grafting, and 42% had prior peripheral vascular disease. On average, TAVR reduced procedure time by 2 hours and intensive care unit stay by 2 days.

Mortality at 1 year was 26.8% in those who received surgical AVR compared with 24.2% for TAVR (HR, 0.93; 95% CI, 0.71 to 1.22; p=0.001 for noninferiority; p=0.62 for superiority). Among those within the TF subgroup, TAVR was noninferior compared with surgical AVR (22.2% vs 26.4%; HR, 0.83; 95% CI, 0.60 to 1.15; p=0.002 for noninferiority, p=0.25 for superiority). The TA TAVR comparison with surgical AVR was underpowered; however, there was a trend toward increased mortality with TA TAVR, and the investigators did not report the preliminary p-value for noninferiority (29.0% vs 27.9%; HR, 1.22; 95% CI, 0.75 to 1.98; p=0.41 for superiority). Mortality rates at 30 days were lower than expected in both treatment groups, with a trend toward a lower rate with TAVR (3.4%, which is the lowest reported to date for this novel procedure) versus 6.5% for surgical AVR (p=0.07). The operative mortality risk that was estimated by these patients' STS scores was expected to be higher (11%).

Neurological events at 30 days and 1 year were significantly higher in those who underwent TAVR (stroke or TIA occurred in 5.5% vs 2.4% at 30 days; p=0.04; 8.3% vs 4.3% at 1 year; p=0.04), driven predominantly by stroke (Table 1).

Table 1. Secondary Endpoints.

	TAVR (n=348) n (%)	Surgical AVR (n=351) n (%)	p value
All stroke or TIA, no. (%)			
30 days	19 (5.5)	8 (2.4)	0.04
1 year	27 (8.3)	13 (4.3)	0.04
Stroke, no. (%)			
30 days	16 (4.6)	8 (2.4)	0.12
1 year	20 (6.0)	10 (3.2)	0.08
Major stroke*, no. (%)			
30 days	13 (3.8)	7 (2.1)	0.20
1 year	17 (5.1)	8 (2.4)	0.07
Major vascular complications	38 (11)	11 (3.2)	<0.01
Major bleeding	32 (9.3)	67 (19.5)	<0.01
New-onset AF	30 (8.6)	56 (16.0)	<0.01
Rehospitalization	15 (4.4)	12 (3.7)	0.64
New pacemaker	13 (3.8)	12 (3.6)	0.89

TAVR=transaortic valve replacement; AVR= aortic valve replacement; TIA=trans ischemic attack; Defined as Rankin Score >2; this was a post hoc analysis.

Cardiac symptoms by NYHA functional class and distance on the 6-minute walk test showed marked improvement at all time points in both groups. Mean echo gradients at 1 year were clinically similar, with paravalvular aortic regurgitation being greater with TAVR.

The PARTNER trial is a groundbreaking study in the minimally invasive management of valvular heart disease, with the potential to change the standard of practice within cardiology in a manner that has not been seen since the introduction of the coronary stent. If these preliminary results can be replicated with similar clinical effectiveness in routine practice, then transcatheter surgical AVR may be an acceptable alternative therapy to surgical AVR for high-risk patients in the near future. The significance of the trade-off between adverse events that are associated with TAVR versus surgical AVR short and long term requires further exploration.

Results from the Randomized PARTNER Trial (Cohort B)

For patients with inoperable severe aortic stenosis, the incremental cost per life-year gained (LYG) for transcatheter aortic valve replacement (TAVR) is in line with values for other cardiovascular (CV) technologies. Matthew R. Reynolds, MD, MSc, Beth Israel Deaconess Medical Center, Boston, Massachusetts, USA, presented these findings, which are based on a cost-effectiveness study of the PARTNER trial (Cohort B).

Data for Cohort B of the PARTNER trial showed that TAVR offers substantial clinical outcome benefits, compared with standard care, for patients who are unsuitable for surgical aortic valve replacement (AVR) [Leon MB et al. *NEJM* 2010]. The economic analysis was designed to compare the two treatment approaches with respect to short-term and long-term costs and lifetime cost-effectiveness.

This study included all 358 subjects in Cohort B. The primary endpoint was the lifetime incremental cost-effectiveness ratio (ICER), expressed as cost per LYG. The secondary endpoint was lifetime incremental cost per quality-adjusted life-year gained (QALY).

The mean initial cost of TAVR was $78,540, which represented the procedural costs, nonprocedural costs, and estimated physician fees. Within the 12-month period of the PARTNER trial, the total follow-up cost (excluding the initial cost) was significantly lower for TAVR ($29,352) than for standard therapy ($52,724)—a difference of $23,372 (p<0.001). The greater follow-up cost that was associated with standard therapy was related to a significantly higher hospitalization rate (2.15 vs 1.02; p<0.001). This higher rate was due entirely to admissions for CV causes. The greater hospitalization

cost that was associated with standard therapy was offset slightly by higher costs for rehabilitation and skilled nursing facilities that are associated with TAVR (total 12-month cost difference, $23,372; p<0.001).

