

Nationwide Cost-Effectiveness Analysis of Off-Pump and On-Pump Coronary Artery Bypass Grafting

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BACKGROUND

Off-pump CABG (OPCAB) has been shown to be as safe and effective as on-pump CABG (ONCAB). Despite recent evidence demonstrating that OPCAB carries multiple patient-centered benefits, the volume of OPCAB surgeries over the last decade has decreased, and there are few studies estimating the cost-effectiveness of OPCAB. The purpose of this study was to determine whether OPCAB was cost-effective relative to ONCAB using a national sample.

METHODS

Using data from the National Inpatient Sample, we studied 666,884 patients who underwent CABG between 2004 and 2015 in the US. Costs were estimated from a health system perspective and adjusted for inflation to 2018 US dollars. The outcome measure was in-patient mortality. Cost-effectiveness was measured as the incremental cost-effectiveness ratio (ICER), which was measured as the additional cost to save one additional life using OPCAB. Uncertainty around the ICER was quantified using a 95% confidence ellipse estimated using bootstrapping. We also estimated cost-effectiveness acceptability curves (CEAC), which estimate the probability OPCAB was cost-effective across a range of willingness-to-pay thresholds. Sensitivity analyses were undertaken by computing the ICER and CEAC across strata of patient, disease, and hospital characteristics.

RESULTS

Among patients receiving CABG surgery, 176,739 (26.5%) received OPCAB. Across all years, the expected cost for OPCAB was \$44,130, compared to \$44,098 for ONCAB. The expected survival was 97.94% for OPCAB, compared to 98.35% for ONCAB, which means that OPCAB was dominated by ONCAB. Over time, OPCAB became relatively more cost-effective but never achieved an ICER that represented good value compared to ONCAB. However, OPCAB was cost-effective in Asian and Hispanic ethnicity and commercial payers.

CONCLUSIONS

Historically, OPCAB does not appear to be cost-effective relative to ONCAB. Overall, OPCAB was more costly but less effective than ONCAB; in about half of sensitivity analyses OPCAB was less costly but less effective than ONCAB.

DISCLOSURES

All authors have nothing to disclose



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In this retrospective study of a national inpatient sample, off-pump CABG was not cost-effective for most patient populations when compared to on-pump CABG

