

SPECIAL ARTICLE

## Pay for Performance in Commercial HMOs

Meredith B. Rosenthal, Ph.D., Bruce E. Landon, M.D., M.B.A.,  
Sharon-Lise T. Normand, Ph.D., Richard G. Frank, Ph.D.,  
and Arnold M. Epstein, M.D.

### ABSTRACT

#### BACKGROUND

Pay for performance has increasingly become the subject of intense interest and debate, both of which have been heightened as the Centers for Medicare and Medicaid Services moves closer to adopting this approach for Medicare. Although many claims have been made for the effectiveness of this approach, the extent of its national penetration remains unknown.

#### METHODS

We surveyed a sample of 252 health maintenance organizations (HMOs) (response rate, 96%) drawn from 41 metropolitan areas across the nation about use of pay for performance. We determined the prevalence of pay-for-performance programs, detailed the features of such programs, and examined the adoption of pay for performance as a function of the characteristics of both the health plans and markets.

#### RESULTS

More than half the HMOs, representing more than 80% of persons enrolled, use pay for performance in their provider contracts. Of the 126 health plans with pay-for-performance programs, nearly 90% had programs for physicians and 38% had programs for hospitals. Use of pay for performance was statistically associated with geographic region, use of primary care providers (PCPs) as gatekeepers, use of capitation to pay PCPs, and whether the plans themselves received bonuses or penalties according to performance.

#### CONCLUSIONS

Pay for performance is now commonly used by HMOs, especially those that are situated to assign responsibility for a particular patient to a PCP or medical group. As the design of Medicare with pay for performance moves forward, it will be important to leverage the early experience of pay for performance in the commercial market.

From the Departments of Health Policy and Management (M.B.R., A.M.E.) and Biostatistics (S.-L.T.N.), Harvard School of Public Health; the Department of Health Care Policy, Harvard Medical School (B.E.L., S.-L.T.N., R.G.F., A.M.E.); the Division of General Medicine and Primary Care, Beth Israel Deaconess Medical Center (B.E.L.); and the Division of General Medicine, Brigham and Women's Hospital (A.M.E.) — all in Boston.

N Engl J Med 2006;355:1895-902.

Copyright © 2006 Massachusetts Medical Society.

SINCE 2001, WHEN THE INSTITUTE OF MEDICINE called for better alignment of payment incentives for providers with a national agenda to improve the quality of health care,<sup>1</sup> pay for performance has increasingly become the focus of debate.<sup>2-5</sup> The Deficit Reduction Act of 2005 directs the secretary of health and human services to develop a plan for value-based hospital payments for persons enrolled in Medicare beginning in fiscal year 2009. The Centers for Medicare and Medicaid Services (CMS) is considering plans to adopt pay for performance for health plans, physicians, and other institutional providers. Momentum in the private sector is believed to be great. Recent reports suggest that more than 100 health plans and other public agencies and employers have implemented pay-for-performance programs.<sup>6,7</sup>

Although many claims have been made for the importance of pay for performance, the extent of the national penetration of this approach is unknown. To date, knowledge about pay for performance is based on inventories of programs identified opportunistically,<sup>6-8</sup> rather than through a systematic study of the national data. As a result, there have been no representative estimates of the prevalence of pay-for-performance programs among private-sector health plans or information on the characteristics of health plans that most commonly initiate such programs or on details of those that have been implemented. In addition, while the federal government is contemplating adopting pay for performance for Medicare, gaining a clearer picture of the extent and nature of pay-for-performance programs among private-sector health plans could provide useful information about existing and potentially conflicting or reinforcing incentives for providers. We report the results from a recent national survey of commercial health maintenance organizations (HMOs).

## METHODS

### DATA SOURCES

We identified Metropolitan Statistical Areas (MSAs) and obtained population data using the 2000 Census.<sup>9</sup> Health plans were identified primarily through the 2004 InterStudy Competitive Edge Database, which was supplemented by information from state insurance commissioners to ensure completeness.<sup>10</sup> Information on pay-for-performance programs and the characteristics of health plans was obtained through the survey.

### SURVEY SAMPLE AND DATA COLLECTION

We surveyed health plans that offer commercial HMO products in 40 randomly selected markets (MSAs) in the United States where at least 100,000 persons are enrolled in HMOs. The markets in the sample include an estimated 91% of persons enrolled in U.S. HMOs and represent 78% of the metropolitan population.<sup>9,10</sup> To ensure that the sample would be distributed proportionally across the four census regions, we calculated the number of markets to be sampled within each region according to the proportion of the total population in the region. Markets were selected for the study on the basis of their share of the population in the region, but only one Primary Metropolitan Statistical Area (PMSA) in each Consolidated Metropolitan Statistical Area (CMSA) could be selected. PMSAs are the individual, contiguous metropolitan areas that make up a CMSA.<sup>9</sup> This choice was made to limit sampling of too many contiguous markets. Because New Orleans was in our original sample and Hurricane Katrina occurred before all the interviews for that MSA were completed, we added an MSA from the same region (San Antonio, TX), for a total of 41 MSAs. However, responses from persons enrolled in the three health plans from New Orleans who had been interviewed before the hurricane were retained in the analysis.