Using parametric survival models to extrapolate life expectancy beyond the observed follow-up period, the researchers estimated a 1.9-year-longer life expectancy for TAVR compared with standard care (3.1 vs 1.2 years). The lifetime incremental cost of TAVR was $79,837, with a lifetime incremental gain in life expectancy of 1.59 years (TAVR-control) after applying a standard economic discount rate of 3% per year to both future costs and benefits. The resultant incremental cost-effectiveness ratio was $50,212/LGY. Bootstrap resampling demonstrated that the probability of cost-effectiveness was 47% for a threshold of $50,000 per LYG and 95% for a threshold of $60,000/LYG.

When the effectiveness measure was changed from LYG to QALYs gained for the secondary analysis, the incremental benefit decreased slightly (1.29 QALYs).

The authors note that these results compare favorably with the costs of other currently used CV treatments, including implantable cardiac defibrillators and atrial fibrillation ablation, and cost less than hemodialysis, percutaneous coronary intervention for stable disease, and left ventricular assist devices.

The study has several limitations. Because the experience with TAVR is still early, care may become more efficient in the future. In addition, care of the control group in the trial may have differed from that for similar patients in community practice. There is also some uncertainty about the lifetime analysis in the study—particularly the cost projections beyond the trial period. Lastly, the patient population of Cohort B was old and at high risk, and the results can not be extrapolated to other patient groups.

Still to be determined is the cost-effectiveness of TAVR compared with surgical AVR, an important point, given the most recent PARTNER data that showed similar clinical outcomes for these two procedures.

One-Year Data from the RESOLUTE US Trial

Drug-eluting stents (DES) are commonly used to treat coronary artery disease (CAD), because they reduce in-stent thrombosis and the need for repeat revascularization compared with bare-metal stents. However, there are safety concerns regarding the infrequent but life-threatening complication of stent thrombosis. Further development of DES with sustained drug release is hypothesized to represent an even safer alternative.

One-year data from the RESOLUTE US trial (NCT00726453), a comparison of a new zotarolimus DES with a hydrophilic biocompatible polymer that provides prolonged drug release (180 days compared with 14 days in the older generation), suggest that the RESOLUTE zotarolimus-eluting stent (R-ZES) is noninferior to historical results of the ENDEAVOR zotarolimus-eluting stent (E-ZES) in rates of clinical restenosis, death, myocardial infarction (MI), and stent thrombosis at 1 year. The results were presented by Martin B. Leon, MD, Columbia University, New York, New York, USA.

RESOLUTE US was a prospective, observational study that evaluated the clinical effectiveness of the R-ZES in a US population. The study comprised patients (n=1402) with *de novo* native coronary lesions that were suitable for 1- or 2-vessel treatment with stents from 2.25 to 4.0 mm in diameter. Subjects were enrolled with clinical follow-up only (n=1242) or with angiographic follow-up (n=160). The primary endpoint was 12-month target lesion failure (TLF; defined as a composite of cardiac death, MI, and clinically driven target lesion revascularization [TLR]) compared with historical data from the E-ZES clinical trials. The primary analysis consisted of data from the patients in the clinical cohort who underwent only single lesion revascularization with a 2.5-mm–3.5-mm stent (n=1001). The other 241 patients either had 2 lesions that were treated and/or received a 2.25-mm stent. Completeness of follow-up at 1 year was analyzable in 982 of the 1001 patients.

A total of 1402 subjects were enrolled in this observational cohort. The mean age was 64 years, most were men (68%), one-third were diabetic, the mean target vessel diameter was relatively small at 2.59±0.47 mm, and dual antiplatelet therapy use was 93% at 1 year. At 1 year, TLF occurred in 36 of the 982 patients with complete follow-up, which is a rate of 3.7% versus 6.5% (70/1076) in the E-ZES historical controls (ie, a risk difference of -2.8%, p<0.001 for noninferiority). The development of secondary endpoints was also low (Figure 1). The TLF rate in the overall clinical cohort (n=1402) was 4.7%. The 12-month rate of stent thrombosis was 0.1%, which occurred exclusively in subjects with small-vessel, 2.25-mm stents.

In summary, RESOLUTE US reported a similar rate of events with the R-ZES next-generation DES compared with earlier E-ZES trials. The low 1-year incidence of in-stent thrombosis and the low need for repeat revascularization that was achieved with very high compliance of dual antiplatelet therapy are reassuring in challenging patients with diabetes mellitus and small-sized vessels. Further