

The Role of Information in Medical Markets: An Analysis of Publicly Reported Outcomes in Cardiac Surgery

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Rationales for Provider Profiling

- Response to documentation of poor quality & variation in medical care.
- **The Holy Grail:** Across the political spectrum profiling is supported by:
 - Single payer advocates
 - MSA fans
 - IOM junkies
 - Congress/CMS
 - The Dartmouth Group
 - Businesses
- **Fundamental Question:** Does disseminating information about quality lead to improved care?

New York State CABG Profiles

CABG profiling in New York State is the granddaddy of provider profiling.

- Ongoing since 1989.
- In 1990 hospital data were made public.
- In 1991, under FIA *Newsday* gained access to surgeon-specific data.
- Since 1992, NY state has publicly released profiles on performance of both hospital and individual surgeons.

What do we Know about NY Experience?

Pro: Access to care & outcomes have improved

(Hannan et al 1994; Hannan et al 1995; Peterson et al 1998; Hannan et al 2003)

Con: Mortality decrease can be explained by:

- National trends (Ghali et al 1997)
- Surgeons refusing to operate on most severe cases (Dranove et al 2003; Green and Wittfeld 1995)
- Transfer of difficult cases to other states (Omoigui et al 1996)

Mechanisms for effects:

- Mixed/negative evidence of effect on where patients receive care:
 - Cardiologists report minimal influence on referrals (Schneider and Epstein, 1996)
 - Patients often unaware of report (Bill Clinton) (Schneider and Epstein, 1998)
 - Conflicting evidence on volume effect (Hannan et al 1994; Mukamel and Mushlin 1998; Cutler et al 2004; Jha et al 2004)
- Some evidence of positive response by providers to improve care (Dziuban et al 1999)

Predicted Effects of Quality Reporting

Good

- Cardiologists send patients to better surgeons/hospitals
 - Volume response
 - Improved outcomes
- Hospital leaders learn about true quality
 - Improved outcomes
 - Encourage poor performing surgeons to retire

Bad

- Improper risk adjustment
 - Cardiologists don't use reports for referrals
 - No volume response
 - Sickest patients find it hard to get care
 - Severity response

Study Design

Limitations of previous research:

- Examined only statewide trends (no control group)
- Compared to other states (lacking detailed clinical data, limited to > 65 population)
- Appropriate statistical methods

Our Approach:

- How do report cards influence behavior of providers who are publicly identified as being "outliers" compared to those not labeled
 - Mortality
 - Volume
 - Severity
 - Retirement of surgeons

Data

- 162,214 patients
 - Received surgery 1991-1999
 - 34 hospitals in NY state
- Detailed clinical data collected for risk-adjustment
- Summarized risk factors using a severity score (estimated by fitting logistic regression model to all years combined)
- Hospital characteristics obtained from AHA
- Between 1991-1996:
 - 10 hospitals identified as "high" mortality outlier
 - 5 hospitals identified as "low" mortality outlier

Observed Characteristics & Outcomes in Hospitals Performing Bypass Surgery in New York State

	All Hospitals (n=34)	Low Mortality (n=5)	Average Mortality (n=19)	High Mortality (n=10)
Teaching Hospital	25 (74%)	3 (60%)	14 (74%)	8 (80%)
Government Owned	6 (18%)	0 (0%)	3 (16%)	3 (30%)
Large MSA (>2,500,000)	20 (59%)	4 (80%)	11 (58%)	5 (50%)
In-Hospital Mortality	2.6%	2.2%	2.4%	3.3%
Volume (# cases per month)	46	67	42	43
Severity	-4.29	-4.20	-4.30	-4.31

Effect of Rating System on Individual Providers

- **Desired counterfactual:** what would have happened in the absence of the reporting system?
- **Our approach:** How do report cards influence behavior of providers who are publicly identified as being "outliers" compared to those not labeled?
- **Fundamental assumption:** trends in identified providers would = those in non-identified peers had the hospital's outcomes not been publicly reported
- Relies on comparing similar facilities and appropriate modeling of time trends.

Analytic Approach

- **Random Effects/Hierarchical Model**
 - Estimate effect on volume, in-hospital mortality & severity
 - Better account for sampling variability, low volume providers, regression to the mean
 - Reliant on assumption that hospital-specific effects are uncorrelated with residual patient effects
 - Use both *within* and *between* hospital information to estimate effect of public reporting on hospital behavior
 - Include controls for hospital characteristics and patient severity (mortality models)
- **Cox proportional hazard models**
 - Estimate risk of stopping surgery
 - Fit to surgeon/hospital pairs
 - Include controls for volume & year of report