To be included in the survey, respondents were asked to confirm that they offered an HMO product in the market. Our sample included all health plans with an HMO product in the 41 selected markets. Using information from the 2004 InterStudy database, we identified potential respondents in each plan, generally medical directors or directors of quality management. When the health plans sampled were part of a regional or national plan, we contacted people in management of the local plan to learn whether the value-based purchasing policies were set by local, regional, or national management and identified respondents at that level of the organization. The survey was conducted between July 2005 and January 2006 and was administered by telephone, except in one case, in which a large national plan elected to complete a subgroup of the questions in writing, supplemented by telephone interviews.

### SURVEY DESIGN

The survey instrument elicited information related to the organizational characteristics of the health plan, its products and purchaser contracts, pro-

**Table 1. Characteristics of 242 HMOs in the Survey Sample.\***

Characteristic	No. of HMOs	HMOs Weighted According to Enrollment (N=100)	
		Unweighted HMOs <i>no. (%)</i>	%†
Region			
Northeast	49	20.3	11.4
South	81	33.5	11.6
Midwest	42	17.4	6.1
West	70	28.9	70.9
Model type			
Network or IPA	226	93.4	92.7
Staff or group	16	6.6	7.3
Persons enrolled with PCP as gatekeeper	—	68.0±42.0	82.2
Persons enrolled with PCP required, but not as gatekeeper	—	12.9±29.2	7.7
Persons enrolled with no PCP required	—	18.7±35.5	10.1
For-profit plan	160	66.1	72.4
Market share	—	14.2±16.3	19.1
Payment for primary care by capitation, ≥50%	72	30.6	72.6
Contracts with purchasers include bonus or penalty for performance	102	44.4	80.5
Use of any pay for performance in provider contracts	126	52.1	81.3

\* Plus-minus values are means ±SD. For characteristics that were recorded dichotomously (yes or no response), frequencies are reported; if the plan was asked to report a percentage (e.g., of enrollees in products that require a PCP gatekeeper), the mean ±SD values are reported. IPA denotes independent practice association.

† Frequencies and means weighted according to the proportion of persons enrolled were computed with the use of the HMO enrollment for each observation. The average enrollment in the sampled HMO plans was 323,553 persons.

vider contracting, quality-improvement approaches, disease management, and programs to influence choices regarding lifestyle and compliance with recommended care among those enrolled in the plans. Questions related to the last four of these topics addressed the health plan's HMO products. Unless otherwise noted, the frame of reference for the survey was 2005.

Here we focus on characteristics of health plans that may be associated with use of pay for performance and the scope and structure of a provider's pay-for-performance efforts. First, information was elicited on the numbers of those enrolled in an HMO in the sampled market, the share of the health plan's total enrollment in an HMO product, the percentage of those enrolled required to select a primary care provider (PCP) (with and without a "gatekeeping" role), and ownership (for-profit or not-for-profit). Using data from the Interstudy database on HMO enrollment according to the MSA, we calculated the plan's commercial HMO market

share as the ratio of the reported enrollment in the commercial HMO to the total enrollment in commercial HMOs in that market. Then we asked about the degree to which the plan relied on salary, capitation, and fee-for-service payment for primary care. We also asked whether during the previous year (2004) any of the health plan's contracts with purchasers included bonuses or penalties related to performance, according to measures of clinical quality or patients' satisfaction.

We requested information on the use of pay for performance, including bonuses or penalties, separately for physicians and hospitals. For physicians, among whom such incentives are more commonly used, we asked about the magnitude and structure of incentive payments, the types of performance indicators included (i.e., clinical quality, including six specific domains, and patients' satisfaction and information technology cost) and the unit of measurement (individual vs. medical group). HMOs for which the predominant meth-

**Table 2. Characteristics of HMOs with Pay-for-Performance Programs.\***

Characteristic	Programs	
	no. (%)	
<b>Plans with any pay-for-performance programs</b>	126	
Hospital pay-for-performance	48 (38.1)	
Physician pay-for-performance	113 (89.7)	
<b>Plans with hospital pay-for-performance programs</b>		
Total plans	48	
Measures†		
ICU staffing	17 (35.4)	
Computerized physician order entry	14 (29.2)	
Volume measures	11 (22.9)	
Other measures of quality	35 (72.9)	
<b>Plans with physician pay-for-performance programs</b>		
Total plans	113	
Pay-for-performance features (unit of measurement or reward)		
Individual physician	15 (13.3)	
Medical group	64 (56.6)	
Both	26 (23.0)	
Unsure	8 (7.1)	
Measures targeted	4.5	
<b>Domains included‡</b>	<b>Capitated Plans§</b>	<b>Noncapitated Plans</b>
Total plans	51	62
Clinical quality	51 (100.0)	49 (79.0)
Information technology	41 (80.4)	28 (45.2)
Patients' satisfaction	35 (68.6)	31 (50.0)
Cost	NA	26 (41.9)

