

Do Quality Report Cards Play a Role in HMOs' Contracting Practices? Evidence from New York State

Dana B. Mukamel, Alvin I. Mushlin, David Weimer, Jack Zwanziger, Todd Parker, and Indridi Indridason

Objective. To answer two related questions: (1) Do managed care organizations (MCOs) in New York State (NYS) consider quality when they choose cardiac surgeons? (2) Do they use information about risk-adjusted mortality rates (RAMR) provided in the *New York State Cardiac Surgery Reports*?

Data Sources. (1) Telephone interviews with and contracting data from the majority of MCOs licensed in NYS; (2) RAMR, quality outlier designation, and procedure volume for all cardiac surgeons, as reported in the *Cardiac Surgery Reports*.

Study Design. Interview data were analyzed in conjunction with patterns revealed by contracting data. Null hypotheses that MCOs' contracting choices were random with respect to the information published in the *Cardiac Surgery Reports* were tested.

Principal Findings. Sixty percent of MCOs ranked the quality of surgeons as most important in their contracting considerations. Although 64 percent of MCOs indicated some knowledge of the *NYS Cardiac Surgery Reports*, only 20 percent indicated that the reports were a major factor in their contracting decision. Analyses of actual contracting patterns show that in aggregate, the hypothesis of random choice could be rejected with respect to high-quality outlier status and high procedure volume but not for RAMR or poor-quality outlier status. The panel composition of the majority of MCOs (80.2 percent) was within two standard deviations of the expected mean under the null hypothesis.

Conclusions. Despite a professed preference for high-quality surgeons, the use of publicly available quality reports by MCOs is currently low, and contracting practices for the majority of MCOs do not indicate a systematic selection either for or against surgeons based on their reported mortality scores. This study suggests that policy initiatives to increase the effective use of report cards should be encouraged.

Key Words. Quality report cards, managed care, quality of care, CABG, selective contracting

Over the last decade a trend has been growing to develop and publicly disseminate quality report cards (Gormley and Weimer 1999). Some, such as the HEDIS report card, grade HMOs (Epstein 1995); others grade providers (mostly hospitals) (Romano, Zach, Luft, et al. 1995)—and, in some instances, physicians (Hannan, Kumar, Racz, et al. 1994). The rationale behind these efforts is that a competitive health care market can be made more efficient if consumers make informed choices in terms of both cost and quality. Because consumers often cannot evaluate the clinical aspects of the care they receive, report cards made available to the public make it more likely that they will obtain the information and use it.

The decision maker, however, is not always the patient, particularly for enrollees of managed care organizations (MCOs). MCOs that offer only a limited provider panel effectively limit the choices accessible to their enrollees. Therefore, for the more than 160 million individuals enrolled in managed care, report cards may be of little consequence unless they are being used by health plans when the plans are choosing providers to be included in their networks. Yet little is known about the role that quality rankings of providers and publicly disseminated quality report cards play when MCOs are selecting physicians for their networks.

The study presented here examines evidence from New York State about the role of quality in the contracting practices of HMOs. New York State has been publishing quality report cards with information about risk-adjusted mortality rates (RAMR) of hospitals and cardiac surgeons performing cardiac artery bypass graft (CABG) surgery since 1990 (New York State Department of Health 1997). These reports are considered to be among the most credible and valid rankings of providers because of the risk-adjustment method on which they rely (Chassin, Hannan, and DeBuono 1996). They have been credited with improving the overall levels of CABG surgery in the state (Peterson, DeLong, Jollis, et al. 1998; Hannan, Kilburn, Racz, et al. 1994) and have been shown to influence Medicare fee-for-service patients' choices

We thank the Agency for Health Care Policy and Research for funding this research (grant #HS09803).

