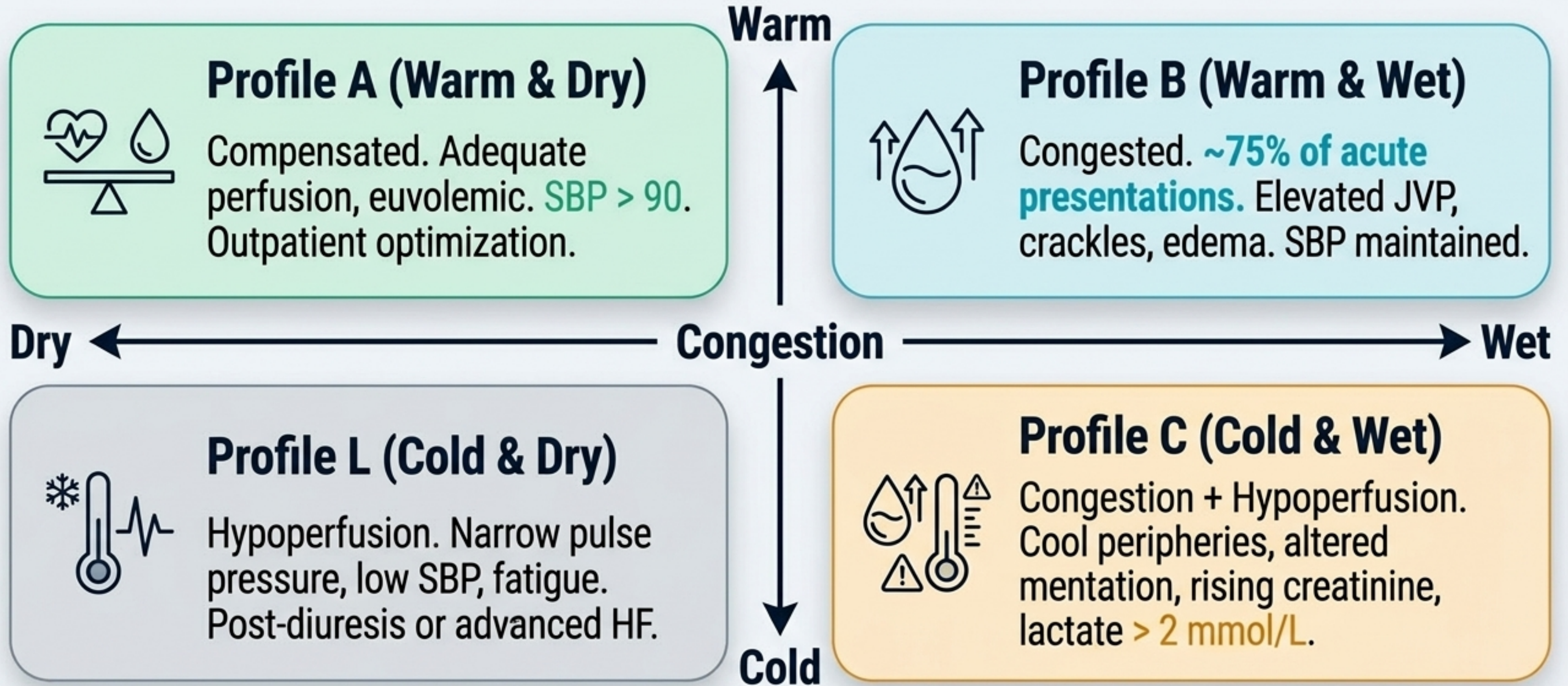
Focus: FBC, UEC, LFTs, and Thyroid. Crucial: Check **iron studies** (ferritin < 100 or TSAT < 20%) and **HbA1c** to identify treatable contributors.



