

Clinical Results of Coronary Artery Bypass Grafting

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- **Operative Mortality**
- **Operative Morbidity**
 - **Myocardial dysfunction**
 - **Periop. MI, Low cardiac output SD**
 - **Neruologic Complications**
 - **Deep sternal wound infection**
 - **Renal failure**
- **Institutional outcomes**

Trends in isolated CABG

Trends in isolated coronary artery bypass grafting: An analysis of the Society of Thoracic Surgeons adult cardiac surgery database

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- Study periods: 2000 ~2009
- 1,497,254 primary & isolated CABG Pts. (60.3%) in 1073 institutions from 2,473,313 Pts

JTCV 2012:143:273-81

TABLE 1. Preoperative demographics of primary coronary artery bypass grafting between 2000 and 2009

	2009		
Demographic	Male gender, Diabetes, Hypercholesterolemia, Renal failure, COPD, Previous PCI		
Age	Aspirin, Beta blockers, ACE inhibitor, Statin		
Male gender			65 (57–73)
White race			72.9%
Weight (kg)			85.0%
BSA			5 (75–100)
Diabetes			0 (1.84–2.16)
Hypercholesterolemia			40.4%
Renal failure			83.8%
COPD			2.5%
Hypertension			22.7%
Peripheral vascular disease			85.0%
No CHF			14.7%
CHF and No prior PCI			84.1%
CHF and prior PCI			4.0%
Previous CVA			11.9%
CVD without prior PCI			6.7%
Preoperative			7.4%
Previous intervention			8.6%
Preoperative			0.94%
Any prior PCI			25.6%
Previous valve surgery			0.2%
Previous other surgery			1.4%
Preoperative			
Aspirin			79.4%
Beta blockers			81.4%
ACE inhibitors			46.2%
Statins†			64.4%

TABLE 3. Operative characteristics

Operative characteristics	2000	2009
Use of internal thoracic	87.7%	94.7%
Off-pump procedure	14.5%	21.1%
Procedure status		
Elective	57.6%	41.3%
Urgent	38.0%	54.1%
Emergency	4.2%	4.4%
Emergency salvage	0.2%	0.2%
Perfusion time	92 (72–116)	89 (69–113)
Crossclamp time	61 (45–81)	62 (46–82)
No. of distal anastomoses		
One	4.7%	4.5%
Two	21.1%	20.5%
Three	73.8%	74.7%