Address correspondence to Dana B. Mukamel, Ph.D., David Stewart Associate Professor of Health Policy, University of Rochester Medical Center, 601 Elmwood Ave., P.O. Box 644, Rochester NY 14642. Dr. Mukamel, Alvin I. Mushlin, M.D., Sc.M., Jack Zwanziger, Ph.D., and Todd Parker are from the University of Rochester Medical Center, Department of Community and Preventive Medicine; David Weimer, Ph.D. and Indridi Indridason are from the Political Science Department of the University of Rochester. This article, submitted to *Health Services Research* on July 16, 1999, was revised and accepted for publication on October 22, 1999.

of providers (Mukamel and Mushlin 1998). They therefore offer an excellent opportunity to test hypotheses about the influence of report cards on MCO behavior. A negative result, that is, failure to find evidence that these reports influence behavior, cannot be easily dismissed by the argument that a lack of credibility of the information is responsible, as in other instances (e.g., the HCFA hospital mortality report cards, which are no longer published because of concerns about the accuracy and validity of the risk adjustment and the resulting quality ranking (Moskowitz 1994).

The study that we report on addressed two questions: (1) Do MCOs consider quality in choosing cardiac surgeons? and (2) Do they make use of the information about risk-adjusted mortality rates provided in the *New York State Cardiac Surgery Reports*?

METHODS

The study combined information obtained through interviews with the decision makers within MCOs who are responsible for the selection of providers and data about actual contracts entered between cardiac surgeons and MCOs. The first answers the question: "What do MCOs say they do?" while the second answers the question: "Do MCOs do what they say they do?" We chose this two-pronged approach because each provides a somewhat different perspective. The interviews allowed us to explore specifically the role of the report card information, as distinct from other avenues that MCOs may employ to obtain information about the relative quality of providers (e.g., through chart reviews, reliance on reputation, etc.). The contracting data offered an opportunity to examine actual behavior that is not subject to the response bias that is likely to arise because responses to interview questions are costless. For example, MCOs face no cost when they respond that quality is the most important factor in their considerations, unlike the consequences they face in making actual contracting decisions.

DATA SOURCES

Sample

The study included all HMOs, IPAs, and PPOs licensed to operate in New York State and all cardiac surgeons offering CABG surgery. Exclusions due to non-response are discussed further on.

The New York State Cardiac Surgery Reports

The *New York State Cardiac Surgery Reports*, published annually since 1990, include information about all hospitals and cardiac surgeons offering CABG surgery in the state. For each hospital and for each surgeon the reports contain the number of cases, their risk-adjusted mortality rate, and a designation of outlier status based on a 95 percent confidence interval (CI). Recognizing the limited accuracy of these measures when samples are small, information about surgeons is reported by name only for those who performed at least 200 procedures over the three-year reporting period. We used data from the report published at the end of 1997, which covers the 1993–1995 period. This report was used because this is the information that was available to MCOs in 1998, the period for which we obtained interview and contracting data.

Interview Data

Of the 53 MCOs in New York State, 31 (59 percent) agreed to participate in interviews. Table 1 compares responders and non-responders along several dimensions. Although none of the differences were statistically significant (at the 0.1 level), non-responders tended to be the smaller, Medicaid-only plans. The survey questions were often not relevant for these plans because they cover very few CABG operations in any year. The individuals interviewed were designated by the chief executives of the MCOs as the persons with the responsibility for making contracting choices. These tended to be individuals in top management, such as the CEOs themselves, vice presidents and managers in charge of network relations, and medical directors. Interviews were conducted over the telephone and lasted, on average, 15 minutes. The interviews included both structured and open-ended questions.

Contracting Data

Provider lists were obtained from 42 (78 percent) of the 53 MCOs in New York State. These lists, which are the lists made available to subscribers choosing their physicians, included all the hospitals and physicians included in each MCO's network. MCOs serving several geographic areas provided separate lists for each area.

