Consumer backgrounder

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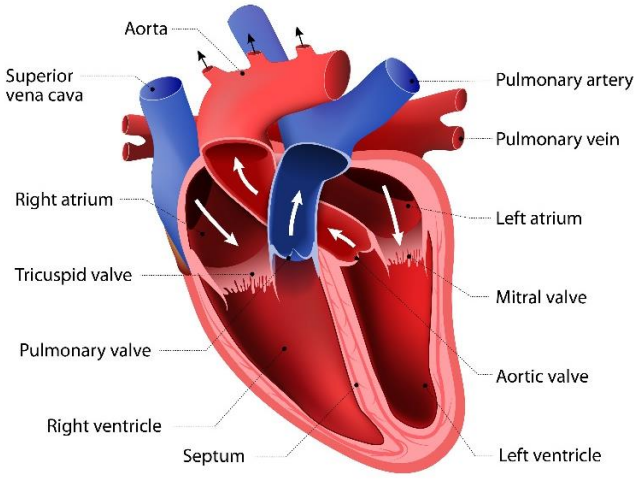
About heart valve disease

About the heart valves

- Located at the exit of each of the four heart chambers, the four heart valves maintain one-way blood flow through the heart, ensuring blood flows effectively to the lungs and body.[1]
- Their repetitive opening and closure occurs with each heartbeat, with the valves opening and closing more than two billion times in a lifetime.[2]
- The four heart valves include the:[1]
    - **Tricuspid valve** — controls the blood flow between the right atrium and right ventricle.



    - **Mitral valve** — controls the blood flow between the left atrium and left ventricle.
    - **Pulmonary valve** — controls blood flow between the heart and the pulmonary artery, which carries blood to the lungs.
    - **Aortic valve** — controls blood flow from the heart to the aorta, which carries blood to the rest of the body.

About heart valve disease

- Heart valve disease (HVD) occurs when one or more of the heart valves don't open or close properly, causing the blood flow through the heart, and to and from the body, to be disrupted.[1,3]
- There are several types of HVD — narrowing (stenosis), leaking (regurgitation), or less commonly, absence (atresia).[1,4]
    - **Stenosis** — a thickening or stiffening of the valve, or fusing of the valve flaps, leaving less space for blood to flow through, requiring the heart to work harder. It can be congenital (from birth) or degenerative in nature, largely due to age-related damage.[4]
    - **Regurgitation** — the valves don’t close tightly, due to being stretched, ruptured or too small (from shrinking due to scarring), causing blood to flow backwards, and the heart to work harder to pump the blood forwards.[4]
    - **Atresia** — a condition whereby the valve is malformed, causing tissue to block the blood flow between the chambers.[1]

- Aortic valve disease (encompassing both stenosis and regurgitation) is the most frequent cause of severe valvular heart disease. Its most common presentation is aortic stenosis (AS) — a moderate to severe narrowing of the aortic valve.[5]
- Mitral regurgitation (MR) — moderate to severe leakage from the mitral valve — is the most specific, common type of HVD.[6]
- If not identified, or treated, HVD can compromise heart rhythm, and cause blood clots, stroke, heart failure, and death.[7]

Prevalence

- Both the incidence and prevalence of aortic and mitral valve disease increase with age.[8,9]
- Estimates suggest there are between 500,000 and 600,000 people in Australia living with HVD.[6]
- Approximately 254,000 Australians are living with undiagnosed HVD, with projections suggesting this number will grow substantially in 2031 to 336,000, and in 2051 to 435,000.[5]
- In general, CVD has a greater impact on older people, Indigenous Australians and people living in remote or low socioeconomic areas.[10]

Aortic stenosis

- Aortic stenosis is present in around 2 per cent of those aged 75 years and over.[11]
- With an ageing population, the number of people with moderate to severe aortic stenosis will continue to climb to an estimated 200,000 in 2031, and 266,000 in 2051, respectively.[5]

Aortic regurgitation

- Approximately 100,000 Australians are currently living with aortic regurgitation.[5]
- The number of people in Australia with aortic regurgitation is set to increase to from 131,000 in 2031, and 160,000 by 2051, due to the ageing population.[5]

Mitral regurgitation

- Mitral regurgitation has been diagnosed in approximately 150,000 Australians this year, and is projected to increase to 200,000 cases by 2051.[5]
- The 520,000 Australians living with mitral regurgitation in 2021 will increase to 670,000 by 2051, with 30 per cent affected by moderate to severe disease.[12]
- Mitral regurgitation is prevalent in one to two per cent of those under 60 years of age, and nine to 11 per cent in those aged 70+.[6,13]

Burden of heart valve disease

- Cardiovascular disease (CVD), which encompasses HVD, is the leading cause of death in Australia and worldwide.[10,14]
- In Australia, CVD accounts for 30 per cent of all deaths, causing one death every 12 minutes.[15]

- CVD is Australia's second-largest direct health care cost, amounting to AUD 10.4 billion annually.[10]
- In 2017, 11 per cent, or 1.2 million hospitalisations were due to CVD.[10]
- Increases in the burden of HVD are strongly driven by our ageing population, with Australians aged 65 years and older most affected.[5]
- CVD, including HVD, can reduce and compromise a person's ability to remain in the workforce.[5]

