Optimizing Aortic Stenosis Management: Evaluating the Clinical and Economic Impact of Transcatheter and Surgical Valve Replacement in Taiwan

EE7

Yu-Hua Fu, PharmD, MS[1,2]; Chih-Fan Yeh, MD, PhD[3]; Mao-Shin Lin, MD, PhD[3]; Chia-Jui Chang, MS[2]; Fang-Ju Lin, PhD[2,4]

[1]Department of Practice, Science, and Health Outcomes Research, School of Pharmacy, University of Maryland Baltimore, Maryland, USA
[2]Graduate Institute of Clinical Pharmacy, College of Medicine, National Taiwan University, Taipei, Taiwan
[3]Division of Cardiology and Cardiovascular Center, Department of Internal Medicine, National Taiwan University Hospital, Taipei, Taiwan
[4]Department of Pharmacy, National Taiwan University Hospital, Taipei, Taiwan

BACKGROUND

- Transcatheter aortic valve replacement (TAVR) has demonstrated clinical benefits for patients with aortic stenosis (AS).[1,2] Nonetheless, the substantial expenses associated with TAVR devices and procedures pose significant challenges for broadening its clinical utility and extending insurance coverage.
- The actual effectiveness of TAVR as compared to surgical aortic valve replacement (SAVR) in real-world settings for AS patients in Taiwan remains uncertain.

STUDY OBJECTIVE

- To assess the clinical and economic outcomes throughout and following the index hospitalization for aortic valve replacement (AVR) in Taiwan.