ANALYTICAL METHODS*Construction of Referral Areas*

Risk-adjusted CABG mortality rates varied by region within the state, with regional averages ranging from a low of 1.08 percent to a high of 3.09 percent,

Table 1 Percentage Comparison Between Survey Responders and Non-responders

| | <i>All New York State MCOs</i> (N = 53) | <i>Survey Responders</i> (N = 31) |
|--------------------------|--|--------------------------------------|
| MCO Type | | |
| IPA | 53% | 52% |
| IPA/PPO | 19 | 23 |
| PPO | 11 | 6 |
| Staff Model | 15 | 19 |
| Hospital-owned | 2 | 0 |
| For-profit | 43 | 39 |
| Medicaid Only | 34 | 29 |
| Size | | |
| Top quartile | 25 | 25 |
| Bottom quartile | 25 | 13 |
| Located in New York City | 21 | 16 |

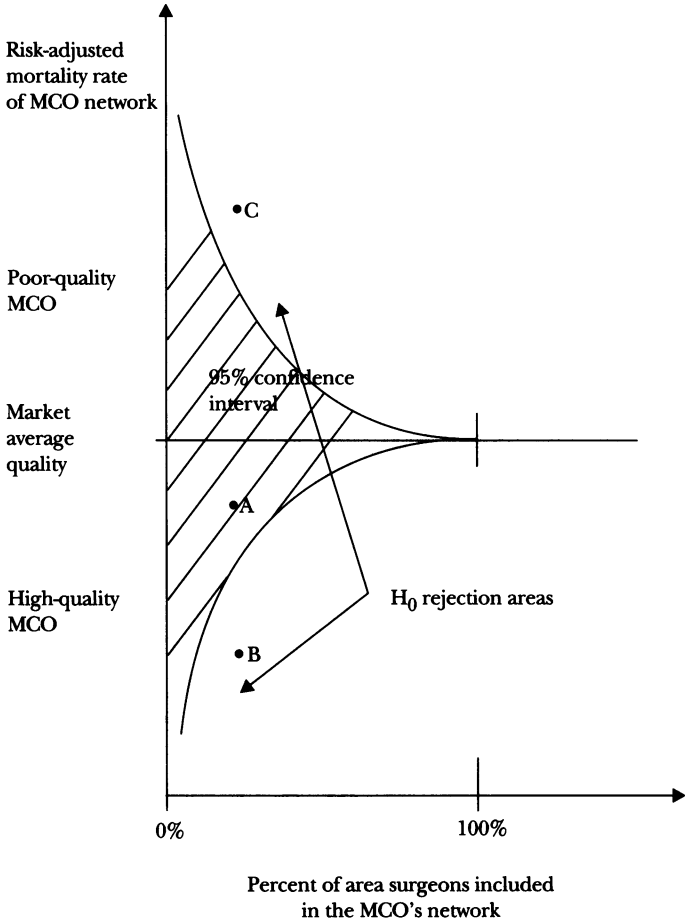
Note: There are no significant differences at the 0.1 level.

raising the question of the appropriate comparison for evaluation of MCO contracting patterns. If patients primarily seek a surgeon in their area of residence, then contracting practices need to be evaluated with respect to the average quality available in the area the MCO serves. We therefore performed an analysis to determine (1) referral regions based on referral patterns in the fee-for-service (FFS) sector, in which patients do not face constraints on their choice of provider, and (2) assigned each MCO to a region based on the residence of its enrollees. These analyses were performed at the county level and resulted in the identification of nine regions that corresponded to the major urban centers in the state. Because some MCOs operated in more than one region, the data set included 98 MCO/region combinations. The analysis described in the next section assumes that MCOs choose surgeons only from among those available in their service areas.

The Relationship Between MCO Selectivity and Quality

Tests of hypotheses about the quality of surgeons' panels in MCOs need to recognize the interrelationship between the selectivity of the MCO and the quality of its panel of surgeons. Consider Figure 1. When the MCO is not selective, that is, when its panel includes all of the surgeons practicing in its area, the panel's quality will by definition equal the average quality in the market. As it becomes more selective, the average quality of the surgeons

Figure 1: Null Hypotheses, that MCO Panel Quality Is Consistent with Random Choice with Respect to Quality



included in its panel is more likely to deviate from the average, even if the selection of surgeons is random with respect to quality. A simple example is a market with two surgeons: unless both surgeons have the same RAMR, the average will lie between their two rates. An MCO contracting with only one of the surgeons will never have the average market quality. Therefore, a departure from average market quality cannot be interpreted as a result of contracting practices with a bias toward either high or low quality. Similarly, an MCO that contracts with all surgeons in its market will by definition include low-volume and poor-quality outliers in its panel.