Causes

- In Australia, the most common causes of heart valve disease are age-related. Ageing can cause the blood vessels to lose their elasticity and stiffen, prompting the blood to flow faster around the body, which can lead to heart valve disease.[9,16]
- Some patients living with HVD have abnormalities of the valves present at birth (congenital heart disease).[1]
- HVD can also run in some families, which indicates genetics may be involved.[17]
- Rheumatic fever, caused by untreated infections with strep bacteria (such as strep throat), can cause HVD.[7] While the body tries to fight the strep infection, one or more heart valves can become damaged or scarred in the process, which generally isn't uncovered until years after recovery.[7]
- People with risk factors for coronary heart disease, including high blood pressure, high blood cholesterol, smoking, diabetes, obesity, lack of physical activity, and a family history of heart disease, are at heightened risk for developing HVD.[7]
- In particular, low cardiorespiratory fitness if one of the strongest and most important risk factors for CVD morbidity and mortality.[18,19]

Symptoms

- HVD is generally characterised by a prolonged asymptomatic period, which can last for years.[20] Therefore, a regular physical examination of the cardiovascular system should form part of an annual check-up for every Australian over 65 years of age.
- The most common symptoms of HVD, in particular exercise intolerance, are often misattributed to 'old age'.[5]
- One of the first signs of HVD is a heart murmur, however not every murmur is associated with HVD.[1]
- A heart murmur is a sound caused by the flow of blood within the heart. Instead of the normal 'lub-dub' sound, the heartbeat of those living with a heart murmur may have an added sound, like a hum, a whoosh or a rasp.[21]

- The common symptoms of HVD include shortness of breath, chest pain and palpitations, fatigue (low energy), cough, dizziness and/or fainting, difficulty when exercising, swollen ankles and feet, abdominal swelling, and a fast or irregular heartbeat.[1,4]

Diagnosis

- It is important to recognise valvular disease early, to avoid a person presenting in a crisis.[5]
- Given some people may develop significant HVD in the absence of any symptoms, effective surveillance of the disease means performing complete physical examinations of every patient at risk, particularly older people.[1,22]
- A physical examination by a GP is the cornerstone for detecting HVD.[1]
- Auscultation — the process of listening to the heart and lungs through a stethoscope — is the first step in diagnosing HVD. Without this crucial step, a person may go undiagnosed.[23]
- Each heart valve lesion has a characteristic murmur that can be heard with a stethoscope, and characterised by timing during the cardiac cycle, location on the chest, and pitch of the sound.[24]
- Any abnormalities detected can be further evaluated with an electrocardiogram (ECG), which shows the electrical activity of the heart.[1]
- Chest X-rays may be used to provide information about the size and configuration of the heart, the presence of valvular calcification, and any congestion in the lungs.[5,25]
- Access to echocardiography — an ultrasound test used to image the heart valves and chambers, and to measure flow within the heart — is a vital component in managing valvular disease in the community, and is the most commonly performed test for the assessment and follow-up of HVD.[5,25,26]
- Similar to echocardiography, cardiac magnetic resonance imaging (MRI) may be used to provide imaging on the structure and function of the heart.[25] MRI provides higher

image quality than ultrasound (which may be compromised by overlying lung tissue or fat), and may provide more reliable measurement of valve leakage.[26]

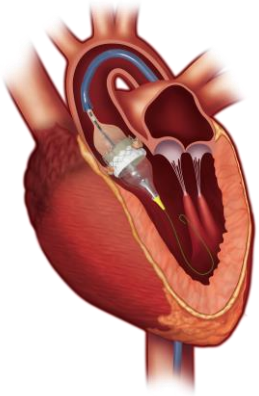
- As Australians gain further access to heart imaging for the diagnosis of HVD, this will drive a substantial increase in those eligible for intervention.[5]

Prevention

- Prevention of HVD focuses primarily on lifestyle changes that promote healthy living, including physical activity, diet, weight management, smoking cessation, limiting alcohol consumption, and ensuring adequate sleep.[5,7]

Treatment and management

- Many people living with HVD are recognised before intervention is required. In these individuals, frequent medical follow-up is essential.[5]
- Although heart valve conditions are serious, they are increasingly treatable.[1]
- Heart valve interventions involve replacement, either with an operation, or — increasingly — using a catheter procedure, repairing valve leaflets (usually for regurgitant valves), or splitting a stenotic valve with a balloon (valvuloplasty).[1]
- Earlier interventions are occurring with transcatheter aortic valve implantation (TAVI).[27]



Transcatheter aortic valve implantation (TAVI)

- TAVI is a minimally invasive procedure that helps to improve a damaged aortic valve. During the TAVI procedure an artificial aortic valve is placed in the heart.[27,28]
- Providing earlier intervention of heart valve replacement with TAVI is predicted to result in greater patient benefits — greater quality of life, fewer life years lost, and fewer cases of heart failure.[5]
- Aortic stenosis is arguably, the most treatable valve lesion due to the development of non-surgical valve replacement, such as TAVI.[5]
- Mitral regurgitation is unfortunately, less responsive to intervention.[5]
- Following surgery, cardiac rehabilitation has been shown to improve cardiorespiratory fitness, counteract depression and anxiety, and improve overall health-related quality of life.[29]
- It is important that patients are monitored regularly following intervention, to check for potential deterioration of prosthetic valves, and to enable early detection of disease in any other valve.[30]

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