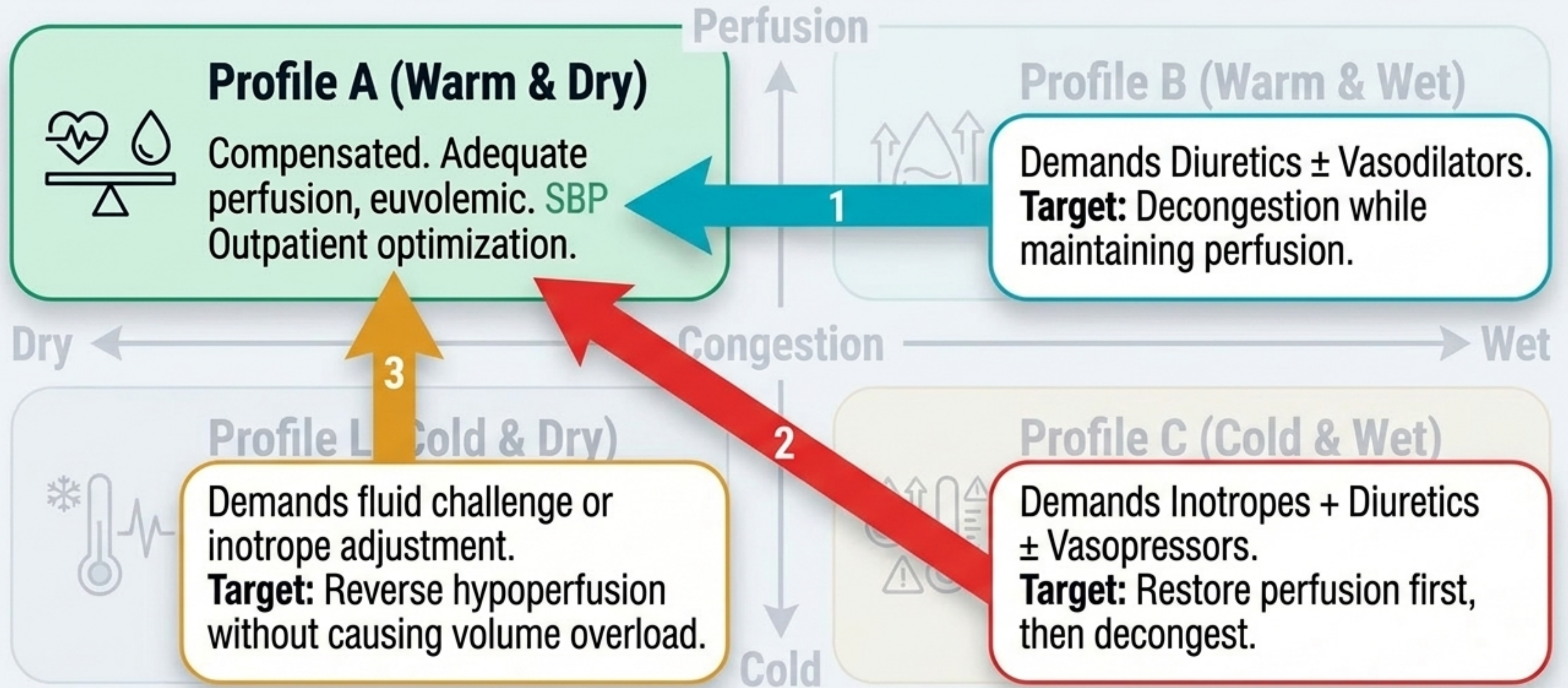
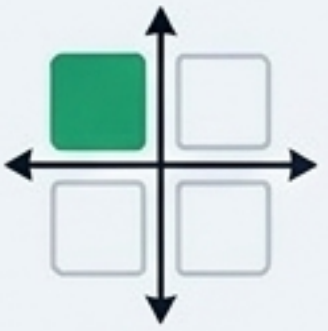
Specialist Echocardiography

Focus: **Urgent** if new diagnosis or hemodynamic instability. Assess **LVEF**, wall motion, **RV function**, and valvular emergencies.

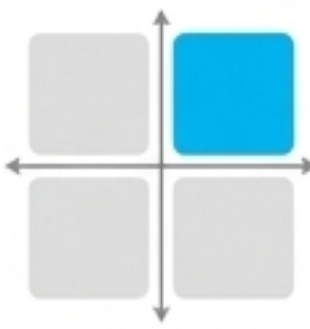
The Nohria-Stevenson Hemodynamic Compass



Navigating Towards the Warm and Dry Profile



Intravenous Diuretics Serve as the Frontline Strategy



Furosemide (First-Line)

- **Dosing:** Start at \geq home oral dose (**1mg IV \approx 2mg PO**). Typical bolus **20-80mg**.
- **Infusion:** **5-20 mg/hr**. Superior for severe congestion (aiming for 3.5 L/day output).
- **Renal Adjustment:** Higher doses needed if eGFR **< 30**.