For every MCO, given the choice set of surgeons it faces and the number of surgeons it contracts with—that is, its selectivity—there is a range of average quality values that is consistent with contracting practices that ignore quality. We can define a 95 percent confidence interval around the market's average quality in such a way that observed MCO quality within this range remains consistent with the null of random choice (MCO A in Figure 1). MCOs whose average quality falls outside of the 95 percent confidence intervals are statistical outliers and can be viewed as having contracting practices that are systematically biased with respect to quality, either favoring high-quality surgeons (MCO B) or favoring low-quality surgeons (MCO C).

The foregoing discussion assumes that selectivity influences panel quality. It is also possible that MCOs' preferences for quality influence their selectivity, that is, that selectivity is endogenous with quality. For example, if MCOs have a preference for high quality, and if they find that all but one surgeon in their area offer average or poor quality, they may choose to contract only with the high-quality surgeon, thus offering a very selective but high-quality panel. If selectivity is indeed endogenous with quality, then failing to account for selectivity will bias our results toward the null, leading to the conclusion that the choice of surgeons is not associated with surgeon quality when in fact it is. To evaluate the potential for such endogeneity bias we examined the distribution of observed MCOs' average panel mortality rates for MCO/regions with selectivity below 20 percent. Of these 20 MCO/regions, nine had RAMR above the market average, five were at the average, and six had rates below the average. This distribution suggests that selective MCOs contract with surgeons of all quality levels and that selectivity is not endogenous with quality.

Hypotheses Testing

To determine if surgeons' quality, as reported in the *New York State Cardiac Surgery Reports*, plays a role in contracting decisions, we tested several null hypotheses:

MCOs choose surgeons randomly with respect to:

- H1.** A surgeon's quality as measured by the surgeon's reported RAMR;
- H2.** A surgeon's designation in the report card as a low-quality outlier;
- H3.** A surgeon's designation in the report card as a high-quality outlier;
- H4.** A high procedure volume as defined by the report card (more than 200 procedures in the three preceding years).

The last hypothesis is motivated by the literature (Hughes, Hunt, and Luft 1987; Hannan 1989) that shows high procedure volume to be associated

with better outcomes and suggests that MCOs may view low volume as a signal for poor quality.

These hypotheses were tested by comparing observed and expected values. To test hypothesis 1 we compared the observed average RAMR of all surgeons included in the MCO panel to the expected average RAMR under the null hypothesis, that is, if surgeons were chosen randomly. To test hypotheses 2 through 4 we compared the observed and expected number of surgeons designated as low-quality outliers in the MCO panel, the number designated as high-quality outliers, and the number with high procedure volume, respectively.

Each of the four hypotheses was tested by aggregating the observed and expected values across all MCO/region combinations. We calculated an aggregate statistic defined as the sum of the differences between observed and predicted values divided by the square root of the sum of the variances. This statistic follows the *t*-distribution, which can be used to test the null hypothesis. Similar tests could not be performed for each of the individual MCO/region observations, because in many instances the number of choices and the number of outlier or high-volume surgeons were too small to allow for the identification of meaningful rejection regions. That is, it was not possible to construct tests that limit type I error to five or ten percent.

To offer insight into the question of whether the aggregate test results are driven by a few MCOs or instead reflect the behavior of the majority, we determined the percent of MCO/region combinations that had observed values two standard deviations above or below the expected mean under the null.

Distributional Assumptions and Calculation of Mean and Variance Under the Null Hypothesis

The expected values and variances depend on the distribution of the variable tested in each hypothesis. In hypotheses 2 through 4 these variables are dichotomous. For example, in hypothesis 2 the variable of interest is whether the surgeon is or is not a low-quality outlier. A choice of a panel of n surgeons of whom m are designated as low-quality outliers in a market in which the choice set includes N surgeons, M of whom are low-quality outliers, follows the hypergeometric distribution (Bishop, Feinberg, and Holland 1975). We therefore calculated the mean and variance for number of outlier surgeons for each MCO conditional on the choice set the MCO is facing and assuming that under the null hypothesis observed choices will follow the hypergeometric distribution.