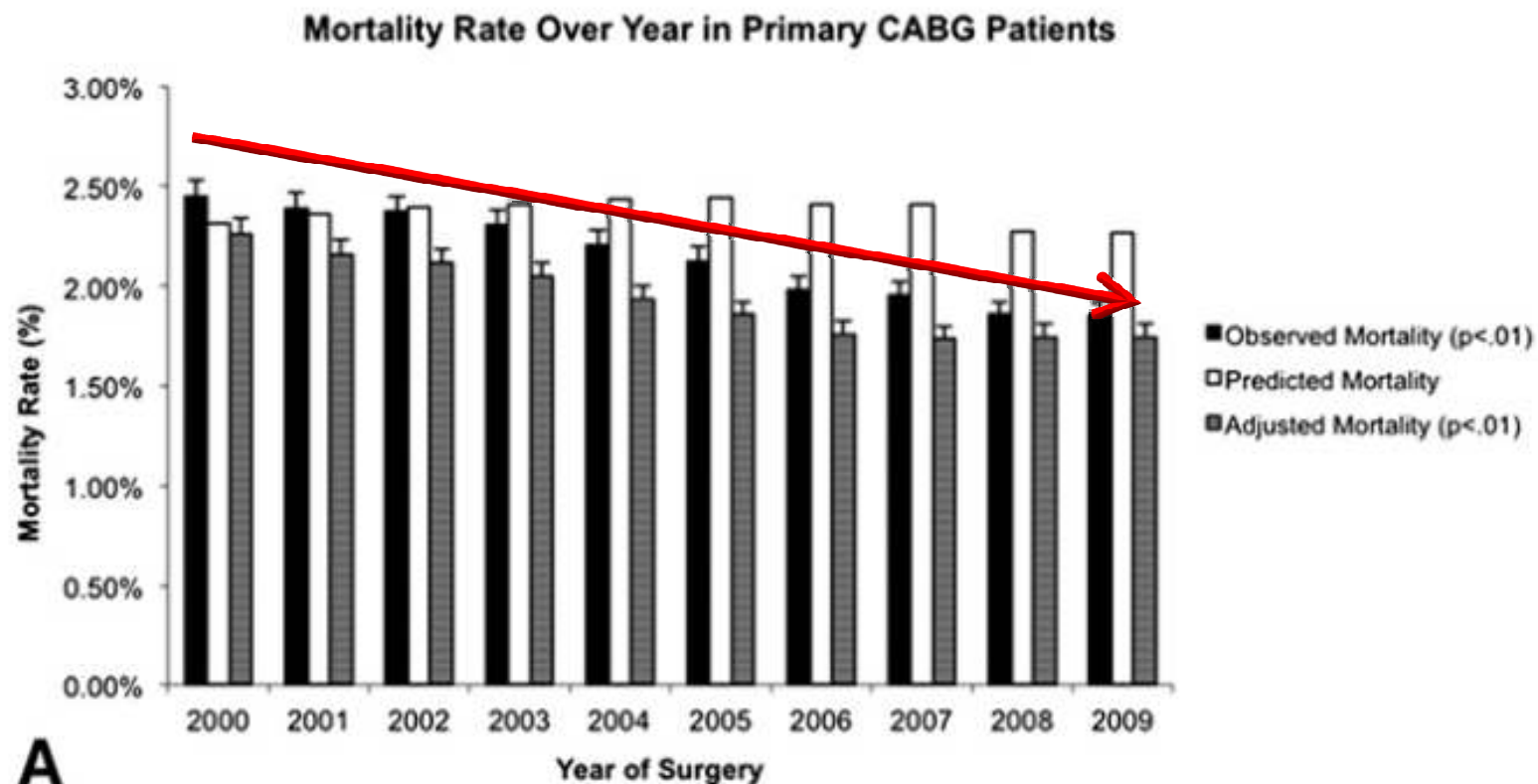


TABLE 4. Outcomes in total cohort and nonemergency/salvage subcohort

	Total cohort			
	2000	2009	<i>P</i> value	Relative risk change
Mortality				
Observed	2.4%	1.9%	<.0001	−24.4% (−28.7% to −20.1%)
Predicted	2.3%	2.3%		
Adjusted	2.3%	1.7%	<.0001	−22.8% (−27.3% to −18.3%)

The Impact of Hospital Cardiac Specialization on Outcomes After Coronary Artery Bypass Graft Surgery: Analysis of Medicare Claims Data

Saket Girotra, Xin Lu, Ioana Popescu, Mary Vaughan-Sarrazin, Phillip A. Horwitz and Peter Cram
(*Circ Cardiovasc Qual Outcomes*. 2010;3:607-614.)

- Cardiac specialization: CABG volume, disease of ischemic heart disease (ICD9-CM)
- 2001 ~ 2005: 705,084 Medicare patients who underwent CABG

Table 3. Unadjusted Outcomes in Medicare Patients Who Underwent CABG

Outcome	Less Specialized		More Specialized			P Trend
	Quintile 1 n (%)	Quintile 2 n (%)	Quintile 3 n (%)	Quintile 4 n (%)	Quintile 5 n (%)	
30-Day mortality						
Overall	3033 (4.9)	4612 (4.8)	6042 (4.7)	8109 (4.8)	10 619 (4.3)	<0.001
CABG only	2357 (4.4)	3596 (4.3)	4577 (4.1)	6249 (4.2)	7878 (3.8)	<0.001
Excluding transfer patients	2735 (4.8)	4135 (4.7)	5272 (4.6)	6853 (4.6)	8338 (4.1)	<0.001
In-hospital mortality	2725 (4.4)	4131 (4.3)	5612 (4.4)	7486 (4.4)	9786 (4.0)	<0.001
1-Year mortality						<0.001
Mean LOS, d (SD)						<0.001

Table 4. Unadjusted Outcomes in Medicare Patients Who Underwent CABG

Outcome	Less Specialized		More Specialized			P Trend
	Quintile 1 OR (95% CI)	Quintile 2 OR (95% CI)	Quintile 3 OR (95% CI)	Quintile 4 OR (95% CI)	Quintile 5 OR (95% CI)	
30-Day mortality						
Unadjusted	1.14 (1.06–1.23)	1.08 (1.01–1.16)	1.06 (0.99–1.13)	1.09 (1.02–1.17)	1.00	0.003
Risk-adjusted	1.15 (1.07–1.24)	1.08 (1.01–1.16)	1.06 (0.99–1.13)	1.09 (1.02–1.16)	1.00	0.001
Risk- and volume-adjusted	1.05 (0.97–1.14)	1.00 (0.93–1.08)	0.99 (0.92–1.07)	1.04 (0.97–1.11)	1.00	0.65
In-hospital mortality						
Unadjusted	1.13 (1.05–1.23)	1.07 (1.00–1.16)	1.08 (1.00–1.16)	1.10 (1.03–1.19)	1.00	0.01
Risk-adjusted	1.17 (1.08–1.27)	1.09 (1.00–1.17)	1.09 (1.01–1.18)	1.11 (1.03–1.20)	1.00	0.002
Risk- and volume-adjusted	1.11 (1.02–1.22)	1.04 (0.95–1.13)	1.05 (0.97–1.14)	1.08 (1.00–1.17)	1.00	0.15

