Evaluating the best approach to treatment of aortic stenosis: The jury is still out

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Central Message

A new mathematical analysis provides early—but not conclusive—evidence that TAVI is a cost-effective replacement for SAVR in patients at intermediate surgical risk.

See Article page 1978.

Cost-effectiveness research seeks to assess the financial value of interventions in broad populations.¹ If an intervention brings substantial health benefits, then (according to this line of research) it should be worth a higher price than an intervention with lower health benefits. In this issue of the *Journal*, Tam and colleagues² develop a mathematical simulation that suggests that the benefits of transcatheter aortic valve implementation (TAVI) justify about \$10,000 additional cost beyond that of surgical aortic valve replacement (SAVR) in patients at intermediate surgical risk.

The conclusion of Tam and colleagues² rests in the incremental cost-effectiveness ratio, which measures the ratio of the difference in costs for TAVI versus SAVR to the difference in quality-adjusted life expectancy. The latter term weights each year of life according to a patient's expected health or disability (with 0 indicating death and 1 indicating perfect health). In this analysis, TAVI cost \$10,547 more than SAVR but added 3 extra months (0.23 years) of quality-adjusted life expectancy, for an incremental cost-effectiveness ratio of \$46,083 (\$10,547/0.23). Because this ratio was less than a commonly used \$50,000 willingness-to-pay threshold, Tam and colleagues² concluded that TAVI was cost-effective.

As Tam and colleagues² acknowledge, results should be considered early evidence rather than a definitive conclusion. Confidence was only slightly better than the flip of a coin (52.7%-55.4% of modeled scenarios were cost-effective). True value therefore may hinge on prices at individual facilities (including transparent prices, which reduce uncertainty), surgeon expertise, and patient views about what makes a good quality of life. Second, the study used Canadian life tables after 2 years, because longer follow-up data from the Placement of Aortic Transcatheter Valves 2 (PARTNER 2) were unavailable.³ Results were robust to a sensitivity analysis that substantially raised the hazard rate of death at each age, however, partially mitigating the concern. Third, US-based readers should be aware that the analysis was informed solely by Canadian health care prices.

Despite these concerns, there is good reason to believe that TAVI could remain cost-effective in future analyses. The 3-month relative increase in quality-adjusted life expectancy was substantial. For perspective, US quality-adjusted life expectancy for the general population of individuals aged at least 65 years increased just 1.7 years during the entire period 1987 through 2008.⁴ In addition, the \$50,000 willingness-to-pay threshold originated in Medicare coverage for patients with end-stage renal disease during the 1970s.⁵ In 2014, the American Heart Association suggested assigning intermediate value to interventions up to a \$150,000 threshold.⁶ At this level, TAVI could cost as much as \$34,500 more than SAVR in the United States (\$150,000 × 0.23 additional quality-adjusted life years) and still be considered intermediate value by the American Heart Association. More broadly, there is no single threshold; rather, there is a spectrum on which value decreases as prices increase.

Readers should keep in mind that cost-effectiveness does not suggest whether a procedure should be performed in a particular case. A borderline cost-effectiveness result may simply suggest that patients and facilities should be carefully selected. In addition, cost-effectiveness analyses are static, whereas prices are dynamic and change with time, fluctuations that may improve or worsen value.

Overall, Tam and colleagues² provide good early evidence to support TAVI in broad populations at intermediate surgical risk.

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