The variable of interest in hypothesis 1 is the average RAMR, which is a continuous variable. To obtain the appropriate distribution for this variable we performed Monte Carlo simulations. For an MCO that contracts with n out of N surgeons in its market, in each iteration of the simulation n surgeons were chosen randomly out of the N surgeons available, without replacement. Each of the N surgeons had the actual RAMR reported for him or her in the New York State report, such that the simulation replicated the actual quality choice the MCO faced. The result of each iteration was the average RAMR for the chosen panel. We performed 7,500 iterations and obtained a distribution of average panel quality values under the null. (The number of iterations was determined by requiring that the mean of the distribution of the average quality remain stable for up to two decimal places.) The simulated distribution was then used to calculate the mean and standard deviation under the null of random choice with respect to RAMR.

RESULTS

Table 2 summarizes the responses to the interview. Sixty percent of responders said that quality is the most important factor in their decision to include surgeons in their panels. These MCOs had average risk-adjusted mortality rates below their market average, unlike the MCOs that did not indicate quality as the most important consideration. This difference, however, was not statistically significant. Among the subset of MCOs with significantly better than expected RAMR (based on hypothesis 1) that also responded to the survey, a higher, although not significantly higher, percent (71 percent) indicated that quality is the most important consideration. A third of MCOs said that quality is the second most important consideration. Thus, about 90 percent of all surveyed MCOs said that quality is either the most important or the second most important consideration.

A percent similar to that of MCOs that referred to quality as the first consideration, 64 percent, said that they had reviewed the information in the New York State reports. There was, however, only partial overlap between these two groups. Of those that considered quality to be the most important consideration, only 66 percent reviewed the NYS reports. Of the subset of MCOs with significantly better than expected RAMR (based on hypothesis 1) that also responded to the survey, a lower, although not statistically significant, percent (43 percent) indicated that they reviewed the report cards. When asked if they would be willing to pay \$1,000 for the reports if the state no

Table 2 MCOs' Response to Survey Questions

| | <i>Percent</i> |
|--|-------------------|
| Role of Quality in Contracting Choices | |
| Quality is the most important consideration. | 60 |
| Quality is the second most important consideration. | 33 |
| Role of the <i>New York State Cardiac Surgery Reports</i> in Contracting Choices | |
| MCO has examined the New York State reports. | 64 |
| MCO is willing to pay \$1,000 to obtain the reports. | 43 |
| For those MCOs who examined the reports, re the information in the report: | |
| • Report was a sole source. | 0 |
| • Report was a major source. | 32 |
| | (20% of all MCOs) |
| • Report was a minor source. | 58 |
| | (37% of all MCOs) |
| • Report information had no effect on quality evaluation. | 10 |
| | (6% of all MCOs) |
| Value of the New York State Reports to MCOs Considering Quality to Be the Most Important Factor | |
| MCOs that reviewed the reports: | 66 |
| MCOs that are willing to pay \$1,000 for the reports: | 47 |
| Other Factors Important in Contracting Decisions | |
| Price is the most important consideration. | 13 |
| Geographic location is the most important consideration. | 13 |

longer made them available for free, only 43 percent indicated that they would. Again, among those who consider quality to be the most important factor, only 47 percent were willing to pay for the reports. These data suggest that MCOs that consider quality to be the most important element in panel selection are not more likely than other MCOs to consult the NYS reports.

The importance of the information in the reports to those who reviewed them varied. Although no MCO relied on this information as its sole source in evaluating quality, 32 percent (20 percent of the full sample) viewed it as a major source of information, 58 percent (37 percent of the full sample) viewed it as a minor source, and 10 percent (6 percent of all MCOs) said that it had no effect on their evaluations.

It is also interesting to note that all MCOs that considered price to be the most important consideration (13 percent of responders) reviewed the NYS reports, while none of those MCOs that considered geographic location of surgeons and hospitals to be the most important (13 percent of responders) reviewed the reports.