The important factor for outcomes may not be the hospital volume, but quality control of each hospital.

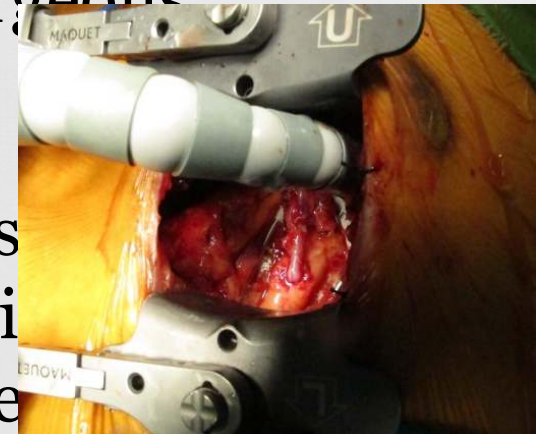
Institutional Quality Control

- Preoperative periods
 - Evaluation of severity of comorbidities
 - Imaging study (carotid artery US -> brain CT/MRI)
 - Pulmonary function test
 - Renal function study – Cystatin C
 - Calculation of operative risks

Institutional Quality Control

● Operative Periods

- Centralization of Surgeons
 - 2005 : 6 surgeons -> 2013: 2 surgeons
- Off pump surgery
 - 2005: 88% -> 2013: 100%
- Routine use of IMA/arterial grafts
- Routine use of epiaortic echocardiography
- Supports from specialized anesthesiologists
- Minimally invasive surgery/hybrid tx



● Postoperative Periods

- Protocols for atrial fibrillation, acute heart failure and ECMO
- Specialized nurses in ICU & GW

