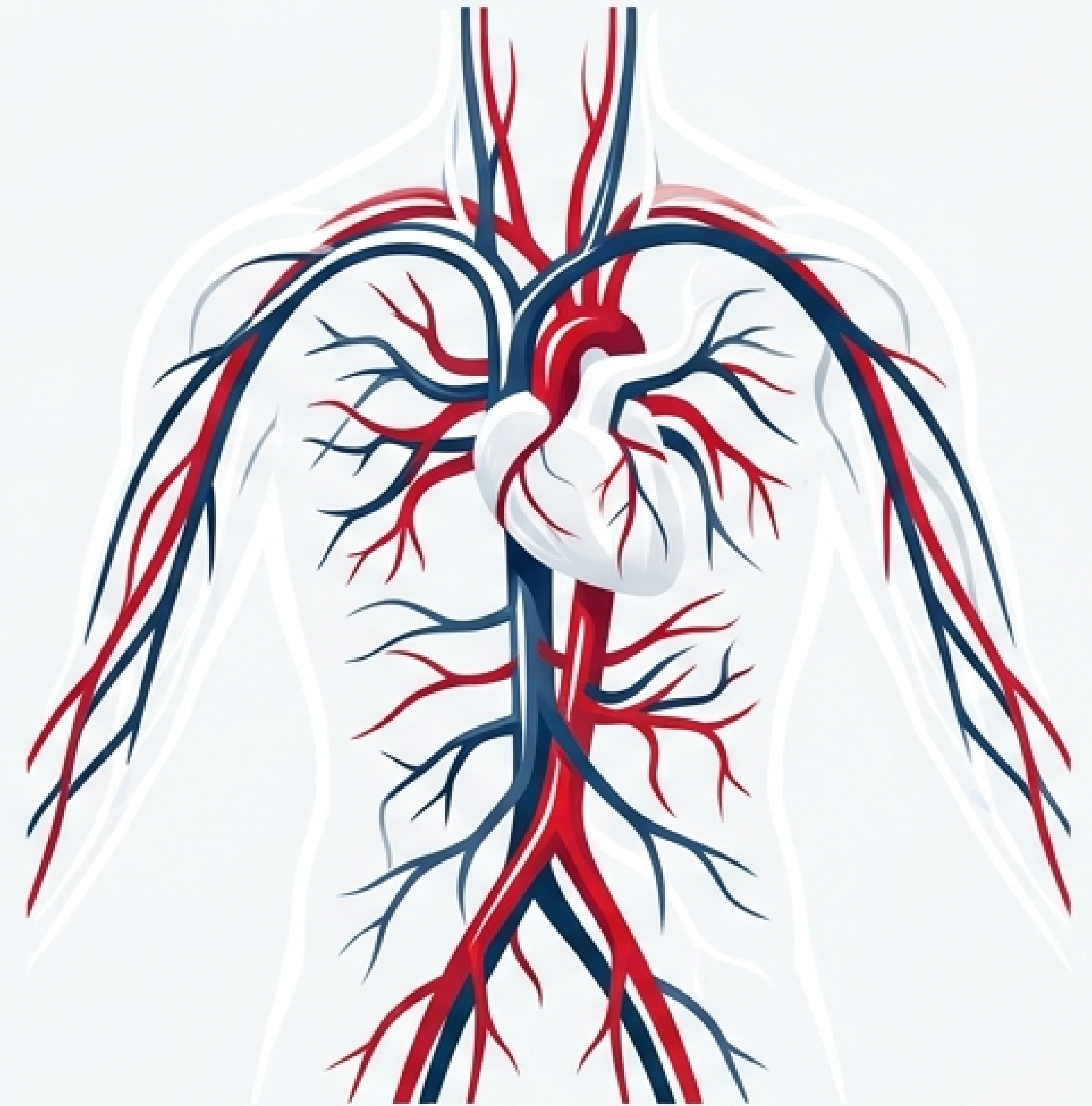
Aortic Aneurysms: The Clinical Playbook

An optimized decision-support matrix for detection, surveillance, and intervention in the Australian healthcare system.

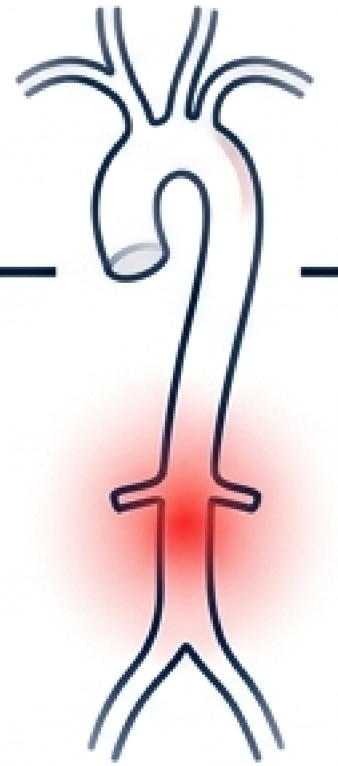


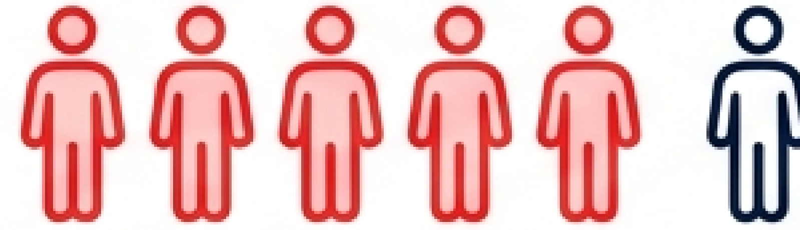
2,100

Annual Australian deaths (2022)