Table 3 reports the percent of MCO/regions that deviated by more than two standard deviations from the expected panel composition under each of the four null hypotheses, as well as the results of the *t*-test for all MCO/regions combined. Hypotheses 1 and 2 were not rejected at conventional significance levels (*p*-values exceeded .10), indicating that, on average, MCOs' panel quality is consistent with random choice with respect to RAMR and poor-quality outlier designation. Hypotheses 3 and 4 were rejected with *p*-values below .001, indicating that MCOs do have a preference for surgeons identified as high-quality outliers and those who have a high procedure volume.

Two trends emerge from the examination of the percentage of MCO/regions that exceed the expected panel composition under the null hypotheses by more than two standard deviations. First, there is a stronger tendency for MCOs to create surgeon panels of better than average quality compared with panels of worse than average quality. The percent of MCO/regions with quality above average (11.2 percent) exceeds the percent with quality below average (7.1 percent). No MCO/region has more poor-quality outliers than expected, but 8.8 percent have more high-quality outliers than expected. Furthermore, almost 20 percent of MCO/regions have more high-volume

Table 3 Percent of MCO/Regions with Observed Contracting Choices That Are Two Standard Deviations Beyond the Expected, Under the Null Hypothesis of Random Choice

| <i>Hypothesis</i> | <i>Percent of MCO/Regions</i> | <i>t-Statistic for Pooled Test</i> |
|---|-------------------------------|------------------------------------|
| H1 | | |
| Average MCO quality (RAMR) is above (below) the expected. | 11.2% | 0.226 |
| Average MCO quality (RAMR) is below (above) the expected. | 7.1% | |
| H2 | | |
| Percent of MCOs with more than expected <i>poor</i> -quality outlier surgeons | 0% | 0.482 |
| H3 | | |
| Percent of MCOs with more than expected <i>high</i> -quality outlier surgeons | 8.3% | 4.618*** |
| H4 | | |
| Percent of MCOs with more than expected <i>high</i> -volume surgeons | 19.8% | 9.301*** |

*** *p* < .001.

surgeons than would be expected if their contracting practices were random with respect to volume.

The second point to emerge is that panel composition for the vast majority of MCO/regions (80.2 percent) is consistent with random choices with respect to the information in the quality report cards, whether it is the RAMR, outlier status, or volume of procedures. This is in contrast to the 60 percent of MCOs who responded in the interviews that quality was the most important consideration, or the 90 percent who said that quality was either the first or second most important consideration.

DISCUSSION

This study evaluated the role that quality rankings published by New York State in its *Cardiac Surgery Reports* have had in choices made by MCOs about the composition of their cardiac surgeons panels. Despite a professed preference for high quality by the majority of MCOs, analyses of actual contracting practices offers mixed results. In aggregate, MCOs tend to prefer high-volume surgeons and surgeons designated as high-quality outliers. They do not, however, seem to make choices based on poor-quality outlier designation or actual RAMR. Furthermore, for the majority (over 80 percent) we did not find a systematic bias for either higher than or lower than average quality surgeons.

One possible explanation for these findings is that the majority of MCOs do not give much weight to quality in their network choices, contrary to the survey responses. Such bias in survey responses is likely because there were no costs associated with responses that favor quality, unlike the costs that MCOs face when making actual choices.

Another possibility is that MCOs define and evaluate quality differently than the NYS reports. MCOs may, for example, judge quality by the reputation of the surgeon and the hospital. There is evidence to suggest that at least some aspects of reputation are not correlated with risk-adjusted mortality rates. Hartz, Kuhn, and Pulido (1999) found that the ranking of the residency program in which the surgeon was trained is not associated with risk-adjusted mortality. If MCOs base their evaluation of quality on information other than the NYS reports, then their contracting choices may not be associated with the reported mortality ranking, even if quality is a major factor in their decisions. Indeed, 58 percent of MCOs who indicated that they consult the reports also indicated that the reported mortality rankings were only a minor factor in their considerations.