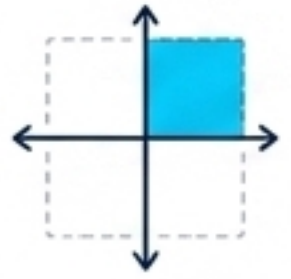
PBS General Benefit

Bumetanide (Alternative)

- **Dosing:** **1-2mg** IV bolus.
- **Potency:** **$\sim 40x$** more potent than furosemide (**1mg \approx 40mg** furosemide).
- **Advantage:** Better oral bioavailability in severe gut edema (**80% vs 10-100%**). Less affected by renal impairment.

PBS General Benefit

The 2-Hour Rule Dictates Diuretic Escalation



**Administer IV
Diuretic Bolus**



**Wait exactly 2 hours
(indwelling catheter
recommended)**

Good Response

(>200mL Furosemide / >60mL Bumetanide)

Action: Repeat same dose at 4-6 hourly intervals or start continuous infusion.

Partial Response

(100-200mL Furosemide / 30-60mL Bumetanide)

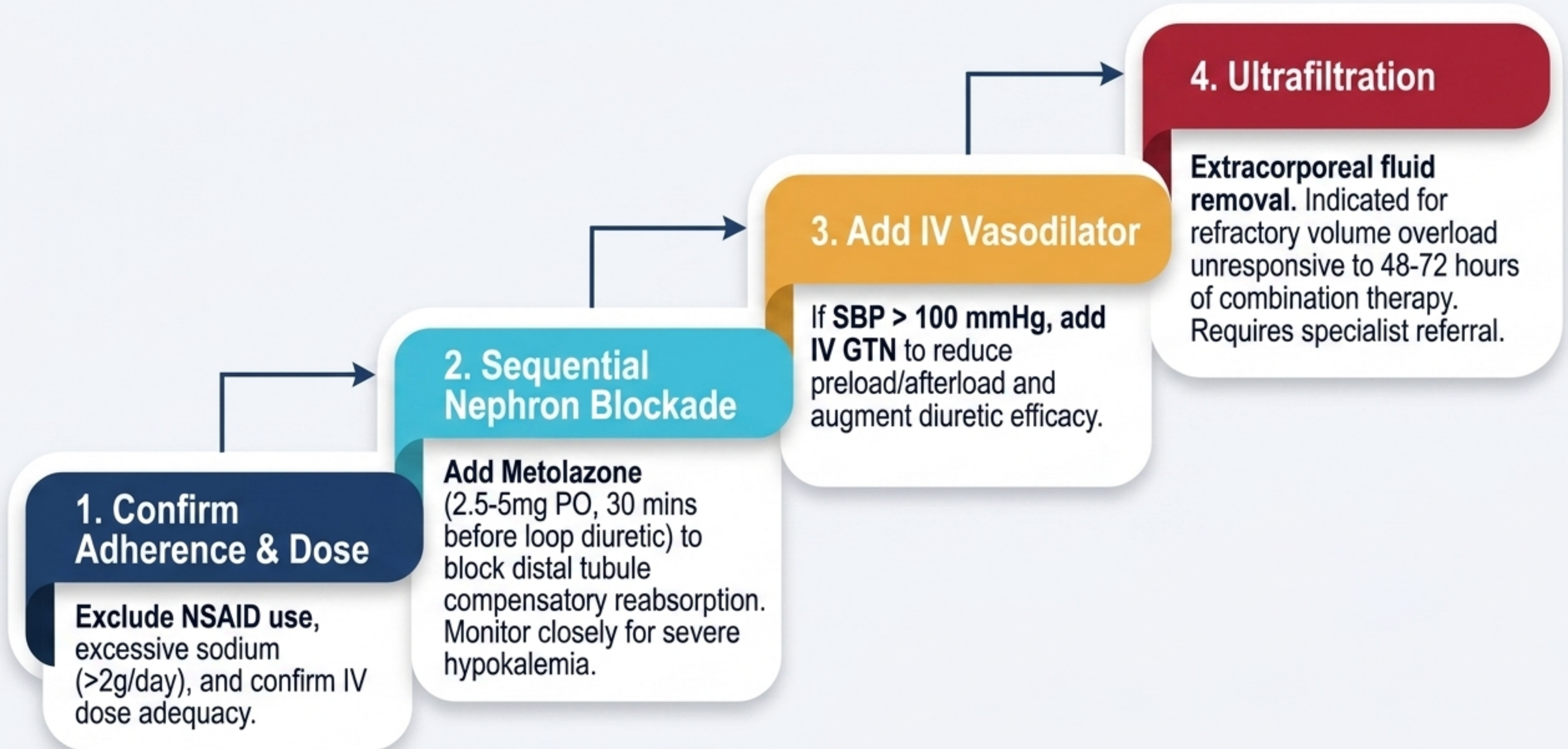
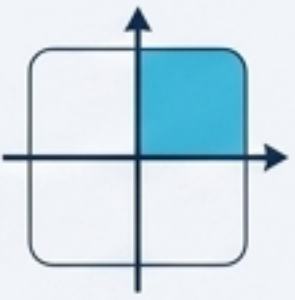
Action: Double the IV diuretic dose and reassess in 2 hours.