Outcomes of CABG in Yonsei

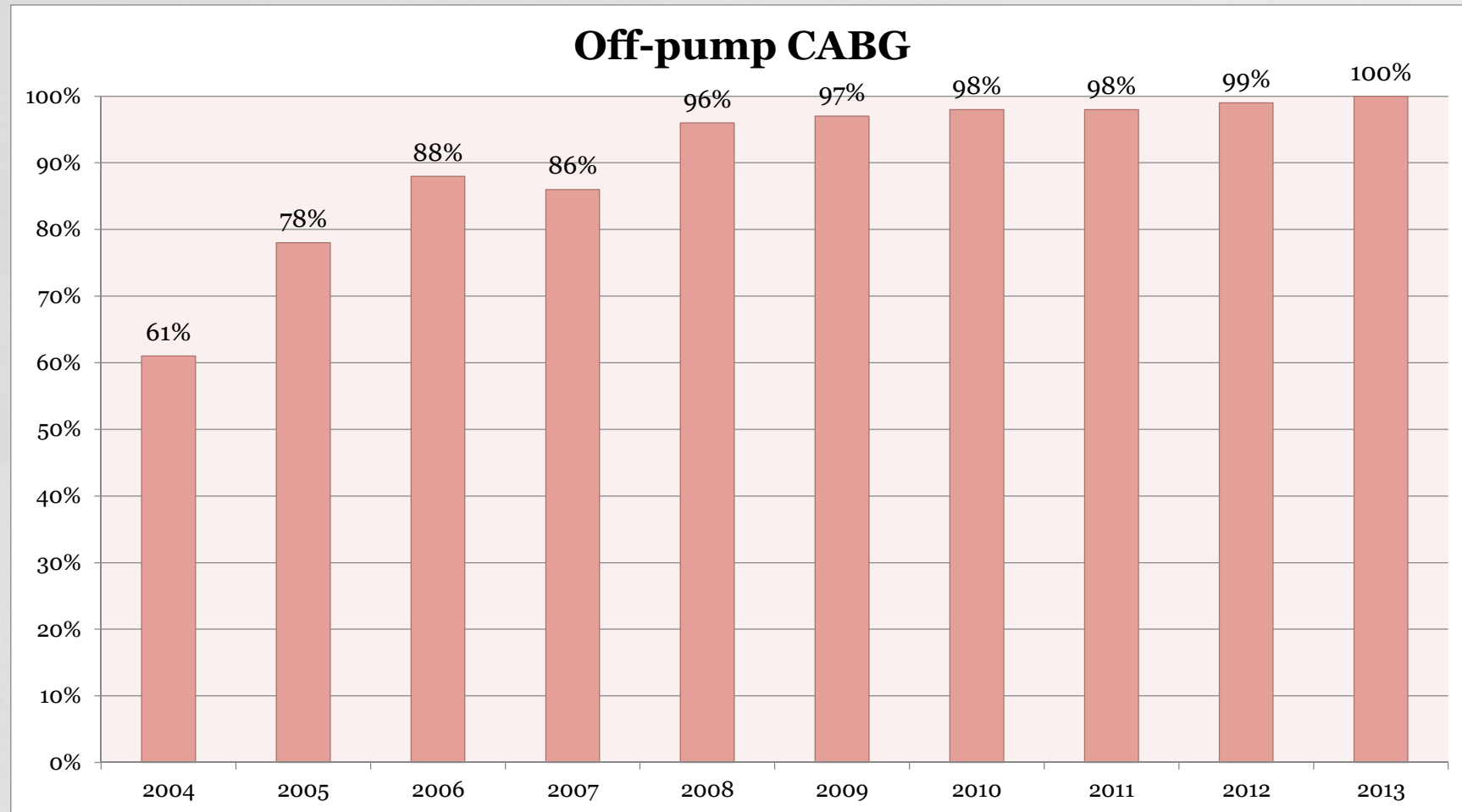
● 2006 ~ 2013: **1952** isolated CABG

Age	63.1 year
Female	568 (29.1%)
Diabetes	825 (42.3%)
Renal dysfunction	172 (8.8%) dialysis 72 (3.7%)
Dyslipidemia	822 (42.1%)
PCI Hx	392 (20.1%)
Acute MI	240 (12.3%)
Emergency/Urgency	109 (5.6%)

Outcomes of CABG in Yonsei

Ejection fraction	48.2%
Low EF (< 30%)	162 (8.3%)
3 vessel disease	1548 (79.3%)
2 vessel disease	346 (17.7%)
Left main disease	519 (26.6%)
Mean Additive EuroSCORE	4.13
high risk (EuroSCORE \geq 6)	540 (27.7%)

On-pump vs Off-pump



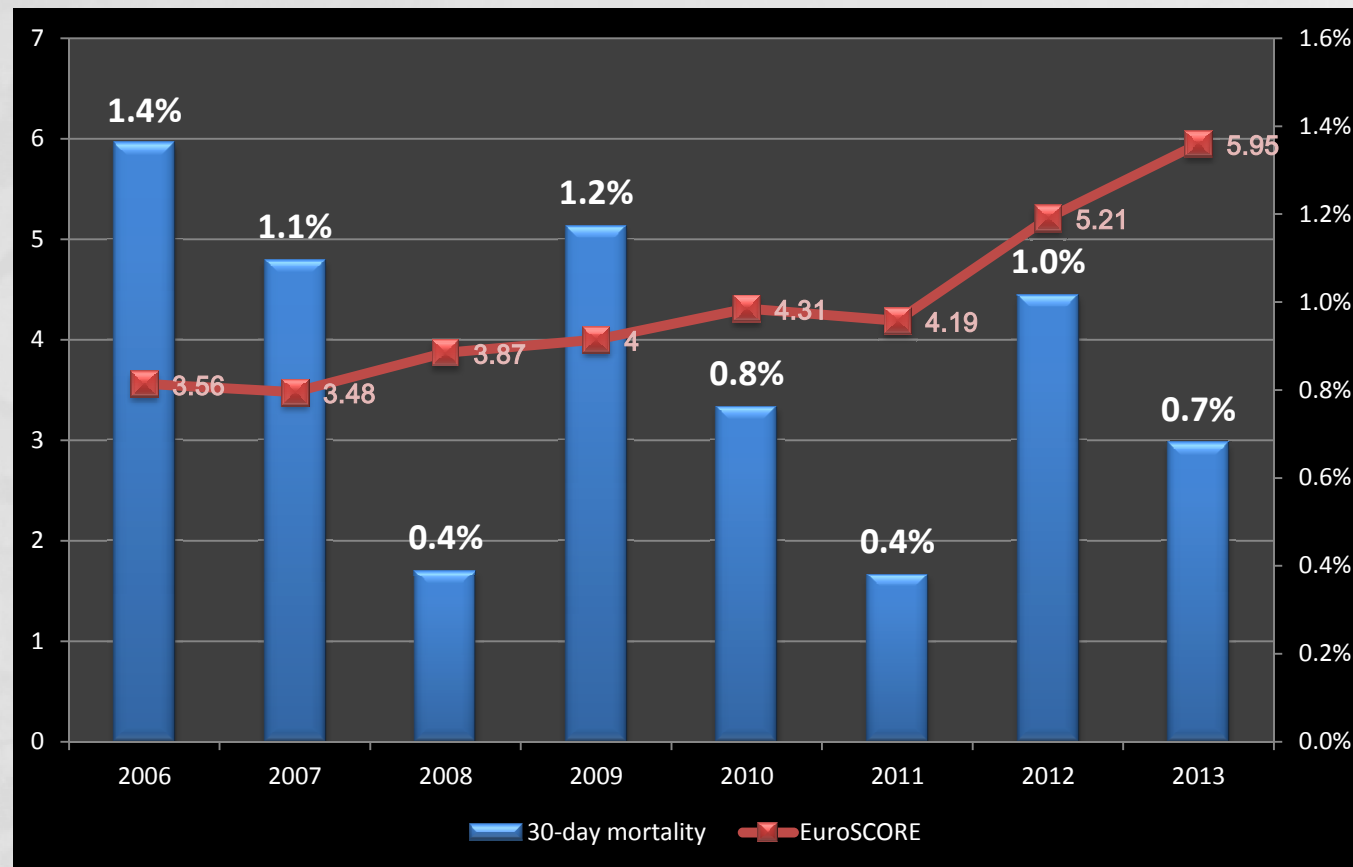
On pump conversion: 13 Pts
- No conversion after 2011