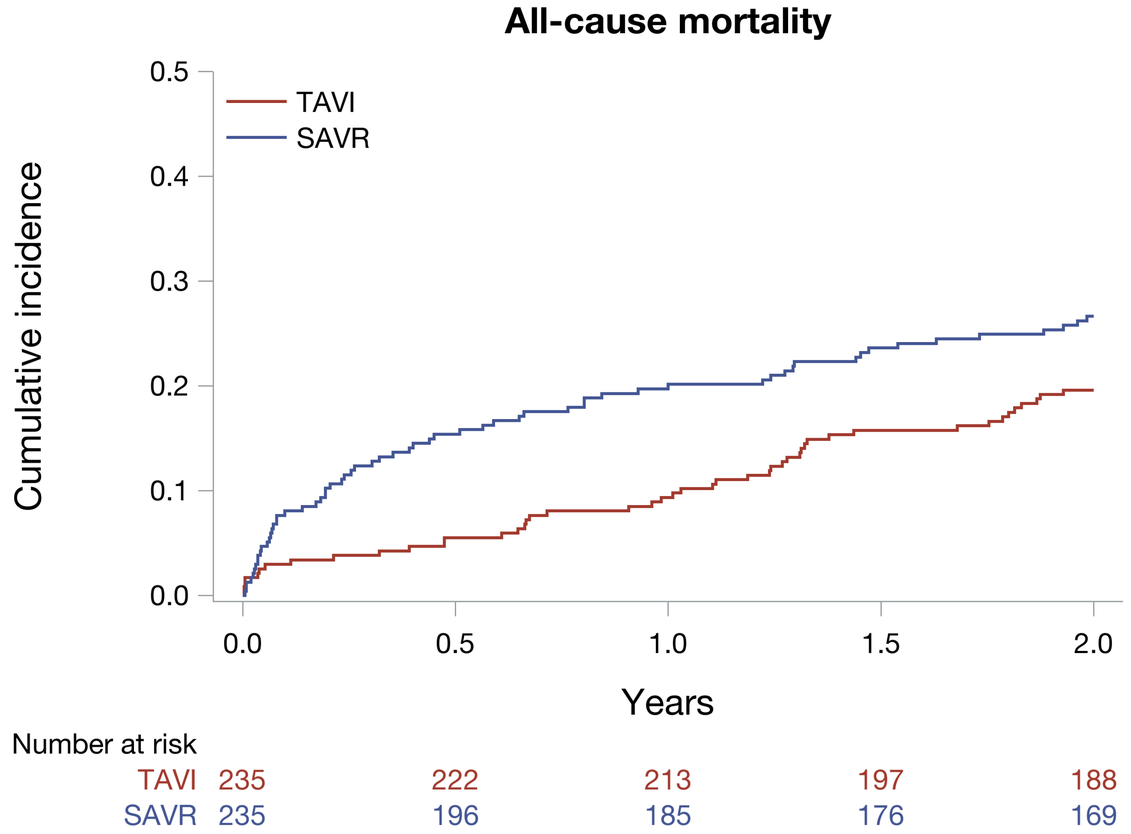
METHODS

- **Study design:** retrospective cohort study
- **Data source:** Taiwan's National Health Insurance Research Database
- **Study population:** AS patients who underwent TAVR or SAVR between January 2016 and December 2018
- **Comparison groups**: individuals who underwent TAVR vs. SAV
- **Study outcomes**: (1) total and ICU length of stay during index hospitalization; (2) medical expenditures; (3) all-cause mortality
- **Duration of follow-up:** two years from the index admission for AVR
- **Confounder adjustment**: Propensity score (PS) matching, taking into account baseline characteristics, including age, sex, comorbidities, medication use, hospital frailty risk score (HFRS), and logistic EuroSCORE, to establish a 1:1 PS matched cohort
- **Statistical analyses for comparing TAVR and SAVR groups:**
  - Clinical outcomes: restricted mean survival time (RMST) analysis
  - Economic outcomes: conditional generalized gamma regression
  - Cost-effectiveness analysis: incremental cost-effectiveness ratio (ICER)
  - Subgroup analysis: logistic EuroSCORE <10% (lower risk) and ≥10% (higher risk)

RESULTS

- A total of 455 patients underwent TAVR, while 832 patients received SAVR between 2016 and 2018. After PS matching, 235 PS-matched pairs were created for further analysis.
- Patients with TAVR experienced shorter hospital stay, including total length of stay (median 15 vs. 20 days) and ICU stay (2 vs. 5 days), compared to patients who received SAVR (**Table 1**).
- Patients with TAVR demonstrated lower all-cause mortality rates, with a 2-year RMST difference of 0.17 years (**Figure 1**).
- Patients receiving TAVR exhibited higher expenditures both during and after the index hospitalization (**Table 1**). Overall, the ICER at 2 years was estimated to be USD 147,630 per life-year gained (three times Taiwan's gross domestic product [GDP] per capita: USD 85,648 in 2020).
- Subgroup analysis suggested that TAVR could be more cost-effective for patients with a logistic EuroSCORE of ≥10% (ICER: USD 67,412 per life-year gained), while SAVR emerged as the dominant option for patients with a logistic EuroSCORE of <10% (**Table 2**).

Figure 1. Comparison of health resource utilization use between TAVR and SAVR after propensity score matching



	TAVR	SAVR
Events / Total PY	46 / 421.02	62 / 376.58
IR per 100 PY (95% CI)	10.93 (8.18~14.59)	16.46 (12.84~21.12)
HR (95% CI)	0.68 (0.47~0.98)	Reference
RMST at 2 years, years (95% CI)	1.80 (1.73~1.86)	1.63 (1.54~1.72)
RMST difference, years (95% CI)	0.17 (0.06~0.28)	Reference

Table 1. Comparison of health resource utilization between TAVR and SAVR after propensity score matching

	TAVR Median (Q1-Q3)	SAVR Median (Q1-Q3)	Ratio (95% CI)
Length of stay during index hospitalization			
Total length of stay	15 (9~21)	20 (15-32)	**0.70 (0.59~0.83)**
ICU length of stay	2 (1~5)	5 (3-11)	**0.51 (0.35~0.75)**
Medical expenditures (USD)			
Index hospitalization	39,991 (37,843~43,979)	15,295 (12,202~20,162)	**2.25 (2.05~2.46)**
Within 6 months after index hospitalization	903 (471~2,085)	655 (334~2,143)	1.19 (0.69~2.05)
Within 12 months after index hospitalization	1,891 (912~4,834)	1,409 (632~4,114)	1.31 (0.86~2.00)
Within 24 months after index hospitalization	4,335 (1,925~8,422)	3,212 (1,236~9,588)	1.13 (0.82~1.56)

Table 2. Incremental cost-effectiveness ratios of TAVR compared to SAVR after propensity score matching

	TAVR		SAVR				
	Total LYs	Total cost (USD)	Total LYs	Total cost (USD)	ΔLYs	ΔCost (USD)	ICER (95% CI)
Overall cohort	421.13	12,617,881	381.39	6,751,973	39.74	5,865,788	147,630 (82,702-401,958)
Subgroup analysis based on logistic EuroScore							
<10%	206.41	5,438,510	210.29	2,948,946	-3.88	2,489,565	-641,535 (-4,811,478~4,843,955) **SAVR dominant**
≥10%	206.47	5,970,600	161.08	3,399,125	45.39	3,059,943	67,412 (42,537~122,812)

CONCLUSIONS

- TAVR demonstrated favorable clinical outcomes with shorter index hospitalization periods and reduced all-cause mortality. However, in terms of cost-effectiveness, TAVR appeared to be a viable option primarily for patients with a higher cardiac operative risk due to the associated elevated costs.

Presented at International Society of Pharmacoeconomics and Outcomes Research Europe (ISPOR Europe 2023)
For further information, please contact: Yu-Hua Fu (yu-hua.fu@umaryland.edu)

REFERENCES

1. Smith CR, Leon MB, Mack MJ, et al. Transcatheter versus surgical aortic-valve replacement in high-risk patients. N Engl J Med. 2011;364:2187-2198.
2. Leon MB, Smith CR, Mack M, et al. Transcatheter aortic-valve implantation for aortic stenosis in patients who cannot undergo surgery. N Engl J Med. 2010;363:1597-1607.