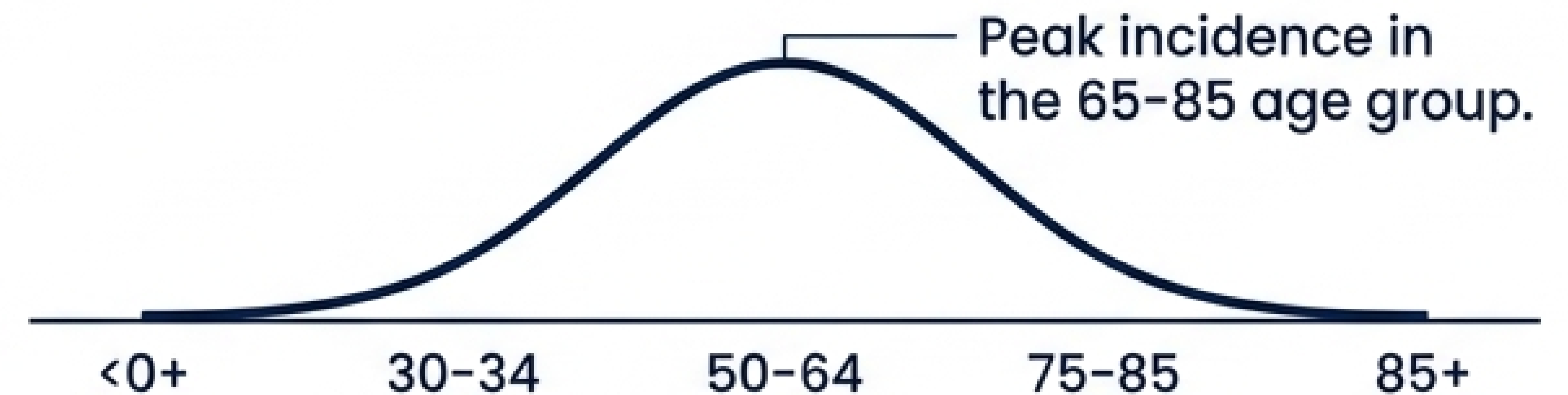
Often asymptomatic until catastrophic rupture.

The Demographic Skew





4–6x more common in men.

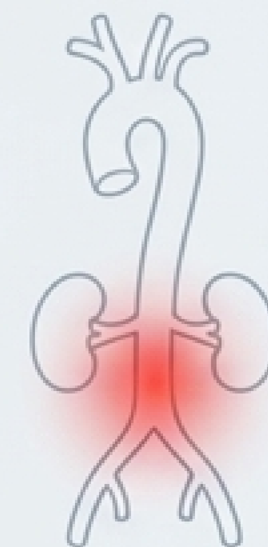


The Screening Impact

42% Mortality Reduction

Impact of one-off ultrasound screening, fundamentally shifting diagnosis from emergency to elective.

The Screening Algorithm: Who gets an ultrasound?



Screening Funnel

One-off abdominal ultrasound
(Level I Evidence)

Men 50-65 with ≥1 risk factor
(Priority: Current/ex-smokers, HTN, hyperlipidaemia)

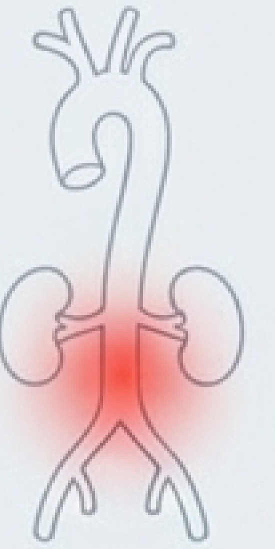
First-degree relatives
(Any sex, screen from age 50 or 10 years younger than index case)