Figure 1

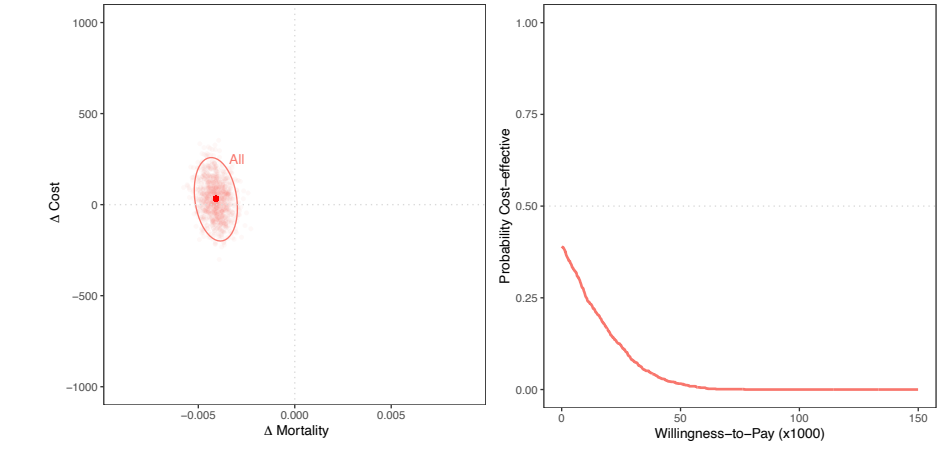


Figure 2

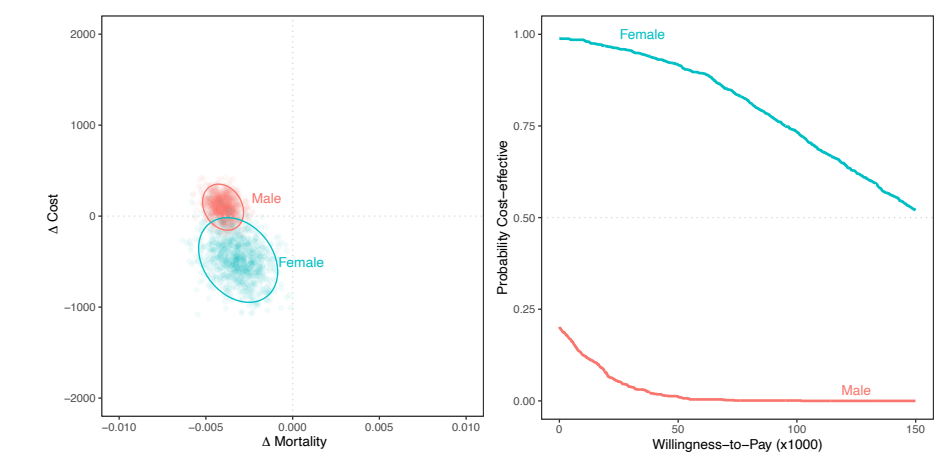


Figure 3

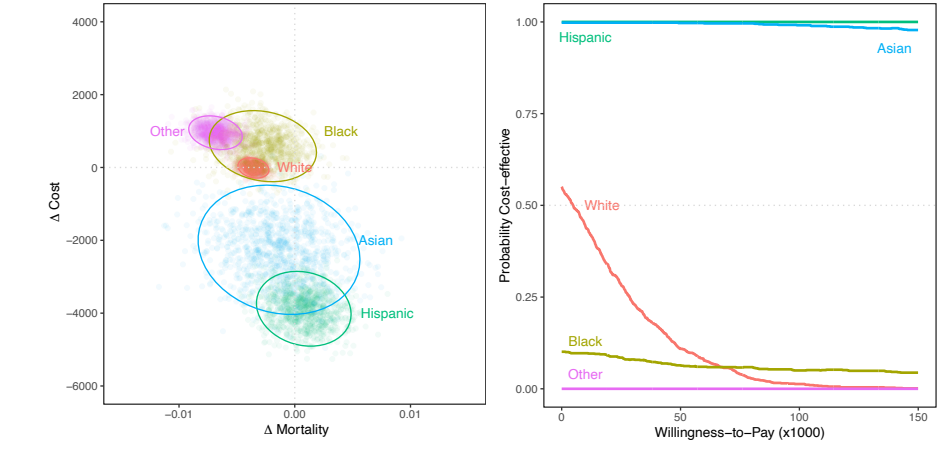


Figure 4

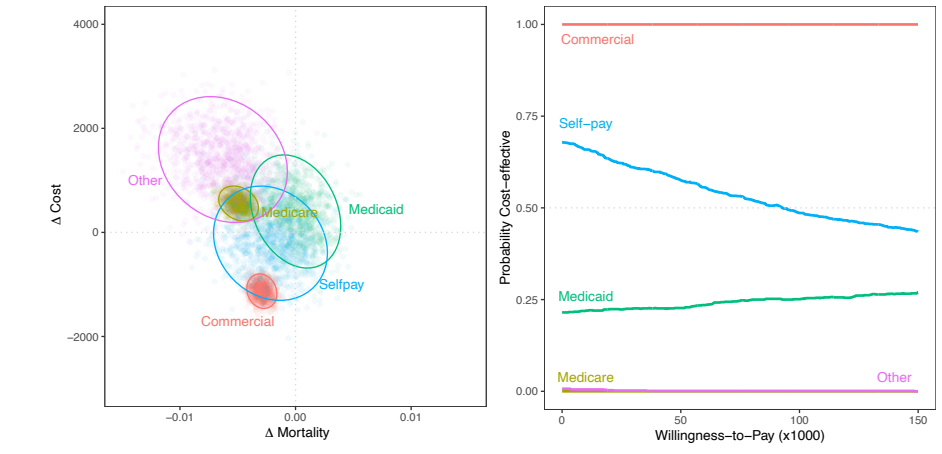


Figure 5

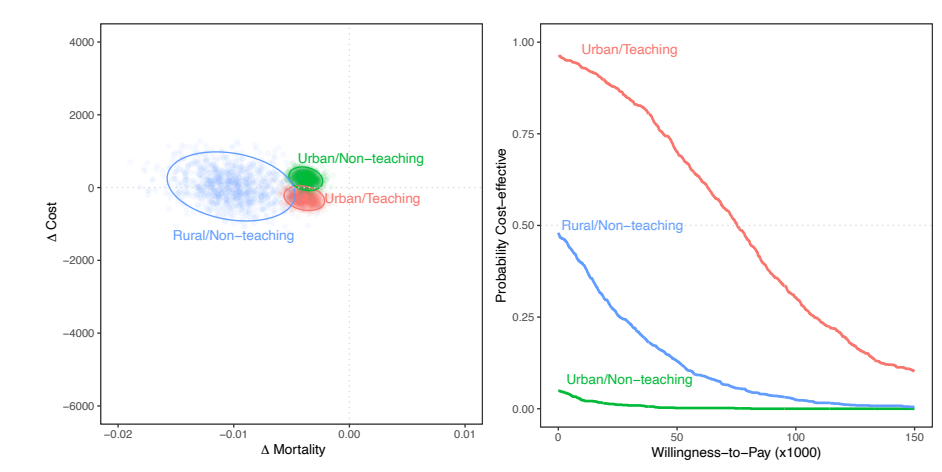


Figure 6

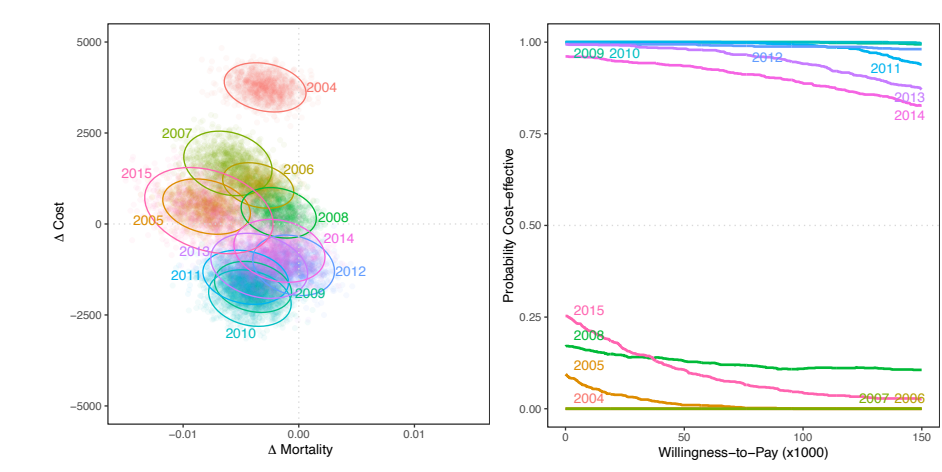


Table 1					
Stratum	On Pump		Off Pump		ICER
	Cost	Survival (%)	Cost	Survival (%)	
All	\$44,098.00	98.35	\$44,129.75	97.94	Dominated
Sex					
Male	\$43,258.91	98.62	\$43,357.76	98.22	Dominated
Female	\$46,488.23	97.58	\$46,023.20	97.26	146,274.20
Year					
2004	\$40,169.14	98.10	\$43,921.61	97.81	Dominated
2005	\$44,031.54	98.23	\$44,513.97	97.42	Dominated
2006	\$42,079.94	98.30	\$43,126.77	97.95	Dominated
2007	\$44,071.15	98.32	\$45,738.59	97.70	Dominated
2008	\$44,098.10	98.15	\$44,408.02	97.97	Dominated
2009	\$44,153.98	98.40	\$42,434.16	98.00	427,728.10
2010	\$46,925.09	98.56	\$44,879.34	98.14	482,004.50
2011	\$45,358.70	98.57	\$43,898.95	98.10	312,895.30
2012	\$45,365.65	98.62	\$44,254.94	98.59	3,078.553
2013	\$45,103.21	98.48	\$43,948.19	98.15	344,265.60
2014	\$44,854.10	98.45	\$44,109.05	98.29	439,617.60
2015	\$46,059.88	98.22	\$46,427.58	97.44	Dominated
Payer					
Medicare	\$45,828.53	97.72	\$46,386.47	97.23	Dominated