Another potential explanation may be related to the low power of our statistical tests in some instances, particularly with respect to outlier status designation. The number of outliers identified in the NYS reports is small. Some referral regions had no outliers at all and others had as few as one or two. Therefore, the power of the MCO/regions-level analyses was more limited than the power of the aggregate tests. This may explain why we fail to identify significant deviations from the average under the null for 80 percent of MCO/regions.

Finally, the analysis of contracting patterns was limited in its scope. It did not account for other factors that may influence contracting decisions, such as prices, geographic location, and other quality attributes including the hospital in which the surgeon practices, waiting times, or local reputation. In essence the analysis we performed is akin to a bivariate analysis that may be biased due to omitted variables.

The findings in this study serve primarily to raise a note of caution regarding the effectiveness of quality report cards in improving the efficiency of competitive health care markets. Further research is needed to confirm our findings—of only a limited report cards impact—on choices made by MCOs in other markets and with other report cards. This study suggests that policy initiatives to increase the effective use of report cards should be considered. To facilitate such policy initiatives the research agenda should be expanded beyond the question of whether or not report cards are effective to identification of the barriers that prevent their effective use by MCOs.

ACKNOWLEDGMENTS

We thank Michael Chernew, the editors, and anonymous referees for insightful comments.

REFERENCES

- Bishop, Y. M. M., S. E. Feinberg, and P. W. Holland. 1975. *Discrete Multivariate Analysis*, pp. 448–50. Cambridge, MA: MIT Press.
- Chassin, M. R., E. L. Hannan, and B. A. DeBuono. 1996. “Benefits and Hazards of Reporting Medical Outcomes Publicly.” *The New England Journal of Medicine* 334 (6): 394–98.
- Epstein, A. 1995. “Performance Reports on Quality: Prototypes, Problems, and Prospects.” *The New England Journal of Medicine* 333 (1): 57–61.

- Gormley, W. T., and D. L. Weimer. 1999. *Organizational Report Cards*. Cambridge, MA: Harvard University Press.
- Hannan, E. L. 1989. "Investigation of the Relationship Between Volume and Mortality for Surgical Procedures Performed in New York State." *Journal of the American Medical Association* 262 (4): 503-10.
- Hannan, E. L., H. Kilburn, Jr., M. Racz, E. Shields, and M. R. Chassin. 1994. "Improving the Outcomes of Coronary Artery Bypass Surgery in New York State." *Journal of the American Medical Association* 271 (10): 761-66.
- Hannan, E. L., D. Kumar, M. Racz, A. L. Siu, and M. R. Chassin. 1994. "New York State's Cardiac Surgery Reporting System: Four Years later." *Annals of Thoracic Surgery* 58 (6): 1852-57.
- Hartz, A. J., E. M. Kuhn, and J. Pulido. 1999. "Prestige of Training Programs and Experience of Bypass Surgeons as Factors in Adjusted Patient Mortality Rates." *Medical Care* 37 (1): 93-103.
- Hughes, R. G., S. S. Hunt, and H. S. Luft. 1987. "Effect of Surgeon Volume and Hospital Volume on Quality of Care in Hospitals." *Medical Care* 25 (6): 489-503.
- Moskowitz, D. B. 1994. "Ranking Hospitals and Physicians: The Use and Misuse of Performance Data." In *The Fed's Medicare Ranking*, no. 8: 77-83. New York: Faulkner & Gray Inc.
- Mukamel, D. B., and A. I. Mushlin. 1998. "Quality of Care Information Makes a Difference: An Analysis of Market Share and Price Changes Following Publication of the New York State Cardiac Surgery Report Card." *Medical Care* 36 (7): 945-54.
- New York State Department of Health. 1997. *New York State Cardiac Surgery Reports*. Albany.
- Peterson, E. D., E. R. DeLong, J. G. Jollis, L. H. Muhlbaier, and D. B. Mark. 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 (4): 993-99.
- Romano, P. S., A. Zach, H. S. Luft, J. Rainwater, L. L. Remy, and D. Campa. 1995. "The California Hospital Outcomes Project: Using Administrative Data to Compare Hospital Performance." *Joint Commission Journal on Quality Improvement* 21 (12): 668-82.