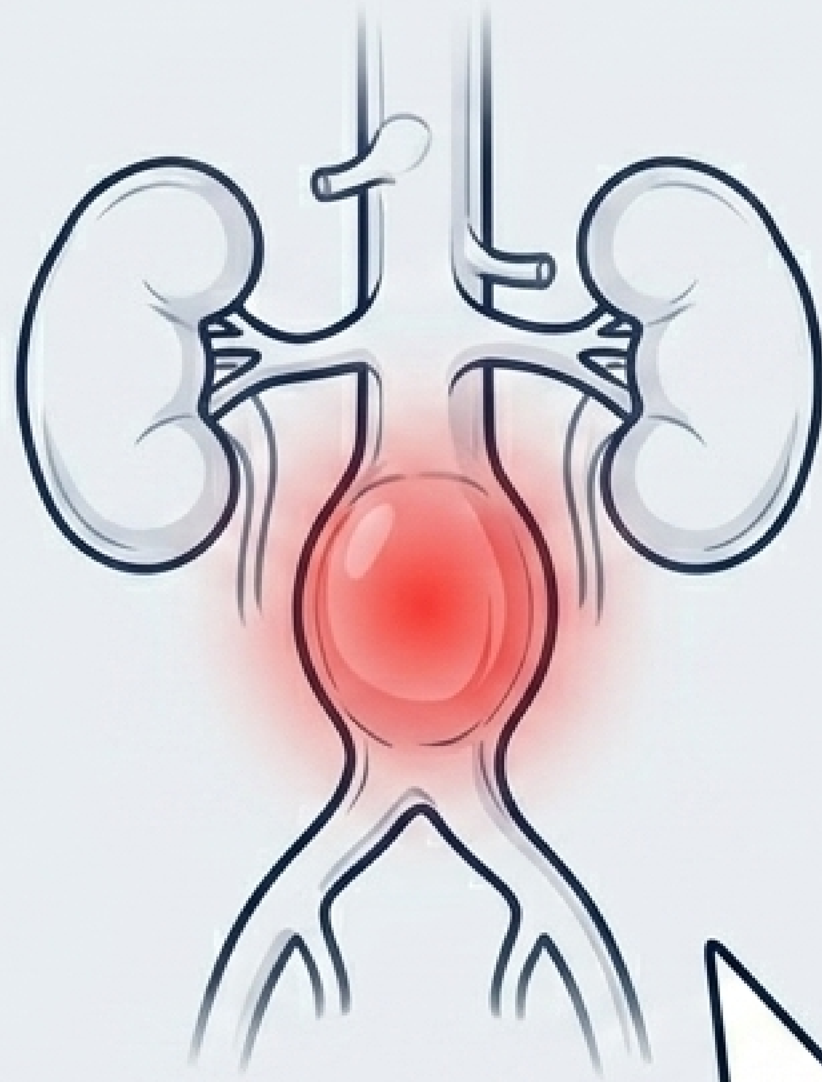
Women ≥65
(No population screening; individualize based on CV risk profile)

Clinical Note Card

Integrate with National Vascular Disease Prevention Alliance CVD risk assessments.

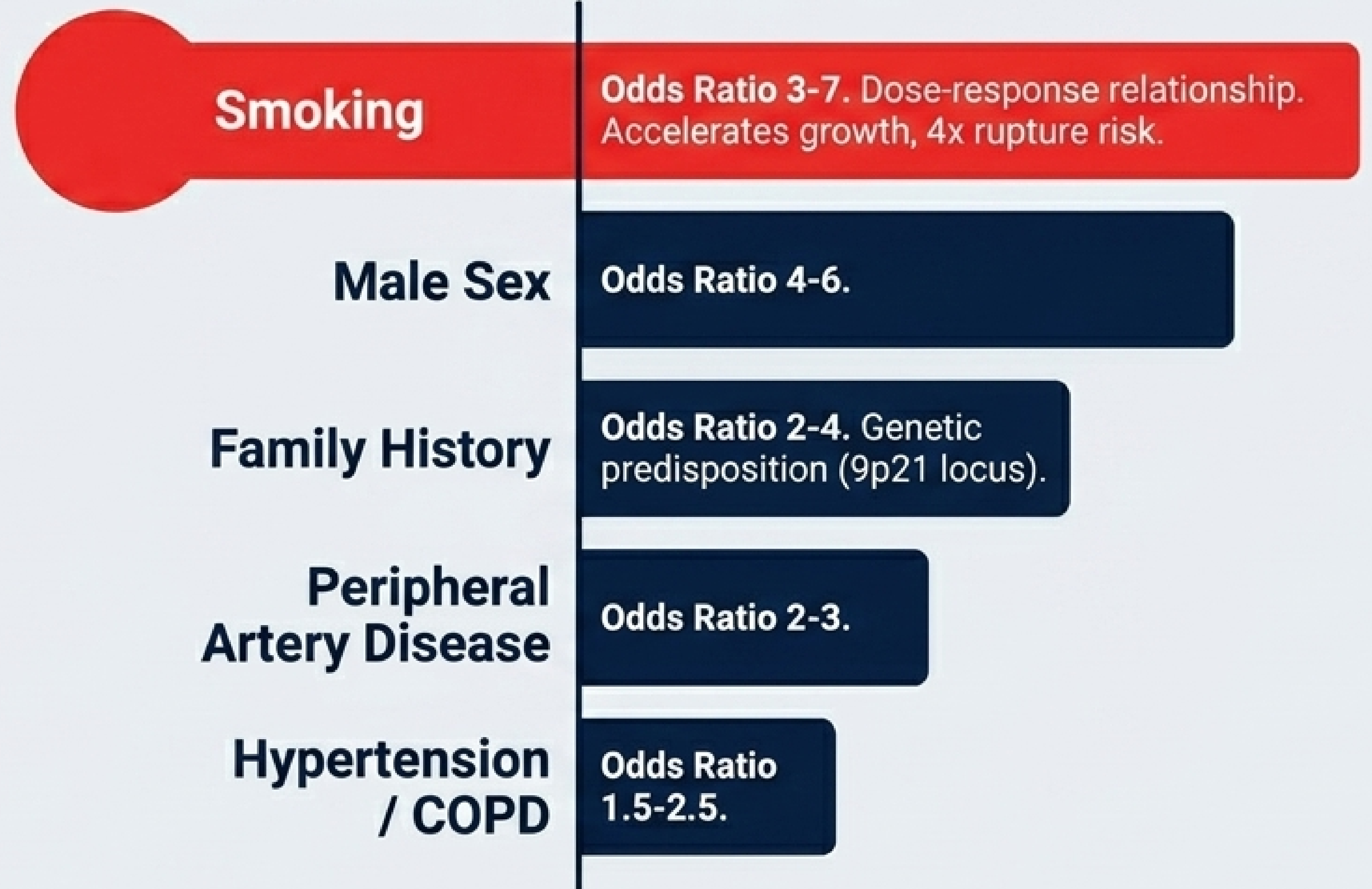
Abdominal Aortic Aneurysm (AAA) Risk Profile



