

Age-Specific Distribution and Selection Patterns of Mechanical and Bioprosthetic Valves in Surgical Aortic Valve Replacement: A 2023 Nationwide Analysis in Taiwan

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Abstract

Background: Surgical aortic valve replacement (SAVR) remains the standard therapy for patients with severe aortic valve disease in Taiwan. Prosthetic selection—between mechanical and bioprosthetic valves, with the latter including both fully reimbursed and balance-billing models—has shifted substantially in recent years alongside aging demographics and evolving patient preferences. Population-based data from the National Health Insurance (NHI) claims system provide a comprehensive overview of contemporary device utilization patterns.

Methods: We analyzed all 2023 SAVR procedures involving prosthetic valves identified from the Taiwan National Health Insurance Research Database (NHIRD). Patients were stratified by age: >80 years, 65–80 years, and <65 years. Valve types were categorized as mechanical valves, fully reimbursed bioprosthetic valves, and balance-billing bioprosthetic valves. Distributions across age groups and detailed sub-brand usage were summarized descriptively.

Results: A total of 2,929 SAVR procedures were recorded in 2023. Age distribution was >80 years: 121 (4.13%), 65–80 years: 1,406 (48.00%), and <65 years: 1,402 (47.87%).

Overall valve utilization included mechanical valves (701; 23.93%), fully reimbursed bioprosthetic valves (976; 33.32%), and balance-billing bioprosthetic valves (1,252; 42.75%).

By age group: >80 years (n = 121): Mechanical 7 (5.8%), fully reimbursed bioprosthetic 73 (60.3%)—mainly *EPIC* and *Hancock* models—and balance-billing bioprosthetic 41 (33.9%), dominated by *MAGNA EASE* and *INSPIRIS*. 65–80 years (n = 1,406): Mechanical 113 (8.0%), fully reimbursed bioprosthetic 571 (40.6%) (*Hancock* ≈47%, *EPIC* ≈45%), and balance-billing bioprosthetic 722 (51.4%), primarily *MAGNA EASE* (~48%) and *INSPIRIS* (~18%). <65 years (n = 1,402): Mechanical 581 (41.4%), fully reimbursed bioprosthetic 332 (23.7%), and balance-billing bioprosthetic 489 (34.9%), again with *MAGNA EASE* and *INSPIRIS* as the most frequently used brands.

Overall, bioprosthetic valves predominated in patients ≥65 years, while mechanical valves were concentrated among younger patients. Across bioprosthetic categories, *Hancock* and *EPIC* were the leading fully reimbursed valves, whereas *MAGNA EASE* and *INSPIRIS* were the dominant balance-billing choices.

Conclusions: In Taiwan's 2023 SAVR practice, bioprosthetic valves have become the predominant choice, particularly among patients aged 65 years and older, whereas mechanical valves remain prevalent in younger patients. Balance-billing bioprosthetic valves accounted for the largest single category, reflecting increasing adoption despite partial reimbursement. These findings provide a valuable nationwide benchmark for prosthesis selection trends, healthcare planning, and future outcome evaluation of valve replacement strategies.