Poor Response

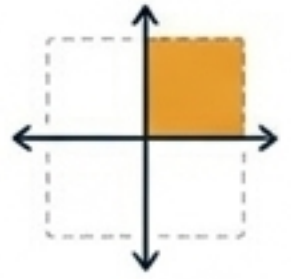
(<100mL Furosemide / <30mL Bumetanide)

Action: Diuretic Resistance identified. Escalate strategy.

Four Steps to Overcome Diuretic Resistance



Vasodilator Therapy Rapidly Reduces Preload and Afterload



Vasodilator Selection Matrix

Glyceryl Trinitrate (GTN)

First-line for acute pulmonary edema with SBP > 110. 10-20 mcg/min start. Rapid, titratable.

Sodium Nitroprusside

For severe ADHF with hypertension / afterload excess (e.g., acute aortic regurgitation). Requires intra-arterial BP line. Cyanide toxicity risk >48h.

Nesiritide (BNP Analogue)

ASCEND-HF trial showed symptom relief without mortality benefit. Limited Australian availability.



Absolute Contraindications: SBP < 90, Severe Aortic Stenosis, RV Infarction, recent PDE5 inhibitors (sildenafil within 24h, tadalafil 48h).

Routine Inotrope Use in the Absence of Shock Increases Mortality

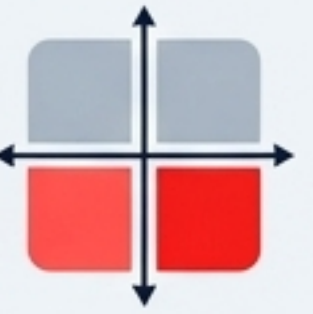


The Warning: Routine use of inotropes in ADHF without evidence of hypoperfusion (Warm-Wet) is associated with increased mortality (ADHERE registry, OPTIME-CHF). They are NOT diuretic adjuncts.

Strict Indications

- ✓ Cardiogenic shock (SBP < 90 + raised filling pressures).
- ✓ End-organ hypoperfusion (oliguria, altered mentation, rising lactate).
- ✓ Low-output syndrome post-cardiac surgery / ACS.
- ✓ Bridge to advanced therapies (LVAD / Transplant).

Selecting the Appropriate Inotropic Agent



Dobutamine (β 1-agonist)

Mechanism:

- Increases contractility, reduces filling pressures.

Advantages:

- Rapid on/off.

Drawbacks:

- **Sinus tachycardia, VT/VF risk, increases myocardial oxygen demand.**

Milrinone (PDE-III Inodilator)

Mechanism:

- Increases cAMP, increases CO while reducing SVR/PVR.

Advantages:

- Excellent for RV failure, works in beta-blocked patients.

Drawbacks:

- **Hypotension, renally excreted (reduce dose 50% if eGFR < 30).**

Levosimendan (Calcium Sensitizer)

Mechanism:

- Increases myofilament Ca²⁺ sensitivity without increasing oxygen demand.

Advantages:

- Prolonged 7-10 day effect (LION-HEART trial).

Drawbacks:

- **Dose-dependent hypotension, limited hospital formulary availability.**

Do Not Discharge Patients with Residual Congestion



Residual congestion is the single strongest predictor of 30-day readmission.



Weight Loss: $\geq 0.5\text{--}1.0$ kg/day achieved during active diuresis.