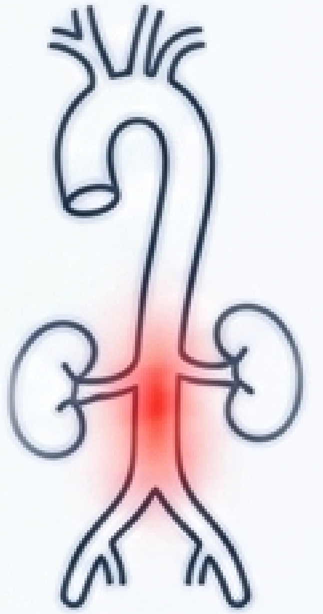


AAA: Dilation >50% of normal expected diameter. **Infrarenal** accounts for 90-95% of cases.

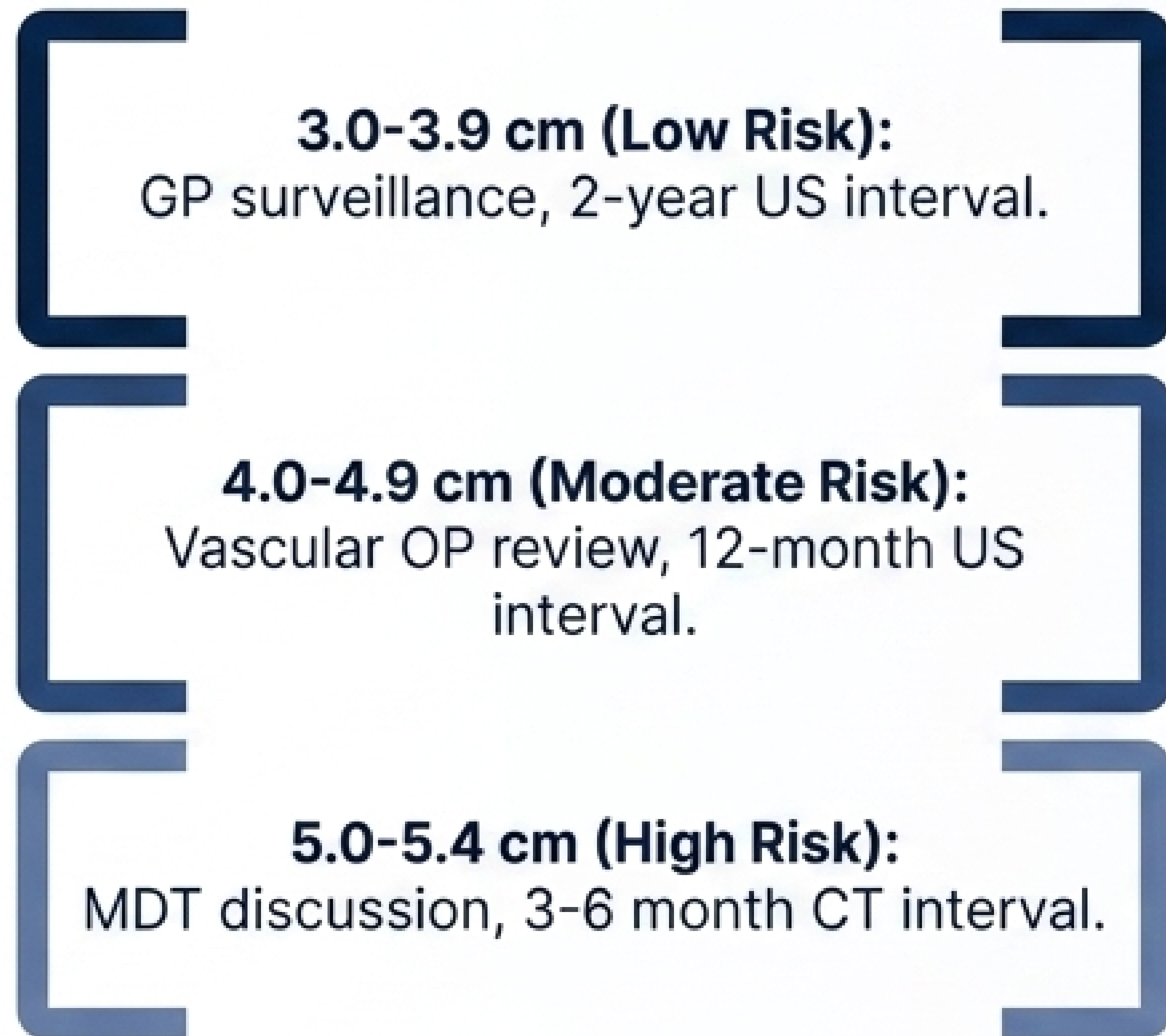
Odds Ratios (OR) of Risk Factors



The Surveillance Loop & Rupture Curve



The Surveillance Loop



Threshold Thermometer

The Rupture Curve

<1% annual rupture risk.