Intraoperative characteristics

- Use of IMA : 1926 (98.7%)
- Total arterial grafting: 1252 (64.1%)
- Bilateral IMA: 291 (14.9%)
- Radial artery: 1417 (72.6%)
- Complete revascularization: 1786 (91.5%)

Mortality

30-day mortality: 17 (0.87%)



Morbidity

- Atrial fibrillation : 380 (19.5%)
- Perioperative MI: 37 (1.9%)
- CVA (type I): 13 (0.7%)
- Need for dialysis: 64 (3.3%)
- Deep sternal infection: 18 (0.9%)
- Reopen for bleeding: 26 (1.3%)

30-day mortality according to risk factors

	Risk factor – Yes	Risk factor – No
Acute MI	2.1% (5 / 240)	0.7% (12 / 1712)
Low EF (<30%)	3.7% (6 / 162)	0.6% (11 / 1790)
Renal failure	4.7% (8 / 172)	0.5% (9 / 1780)
High risk patients (EuroSCORE\geq6)	2.2% (12 / 540)	0.4% (5 / 1412)

Summary

- Coronary artery bypass grafting is the safe and optimal method for myocardial ischemia
- Quality control should be mandatory for improving the results of surgery

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	Total cohort			
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Mortality				
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Predicted	2.3%	2.3%		
Adjusted	2.3%	1.7%	<.0001	−22.8% (−27.3% to −18.3%)
Stroke				
Observed	1.6%	1.2%	<.0001	−26.4% (−31.6% to −21.1%)
Predicted	1.3%	1.3%		
Adjusted	1.6%	1.2%	<.0001	−26.4% (−31.6% to −21.2%)
Renal failure				
Observed	3.5%	3.6%	.005	5.5% (1.6%–9.3%)
Predicted	3.8%	4.0%		
Adjusted	3.2%	3.2%	.956	−0.1% (−4.1% to 3.9%)
Reoperation for bleed				
Observed	2.5%	2.2%	<.0001	−9.2% (−13.6% to −4.7%)
Predicted	2.5%	2.4%		
Adjusted	2.4%	2.2%	.002	−7.1% (−11.6% to −2.5%)
Deep sternal wound infection				
Observed	0.55%	0.37%	<.0001	−32.9% (−41.8% to −23.9%)
Predicted	0.41%	0.43%		
Adjusted	0.59%	0.37%	<.0001	−37.3% (−45.8% to −28.7%)
Atrial fibrillation				
Observed	19.8%	21.1%	<.0001	6.4% (4.9%–7.8%)
Predicted	20.3%	21.2%		
Adjusted	20.0%	20.5%	.004	2.2% (0.7%–3.6%)