Medicaid	\$48,425.08	98.41	\$48,835.71	98.41	Dominated
Commercial	\$40,839.85	99.18	\$39,700.10	98.89	391,757.40
Self	\$44,351.24	98.63	\$44,172.77	98.41	79,578.42
Other	\$44,501.01	98.90	\$45,896.38	98.27	Dominated
Race/Ethn.					
White	\$43,198.46	98.40	\$43,186.09	98.04	3445.884
Black	\$47,377.26	97.91	\$47,954.88	97.63	Dominated
Hispanic	\$51,325.02	98.26	\$47,423.37	98.33	-5,512.674
Asian	\$53,409.81	98.08	\$51,128.51	97.95	1,868.653
Other	\$43,212.30	98.38	\$44,176.10	97.69	Dominated
Region					
Northeast	\$44,984.33	98.53	\$45,538.63	98.46	Dominated
Midwest	\$43,478.91	98.40	\$44,089.68	97.88	Dominated
South	\$40,156.17	98.31	\$41,414.21	97.83	Dominated
West	\$55,692.92	98.24	\$50,613.57	97.86	1,326,444
Charlson					
0	\$37,149.61	99.29	\$36,554.66	99.07	272,310
1	\$41,190.48	98.71	\$41,564.45	98.41	Dominated
2	\$45,964.95	98.07	\$46,430.44	97.39	Dominated
3	\$49,880.62	97.61	\$49,919.31	97.07	Dominated
4+	\$54,751.45	97.02	\$54,096.82	96.67	187,496
Hospital type					
Urban - Teaching	43960.93	98.36	44194.76	97.98	Dominated
Urban – Non-teaching	44320.25	98.31	44027.79	97.92	75170.94
Rural - Non-teaching	44062.34	98.56	44104.84	97.55	Dominated

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