<5.0 cm.

~20%+ risk.

~3-5% risk.

Elective Surgical Threshold (or >1cm/year growth): Men 5.5cm, Women 5.0cm.

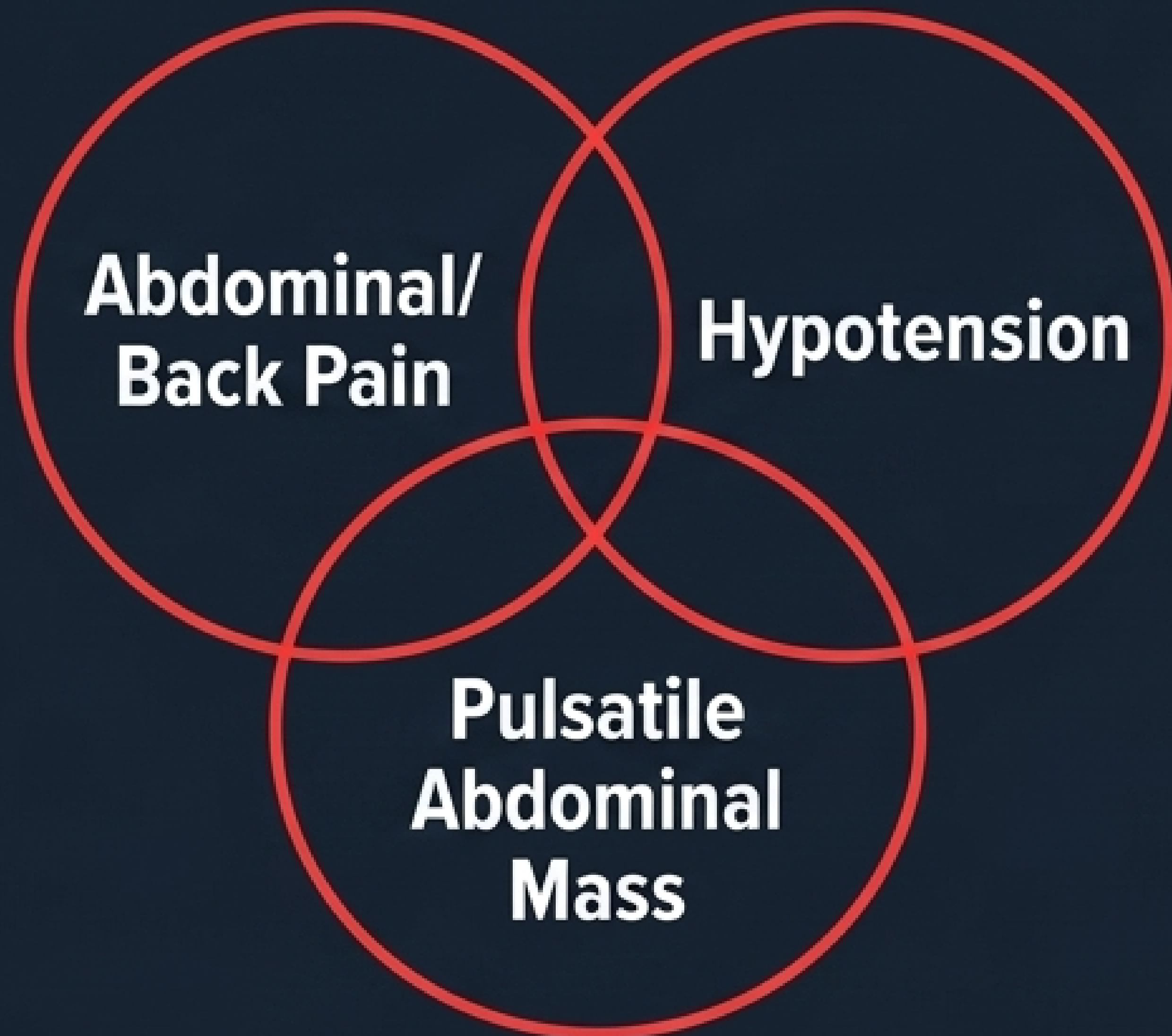
~10-20% risk.

~20%+ risk.

RUPTURED AAA: CLINICAL EMERGENCY

Overall mortality exceeds 80%. Pre-hospital death is common.

The Classic Triad

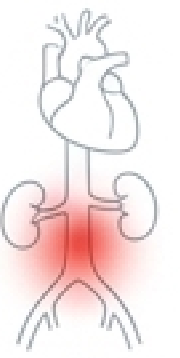


*Mass present in only ~50% of cases.

Immediate Action Protocol

- 1. Resuscitate with Permissive Hypotension (Target Systolic 80-90 mmHg to avoid blowing the clot).
- 2. Activate Massive Transfusion Protocol.
- 3. Emergent CT Angiography (if haemodynamically permitting).
- 4. Immediate Operating Theatre transfer (MBS Item 35200).

