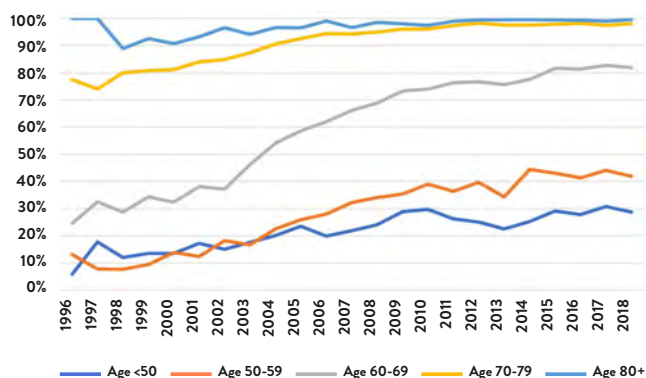


# Bioprosthetic vs. Mechanical Aortic Valve Replacement in Patients 40–75 Years

## INTRODUCTION

Over the past decade, there has been a steady decline in the use of mechanical heart valves for aortic valve replacement (AVR). The decline in mechanical aortic valve use is particularly evident in younger patients, who historically were more likely to receive mechanical valves due to their longer life expectancy. This retrospective study aimed to compare the risk-adjusted long-term survival benefit of bioprosthetic versus mechanical aortic valve replacement (AVR) in patients aged 40–75 years.<sup>1</sup>

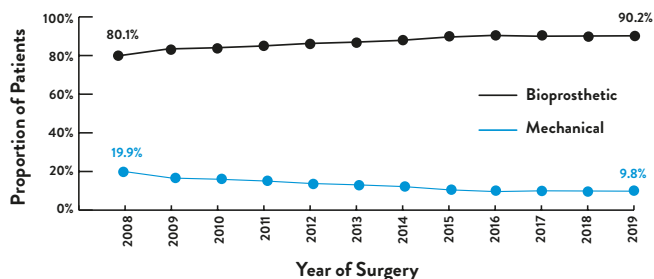
### Proportion of Bioprostheses used against Mechanical Prostheses



Trend of the proportion of bioprostheses used (against mechanical prostheses) across all five age groups from 1996 to 2018<sup>2</sup>

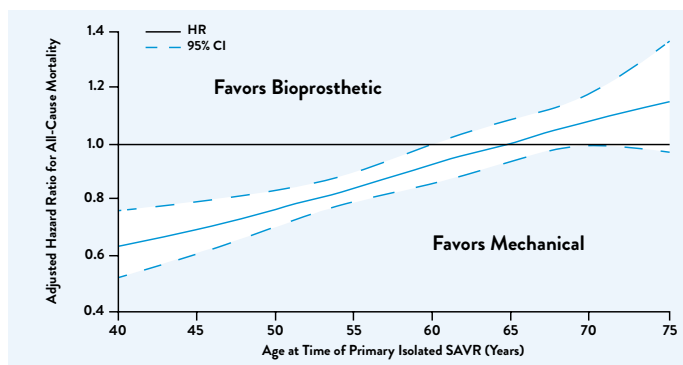
## DEMOGRAPHICS

Of the 109,842 patients, 14.3% (15,717) received mechanical valves, while 85.7% (94,125) received bioprosthetic valves. Over the study period, mechanical AVR procedures decreased from nearly 20% in 2008 to less than 10% in 2019.



## RESULTS

The study found that mechanical AVR was associated with a significant survival benefit in patients aged  $\leq 60$  years compared to bioprosthetic AVR. The risk-adjusted all-cause mortality rates at 12 years were lower for mechanical AVR in the 40–49 and 50–59 age groups but not significantly different in the 60–69 age group. The primary endpoint of this study was all-cause mortality and did not take into consideration additional complications.



## METHODS

The researchers conducted a retrospective analysis using data from the Society of Thoracic Surgeons Adult Cardiac Surgery Database (STS-ACSD) linked with the National Death Index (NDI). The study included 109,842 patients, 97% of all patients, who underwent primary isolated AVR between 2008 and 2019. The median follow-up period was 5.44 years.

To accurately compare the valve types, the analysis employed robust risk adjustment techniques, including age-specific inverse probability weighing and restricted cubic splines. Patients were excluded if they had endocarditis, emergency/salvage status, shock, left ventricular ejection fraction (LVEF)  $\leq 25\%$ , prior cardiac surgery, or received discontinued bioprosthetic aortic valves.

## DISCUSSION

The decline in mechanical aortic valve replacements over the past several years may not be what is best for patients. The results from this study concluded that mechanical AVR offers a survival advantage for patients 60 and younger, which goes against the ongoing aortic valve replacement trend. Reliance on real-world nationwide data and patient specific valve selection are key to providing patients with the best long-term clinical outcomes.

In summary, this study provides critical insights into the long-term survival of bioprosthetic versus mechanical AVR in patients aged 40–75 years. With the availability of a precise age cutoff of 60 years to inform clinical practice, managing clinicians may now provide better guidance regarding prosthesis type with a preference to use MHVs in patients < 60 years. The 2021 ESC guidelines<sup>3</sup> recommend a MHV in patients < 60 years of age undergoing SAVR and align with results of the current study. An update to the 2020 ACC/AHA guidelines to align with the 2021 ESC guidelines may be warranted. These findings have the potential to shape clinical practice, ultimately improving patient care and outcomes in aortic valve replacement.

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**Rx Only**

**Important Safety Information**

## MASTERS SERIES MECHANICAL HEART VALVE

### INDICATIONS FOR USE

The SJM™ Masters Series Mechanical Heart Valve is intended for use as a replacement valve in patients with a diseased, damaged, or malfunctioning aortic or mitral heart valve. This device may also be used to replace a previously implanted mitral or aortic prosthetic valve.

### CONTRAINDICATIONS

The SJM™ Masters Series Mechanical Heart Valve is contraindicated for individuals unable to tolerate anticoagulation therapy.

### POTENTIAL ADVERSE EVENTS

Complications associated with replacement mechanical heart valves include, but are not limited to, hemolysis, infections, thrombus, or thromboembolism, valve dehiscence, unacceptable hemodynamic performance, hemorrhagic complications secondary to anticoagulation therapy, prosthetic failure, failure or death. Any of these complications may require reoperation or explantation of the device.

**Rx Only**

**Important Safety Information**

## REGENT™ MECHANICAL HEART VALVE

### INDICATIONS FOR USE

The SJM Regent™ Mechanical Heart Valve is intended for use as a replacement valve in patients with a diseased, damaged, or malfunctioning aortic valve. This device may also be used to replace a previously implanted aortic prosthetic valve.

### CONTRAINDICATIONS

The SJM Regent™ Mechanical Heart Valve is contraindicated for individuals unable to tolerate anticoagulation therapy.

### POTENTIAL ADVERSE EVENTS

Complications are associated with replacement mechanical heart valves include, but are not limited to, hemolysis, infections, thrombus, or thromboembolism, valve dehiscence, unacceptable hemodynamic performance, hemorrhagic complications secondary to anticoagulation therapy, prosthetic failure, heart failure or death. Any of these complications may require reoperation or explantation of the device.

## REFERENCES

1. Bowdish M. et al. (2025). Bioprosthetic vs mechanical aortic valve replacement in patients 40 to 75 years of age. *Journal of the American College of Cardiology*, 85(12), 1289–1298. <https://doi.org/10.1016/j.jacc.2025.01.013>
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