Net Fluid Balance: Net loss of **1–1.5 L/day**.



Clinical Signs: JVP < 8 cm H₂O, orthopnea fully resolved, peripheral edema trace or absent.



Biomarker Trajectory: NT-proBNP reduced by $\geq 30\%$ from admission baseline.



Renal Function: Stable (up to 30% creatinine rise is tolerated if congestion is actively resolving—“pseudo-worsening”).

Initiate the Four Pillars of GDMT Prior to Discharge



Optimal Outpatient Resilience

ACEi / ARB / ARNI

(Sacubitril-valsartan preferred if LVEF \leq 40%. Requires 36hr ACEi washout).

Beta-Blocker

(Carvedilol, Bisoprolol.
***Critical Rule: Start low once euvolemic; NEVER initiate during acute congestion).**

MRA

(Spironolactone/Eplere-none. Target 50mg daily. Require eGFR $>$ 30 and K^+ $<$ 5.0).

SGLT2 Inhibitor

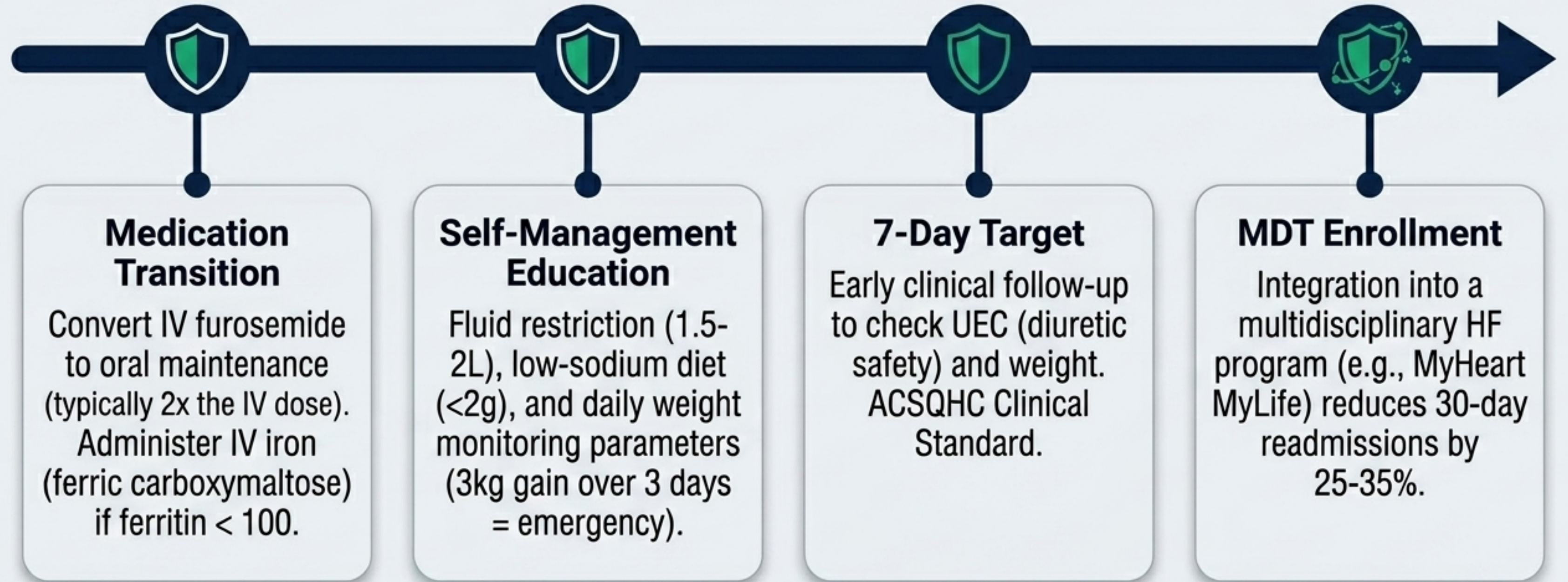
(Dapagliflozin/Empagliflozin 10mg daily. Now Now the standard of care for HFrEF regardless of diabetes status. Initiate in-hospital once euvolemic).

A Structured Discharge Plan Defends Against 30-Day Readmission

Day 0 (Discharge)

Day 7

Day 30



Tailoring Acute Management for Special Populations



Pregnancy

DO use Hydralazine + Nitrate for vasodilation.