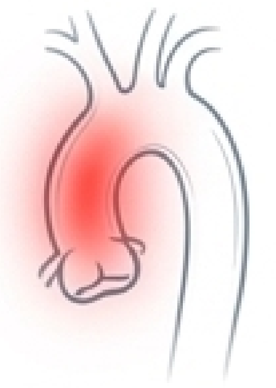
Intervention Balance Sheet: EVAR vs. Open Repair

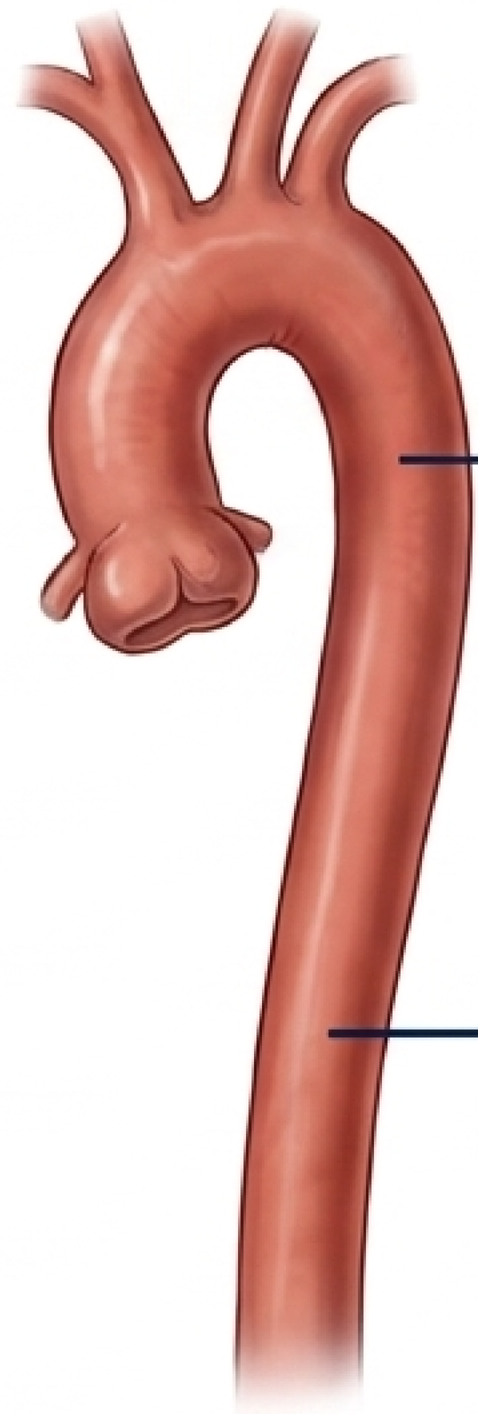


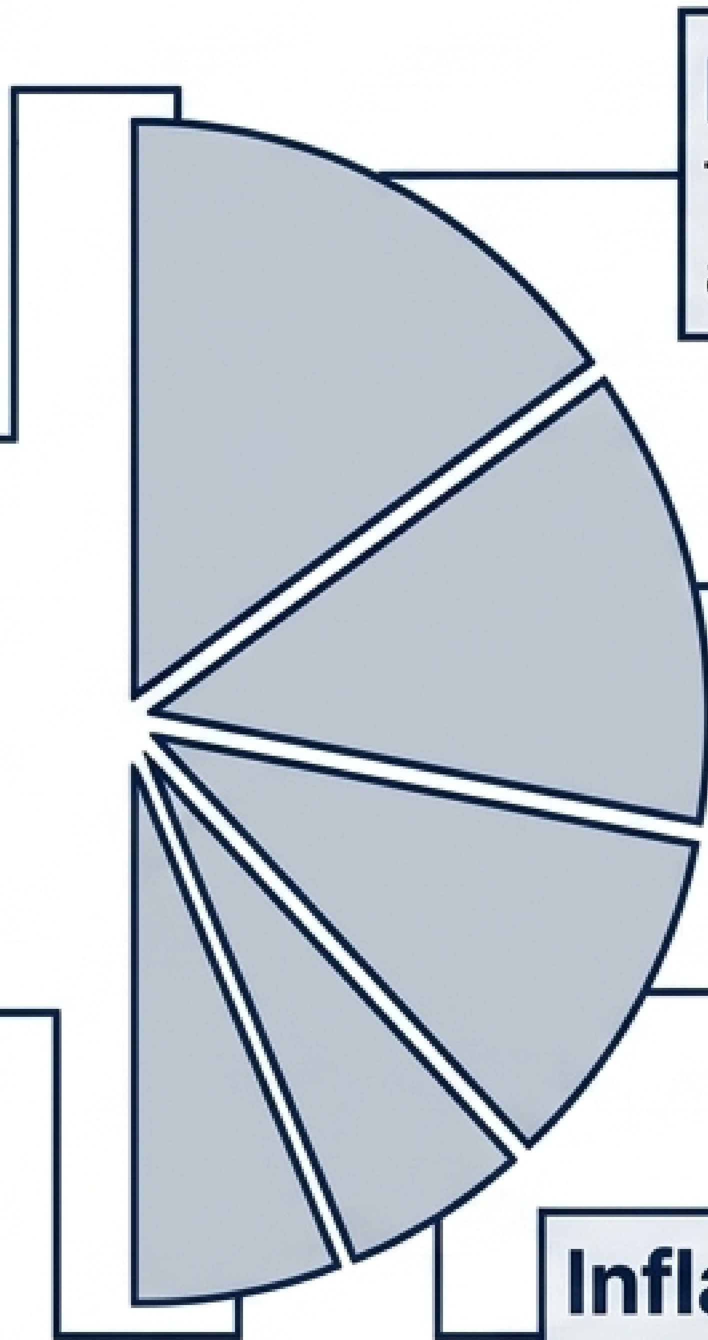
	EVAR	Open Repair
Approach	Percutaneous femoral, stent-graft.	Midline laparotomy, prosthetic graft.
30-Day Mortality	1-2% (Early safety advantage)	4-5%
Long-Term Durability	Inferior beyond 5-8 yrs. Higher reintervention rate (20-30%).	Superior beyond 5-8 yrs. Very low reintervention rate (<5%)
Anatomical Requirement	Strict. Needs >=15mm neck and good iliac access.	Versatile. Suitable for hostile anatomy and young patients.

