Temporal trends and determinants of aortic valve replacement in patients with asymptomatic severe aortic stenosis

Poster #EPH183

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Background

Existing knowledge

- Many patients with asymptomatic severe aortic stenosis (AS) progress to symptoms or require aortic valve replacement (AVR) within a few years.
- Asymptomatic severe AS is typically managed with clinical surveillance every 6–12 months.
- Emerging evidence favors earlier intervention in select patients. Randomized data from the EARLY-TAVR clinical trial published in October 2024 suggest that early surgical AVR (SAVR) or transcatheter AVR (TAVR) reduces mortality/heart failure hospitalization.

Objective

- Quantify 6-month TAVR/SAVR among adults with asymptomatic severe AS in 2017–early 2024 and identify clinical and sociodemographic determinants of AVR.

Methods

Data

- A subset of Truveta Data: real-world US electronic health record (EHR) data, which is aggregated, normalized, and de-identified from US health care systems comprising clinics and hospitals.

Population

- Adults ≥50 years with first qualifying (index event) severe AS echo in January 2017– March 2024. Severe AS defined as: aortic valve area ≤1 cm² or mean avg gradient ≥40 mmHg or Vmax ≥4 m/s.
- Inclusion criteria:
  - Usual-care encounter in both the 0–6 and 7–12 months prior to index event date.
- Exclusion criteria:
  - Heart failure, angina, syncope, presyncope, or dyspnea at, before, or ≤6 months after index.
  - AS diagnosis or AVR prior to index; low-gradient, low ejection fraction (LG-LEF) phenotype.
  - Patients with TAVR and SAVR on same day were excluded.

Analyses:

- Outcome & follow-up: 6-month AVR from index date with censoring at procedure, last encounter, or 6 months.
- Annual 6-month AVR rates (overall, TAVR, SAVR).
- Cox proportional hazard regression models for any AVR, TAVR, SAVR, adjusted for demographics and comorbidities.

Table 1. Yearly trends in TAVR/SAVR treatment among patients with asymptomatic severe AS, 2017-2024.

	2017 N = 2,748	2018 N = 2,264	2019 N = 1,798	2020 N = 1,563	2021 N = 1,477	2022 N = 1,213	2023 N = 2,011	2024 N = 410
Categories of asymptomatic aortic stenosis								
High gradient-Normal EF without symptoms	665 (24.2%)	505 (22.3%)	348 (19.4%)	266 (17.0%)	154 (10.4%)	106 (8.7%)	232 (11.5%)	29 (7.1%)
Low gradient-Normal EF without symptoms	2,083 (75.8%)	1,759 (77.7%)	1,450 (80.6%)	1,297 (83.0%)	1,323 (89.6%)	1,107 (91.3%)	1,779 (88.5%)	381 (92.9%)
Had any TAVR during the 6-month follow-up period	16 (0.6%)	8 (0.4%)	10 (0.6%)	18 (1.2%)	27 (1.8%)	15 (1.2%)	45 (2.2%)	9 (2.2%)
Had any SAVR during the 6-month follow-up period	47 (1.7%)	29 (1.3%)	13 (0.7%)	16 (1.0%)	17 (1.2%)	22 (1.8%)	28 (1.4%)	12 (2.9%)
Had any TAVR/SAVR during the 6-month follow-up period	63 (2.3%)	37 (1.6%)	23 (1.3%)	34 (2.2%)	44 (3.0%)	37 (3.1%)	73 (3.6%)	21 (5.1%)

Table 2. Time to event analysis of TAVR/SAVR treatment among patients with asymptomatic severe AS.

	Time to TAVR/SAVR		Time to TAVR		Time to SAVR	
	HR[1]	95% CI[1]	HR[1]	95% CI[1]	HR[1]	95% CI[1]
Categories of aortic stenosis						
LG-NEF with symptoms	—	—	—	—	—	—
HG-NEF with symptoms	**5.58**	**4.44, 7.00**	**5.59**	**3.98, 7.85**	**5.41**	**3.97, 7.35**
Age group						
50-64	—	—	—	—	—	—
65-74	0.98	0.74, 1.30	**5.03**	**2.27, 11.2**	**0.64**	**0.46, 0.88**
75-84	0.76	0.56, 1.03	**6.51**	**2.95, 14.4**	**0.27**	**0.17, 0.42**
85+	**0.50**	**0.31, 0.80**	**6.08**	**2.54, 14.5**	—	—
Sex						
Female	—	—	—	—	—	—
Male	**1.40**	**1.12, 1.75**	1.26	0.90, 1.76	**1.53**	**1.13, 2.06**
Race						
White	—	—	—	—	—	—
Asian	**0.35**	**0.13, 0.93**	0.19	0.03, 1.39	0.48	0.15, 1.50
Black	0.55	0.27, 1.12	0.80	0.33, 1.96	0.36	0.12, 1.14
Other	0.88	0.40, 1.96	0.31	0.04, 2.31	1.30	0.54, 3.16
Hispanic ethnicity						
Not Hispanic	—	—	—	—	—	—
Hispanic	**2.07**	**1.19, 3.60**	**2.49**	**1.07, 5.78**	1.80	0.87, 3.72
Rural/urban status						
Urban	—	—	—	—	—	—
Rural	**0.62**	**0.43, 0.90**	0.62	0.32, 1.21	**0.61**	**0.39, 0.96**
Elixhauser comorbidity index						
None	—	—	—	—	—	—
1-2	**7.31**	**3.66, 14.6**	**8.49**	**2.82, 25.5**	**6.23**	**2.57, 15.1**
3-4	**9.21**	**4.73, 17.9**	**10.4**	**3.61, 30.1**	**7.86**	**3.34, 18.5**
5+	**7.99**	**4.20, 15.2**	**11**	**3.99, 30.3**	**5.93**	**2.58, 13.6**

[1]: HR, hazard ratio; CI, confidence interval. Bold coefficients indicate statistically significant at p-value < 0.05.

Results

Final cohort: N = 13,484 patients with asymptomatic severe AS

- High gradient – normal ejection fraction (HG-NEF), N = 2,305.
- Low gradient – normal ejection fraction (LG-NEF), N = 11,179.

6-month AVR increased (from 2017 to 2024):

- Any AVR 2.3% → 5.1%
- TAVR 0.6% → 2.2%
- SAVR 1.7% → 2.9%.

HG-NEF had higher likelihood than LG-NEF for any AVR (HR 5.58; 95%CI 4.44–7.00), TAVR (5.59; 3.98–7.85), and SAVR (5.41; 3.97–7.35).

Likelihood of TAVR:

- Older age, Hispanic ethnicity, and Elixhauser score ≥1 (vs 0) were associated with higher likelihood of TAVR.

Likelihood of SAVR:

- Male sex and Elixhauser score ≥1 (vs 0) were associated with a higher likelihood of SAVR.
- Older age and rural residence were associated with a lower likelihood of SAVR.

Conclusions

- In the pre-EARLY-TAVR era (January 2017–March 2024), 6-month AVR among asymptomatic severe AS rose two-fold, with both TAVR and SAVR increasing.
- HG-NEF patients were substantially more likely to undergo AVR than LG-NEF.
- Higher comorbidity burden (Elixhauser score ≥1 vs 0) was associated with a greater likelihood of both TAVR and SAVR.
- Older age was associated with a higher likelihood of TAVR but a lower likelihood of SAVR, suggesting older patients were more likely to receive TAVR over SAVR.

From 2017–2024, 6-month aortic valve replacement in patients with asymptomatic severe aortic stenosis rose from 2.3% to 5.1%, driven by both rising use of TAVR and SAVR.