DO NOT use ACEi/ARB/ARNI, MRA, or SGLT2i (teratogenic/contraindicated).



Pediatrics

Managed at specialist centers. Note that baseline BNP's are naturally higher in children.

Rely on weight-based dosing (**Furosemide 0.5-1 mg/kg IV**).



Renal Impairment

Beware of "Cardiorenal Syndrome". Tolerate up to 30% creatinine rise if decongesting.

Metolazone retains efficacy in severe CKD.



Hepatic Impairment

Severe right heart failure causes congestive hepatopathy and poor GI absorption.

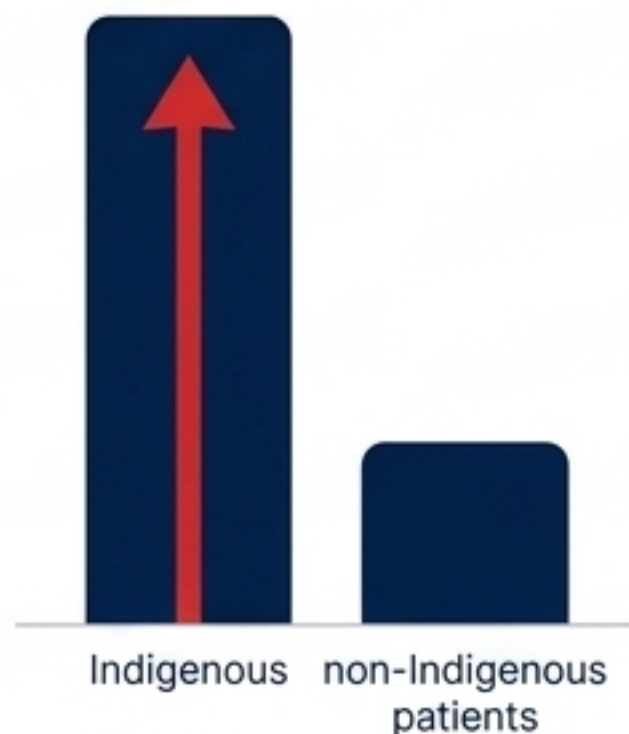
IV diuretic route is strictly preferred over oral.

Closing the Care Gap for Aboriginal and Torres Strait Islander Patients

The Burden

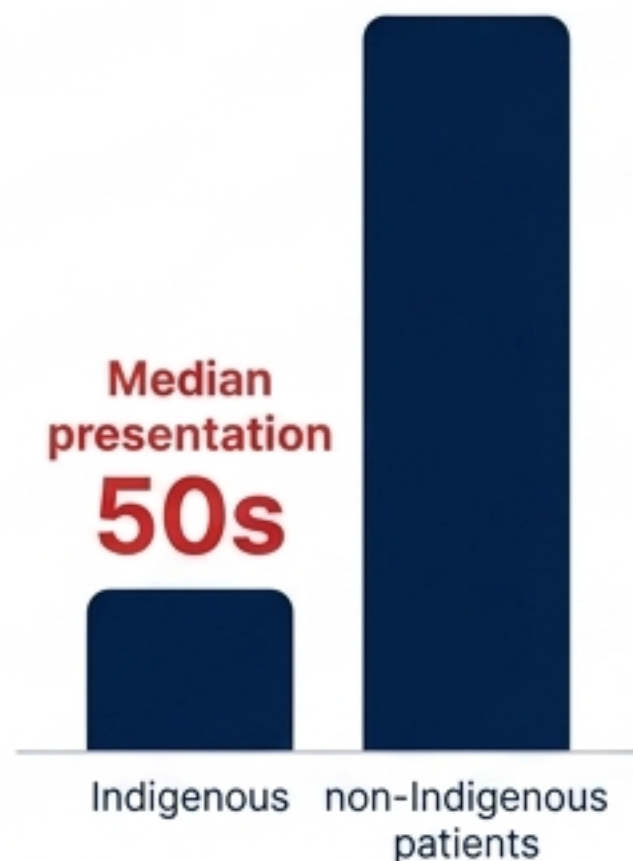
Hospitalization Rates

2.7x
higher



Age Gap

Median
presentation
50s



Rheumatic Heart Disease (RHD) remains a leading cause in remote communities.

Culturally Safe Care Cycle



The Complete ADHF In-Hospital Clinical Pathway