Australian EVAR Surveillance Protocol: Lifelong requirement.
CTA at 30 days, 12 months; Duplex US annually thereafter.

Thoracic Aortic Aneurysms (TAA) & Etiologies







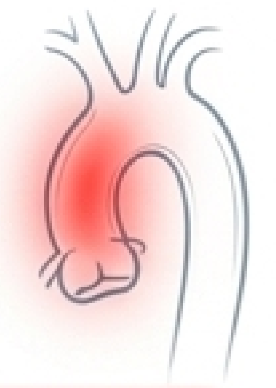
Degenerative / Atherosclerotic (~60%)
Typically descending aorta, older adults. Linked to HTN and smoking. Mean growth rate 0.1-0.2 cm/year.

Genetic / Connective Tissue (~20%)
Marfan Syndrome, Loeys-Dietz. Earlier onset, highly aggressive growth requiring early intervention.

Bicuspid Aortic Valve (BAV) (~10-15%)
Aortopathy independent of valve haemodynamics—caused by underlying extracellular matrix defect.

Inflammatory / Post-dissection (~5%)
Takayasu arteritis, Syphilis, or chronic residual dissection flap

The Genetic Aortopathies Matrix



Marfan Syndrome

- **Gene:** *FBN1* (Fibrillin-1)
- **Growth:** ~0.2-0.3 cm/year
- **Clinical Rule:** Calculate Z-scores. Prophylactic valve-sparing root replacement (David procedure) is preferred over Bentall.

Loeys-Dietz Syndrome (LDS)

- **Gene:** *TGFBR1/2, SMAD3*
- **Growth:** Highly variable, faster than Marfan.

⚠ **Critical Alert:** Dissection can occur at <4.0 cm.

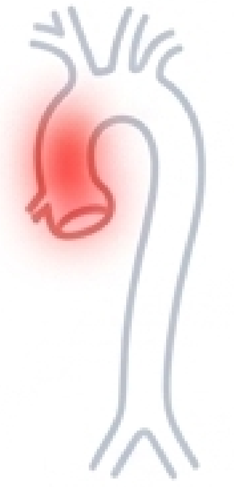
Requires full arterial tree imaging from brain to pelvis due to widespread risk.

Vascular Ehlers-Danlos (Type IV)

- **Gene:** *COL3A1*
- **Clinical Rule:** Medical management is mainstay. Avoid invasive angiography.

⚠ **Critical Alert:** Extreme tissue fragility. High risk of spontaneous bowel/uterine rupture. Exceedingly poor surgical healing.

TAA Shifting Surgical Thresholds



4.0 cm — 4.5 cm — 5.0 cm — 5.5 cm — 6.0 cm

Loeys-Dietz Syndrome (earliest intervention)

Marfan (with risk factors: family history, rapid growth, pregnancy desire)
OR
Bicuspid Aortic Valve (with concomitant valve replacement)

Marfan (baseline without additional risks)

Degenerative TAA & Bicuspid Aortic Valve (baseline)

Growth Alert: Expansion >0.5 cm in 6 months or >1.0 cm in 12 months dictates intervention regardless of absolute diameter.

The Three Pillars of Medical Protection

Blood Pressure Control

The Cornerstone.

Target <130/80 mmHg. Goal is to reduce aortic wall stress (dP/dt). Requires lifelong management.

Statin Therapy

For all patients.

Reduces massive CV mortality risk (the leading cause of death in AAA) and provides plaque stabilization regardless of baseline lipid levels.

Smoking Cessation

The Greatest Multiplier.

The single most modifiable risk factor. Halts accelerated growth. Use combined pharmacological and behavioral support.

The Pharmacology Playbook

Marfan Root Protection

Atenolol: 25-50 mg BD (Target resting HR <60 bpm). First-line to slow dilation via reduced dP/dt.

Losartan: 25-100 mg daily. Reduces TGF-beta signaling. Synergistic with beta-blockers.

Standard BP Control

Perindopril: 5-10 mg PO daily. Monitor potassium if eGFR <30.

Amlodipine: 5-10 mg PO daily. No renal adjustment required.