Results: Effect of Designation as High or Low Mortality Outlier

	High Mortality		Low Mortality	
	Estimated Coefficient	Average Effect	Estimated Coefficient	Average Effect
Volume	-0.03 (-0.15, 0.08)	-1.4 cases per month	0.01 (-0.16, 0.17)	+0.5 cases per month
Mortality	-0.28 (-0.53, -0.01)	-0.6 pct pts probability of death	-0.04 (-0.51, 0.34)	-0.2 pct pts probability of death
Severity	0.06 (-0.02, 0.14)	+0.1 pct pts predicted probability of death	-0.01 (-0.14, 0.13)	-0.01 pct pts predicted probability of death

Results: Effect on surgeons risk of leaving hospital

	Relative Risk	95% CI	P-value
High Mortality Outlier (relative to no designation at hospital)	1.50	(0.93,2.43)	0.10
Low Mortality Outlier (relative to no designation at hospital)	0.81	(0.43,1.53)	0.52

Summary

1. Evidence designation as high outlier leads to improved performance
 - Compare to all hospitals: 0.6 percentage point decrease on average following report stating higher than average mortality
 - Effects stronger for some hospitals than others
2. No evidence outlier status effected volume or average severity of cases
3. No evidence designation as low outlier had any effect on volume, severity or mortality
4. Marginal evidence that surgeons at hospitals designated to be high outlier were more likely to stop performing surgery.

Possible Implication

- Focus reporting more on internal uses than external uses?
 - Hibbard et al (2003) report increased incentives for quality improvement associated with public reporting
- Need reports on a more timely basis
- Attach money to quality outcomes?
- Analytic approach: study design and estimation approach can matter; implications for other evaluations

References

- Cutler DM, Huckman, RS, Landrum MB (2004), "The role of information in medical markets: An analysis of publicly reported outcomes in cardiac surgery," *American Economic Review*, 342-346.
- Dranove, D, Kessler, D, McClellan M, Satterthwaite, M (2003), "Is more information better? The effects of "report cards" on health care providers" *Journal of Political Economy*, 111, 555-588.
- Dziuban, SW, McIlduff, JB, Miller, SJ, Dal Col, RH (1994), "How a New York cardiac surgery program uses outcome data," *Annals of Thoracic Surgery*, 58, 1871-1876.
- Ghali, W, Ash, A, Hall, R, Moskowitz, M (1997), "Statewide quality improvement initiative and mortality after cardiac surgery," *Journal of the American Medical Association*, 277, 379-382.
- Green, J, Wintfeld, N (1995), "Report cards on cardiac surgeons: assessing New York State's approach," *New England Journal of Medicine*, 332, 1229-1232.
- Hannan, EL, Kilburn, H, Racz, M, Shields, C, Chassin, M (1994), "Improving the outcomes of coronary artery bypass surgery," *Journal of the American Medical Association*, 271, 761-766.
- Hannan, EL, Kumar E, Racz, M, et al (1994), "New York State's Cardiac Surgery Report System: Four years later," *Annals of Thoracic Surgery*, 58, 1852-1857.
- Hannan EL, Vaughn Sarrazin, MS, Doran, DR, Rosenthal, GE (2003), "Provider Profiling and quality improvement efforts in coronary artery bypass surgery," *Medical Care*, 41, 1164-1172.
- Hibbard, JH, Stockard, J, Tusler, M (2003), "Does publicizing hospital performance stimulate quality improvement," *Health Affairs*, 22, 84-92.

References (cont)

- Jha, AK, Epstein, AM (2004), "The predictive accuracy of the New York coronary bypass report card and its impact of volume and surgery practice," *Journal of General Internal Medicine*, 19, 223.
- Marshall M, Shekelle, P, Leatherman, S, Brook, R (2000), "The public release of performance data: what do we expect to gain? A review of the evidence," *Journal of the American Medical Association*, 283, 1866-1874.
- Omoigui, N, Miller, D, Brown, K (1996), "Outmigration for coronary artery bypass surgery in an era of public dissemination of clinical outcomes," *Circulation*, 93, 27-33.
- Peterson, E, DeLong, E, Jollis J, Muhlbaier, L, Mark, D (1998), "The effects of New York's bypass surgery provider profiling on access to care and patient outcomes in the elderly," *Journal of the American College of Cardiology*, 32, 993-999.
- Schneider, EC, Epstein AM (1996), "Influence of cardiac-surgery performance reports on referral practices and access to care - A survey of cardiovascular specialist," *New England Journal of Medicine*, 335, 251-256.
- Schneider, EC, Epstein AM (1998), "Use of public performance reports: A survey of patients undergoing cardiac surgery," *Journal of American Medical Association*, 279, 1638-1642.
- Shanian, DM, Normand S-LT, Torchiana, DF, Lewis, SM, Pastore, JO, Kuntz, RE, Dreyer, PI (2001), "Cardiac surgery report cards: Comprehensive review and statistical critique," *Annals of Thoracic Surgery*, 72, 2155-2168.