Target: Strict <130/80 mmHg.

Statin Therapy

Atorvastatin: 40-80 mg daily. High-intensity secondary prevention. No renal adjustment needed.

Rosuvastatin: 20-40 mg daily. Max 10mg if eGFR <30.

Smoking Cessation

Varenicline (Champix): 12-week titrated course, PBS general benefit.

NRT: Patches 21mg/24h combined with oral forms for breakthrough cravings.

Action: Refer to Quitline (13 7848) and bill MBS 2517.

Clinical Nuances Matrix

Pregnancy (Haemodynamic Stress)

- 30-50% cardiac output jump. High risk of 3rd-trimester dissection.
- Marfan requires pre-conception root replacement if ≥4.5cm.
- Atenolol, ARBs, and ACEi are teratogenic. Switch to Labetalol.
- Caesarean section recommended if root ≥4.0cm.

Paediatrics (Growth Tracking)

- Absolute diameters are unreliable in growing children.
- Mandatory use of Z-scores indexed to body surface area.
- Strict avoidance of competitive, contact, and isometric sports.

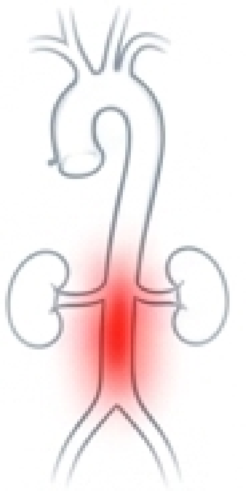
The Elderly (Frailty)

- Balance EVAR 30-day safety against the lifelong surveillance burden.
- Permissive systolic targets (130-150 mmHg) are acceptable to prevent orthostatic falls.
- Incorporate Clinical Frailty Scale into surgical MDT.

Renal Impairment (Contrast Risk)

- High risk for contrast-induced nephropathy during CTA.
- Pre-hydrate with 1mL/kg/h saline. Consider CO2 angiography.
- Adjust Atenolol and Rosuvastatin dosages based on eGFR.
- Monitor eGFR at 1, 3, and 6 months post-EVAR.

Aboriginal and Torres Strait Islander Health



The Care Gap & Disparity

- Lower reported screening prevalence but disproportionately **higher rupture mortality**.
- Compounded by very high smoking rates (**40%** vs **12%**).
- Remote geographical barriers cause critical retrieval times (**>24h**) for **acute ruptures**.

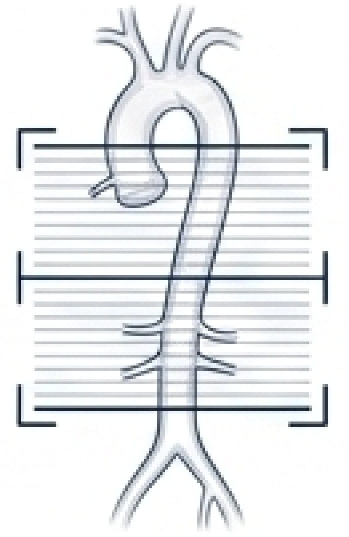
The Strategic Action Plan

Screening: Integrate abdominal ultrasound into **MBS 715** health assessments starting early at **age 50**. Utilize **POCUS** in remote clinics.

Surveillance: Leverage **telehealth** for vascular **MDT reviews** and Royal Flying Doctor Service (**RFDS**) for outreach imaging.

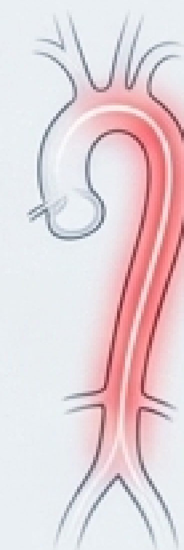
Support: Utilize the Patient Assisted Travel Scheme (**PATS**) and collaborate with **Aboriginal health practitioners** for culturally safe smoking cessation.

The Modality Matrix



Ultrasound (MBS 55208)	First-line screening and AAA size surveillance. Non-invasive, >95% infrarenal sensitivity.
CT Aortography (CTA) (MBS 56300)	The Gold Standard for operative planning (EVAR anatomy). Pre-hydrate if eGFR <45.
MR Aortography (MRA) (MBS 63000)	Preferred for genetic aortopathies and young patients to eliminate cumulative radiation dose.
Echocardiography (TTE/TOE) (MBS 55118 / 55127)	TTE is essential for Marfan/BAV root Z-scores. TOE is superior for viewing descending aorta/arch dissection.

Synthesis: The Clinical Master-Algorithm



Entry

Screening (MBS 715 / Age 65)

OR

Symptoms.

Baseline Medical

Universal Pathway: Target BP <130/80, High-intensity Statins, Strict Smoking Cessation.

Thoracic Pathway

Check genetics (Marfan/LDS) & BAV.

Image via Echo/MRA.

Surgical thresholds shift dynamically (4.0 - 5.5cm).

Abdominal Pathway

Atherosclerotic profile.

Enter Ultrasound surveillance loop.

The 5.5cm hard line (or 5.0cm women).

Intervention

Vascular Surgery MDT –> Choose EVAR vs Open Repair

–> Lifelong post-op surveillance.

Med2Date Guidelines 2026. Transforming silent risk into managed outcomes.