od of payment was capitation were not asked about the inclusion of cost measures in their pay-for-performance program because of the conceptual difficulty involved in distinguishing the cost-control incentives related to the base capitation payment from any additional payment in relation to such measures. For hospital pay-for-performance programs, we asked about the targeting of specific measures promoted by the Leapfrog Group (e.g., staffing of intensive care units, computerized physician order entry, and volume standards for high-risk procedures).

#### STATISTICAL ANALYSIS

We first summarized the characteristics of the sample and the prevalence of pay for performance, with and without weighting according to the proportion of persons enrolled in the commercial HMO. We also examined the characteristics of

pay-for-performance programs with the use of unweighted frequencies. Next, we tested the bivariate association between the selected characteristics of HMOs and use of any pay for performance using generalized estimating equations to account for clustering at the market level. We further explored the association between the HMO's characteristics and use of any pay for performance by estimating a multiple regression, again using generalized estimating equations to account for market-level clustering. For the bivariate and multiple regression analyses, we excluded staff and group-model HMOs, because they were few in number (16) and differ in important ways from the rest of the sample. We tested the sensitivity of our results to this exclusion.

We chose characteristics of HMOs to examine as potential correlates of pay for performance on the basis of previous studies (geographic region,

**Table 2. (Continued.)**

Characteristic	Programs
	no. (%)
Clinical indicators targeted	
Blood pressure control	35 (31.0)
Asthma medication	80 (70.8)
Diabetes care	98 (86.7)
Management of antidepressant medication	42 (37.2)
Mammography	85 (75.2)
Cholesterol management	70 (61.9)
<b>Bonus</b>	
Average bonus	
<5%	40 (35.4)
≥5%	34 (30.1)
Unsure	39 (34.5)
Maximum bonus	
<5%	32 (28.3)
≥5%	47 (41.6)
Unsure	34 (30.1)
Structure of bonus‡	
Rewards only to top performers	36 (31.9)
Based on attainment of predetermined performance threshold	70 (61.9)
Based on improvement	23 (20.4)
Unsure	8 (7.1)

\* ICU denotes intensive care unit, and NA not applicable.

† These three measures are specified by the Leapfrog Group (for details, go to [www.leapfroggroup.org](http://www.leapfroggroup.org)).<sup>6</sup> The measure “ICU staffing” requires dedicated physicians specially trained in critical care to be in the ICU during the day and available by pager at all other times.

‡ Because the categories are not mutually exclusive, responses may sum to more than 100%.

§ Capitated plans are defined as HMOs that use capitation to pay for half or more of primary care services. These plans were not asked whether performance information on cost was used to determine bonuses or penalties (withholds).

for-profit status) and our judgment of the factors that would increase the likelihood of adopting pay for performance.<sup>11-13</sup> These factors included a requirement that those enrolled have an assigned PCP (with or without a gatekeeping role), which would facilitate the attribution of patients to accountable physicians; payment by capitation, which would also ease attribution and increase concern about underuse; a large market share (defined as the commercial HMO market share), since it would make such programs more influential than those with less market share; and the receipt of bonuses or penalties according to performance through purchaser contracts, which could heighten interest in this approach.

Odds ratios and two-sided P values are reported for each predictor variable. The odds ratio for market share and a gatekeeping role of PCPs were evaluated for a meaningful increment of difference (10%). P values of 0.05 or less were considered to indicate statistical significance.

For characteristics collected as percentages (market share, proportion of enrolled persons with PCPs or gatekeepers, and proportion of primary care funded through salary, capitation, and fee-for-service programs), we tested linear, quadratic, and various threshold models and selected the specification that appeared to fit the data best. For PCPs with a gatekeeping role and market share, we used the linear specification; for payment

**Table 3. Prevalence of Any Pay-for-Performance Activities, According to Characteristics of the HMO.\***

Characteristic	Any Pay-for-Performance Activity %	P Value†
Total plans	53.1	
Region		<0.001
Northeast	74.5	
South	20.5	
Midwest	56.4	
West	75.8	
Role of PCP		0.002
As gatekeeper, ≥50%	61.3	
Required but not as gatekeeper, ≥50%	35.0	
Not required, ≥50%	25.7	
Ownership status		<0.001
For-profit	46.3	
Not-for-profit	69.7	
Market share		0.33
Below median	50.0	
Above median	56.7	
Payment by capitation		<0.001
≥50	88.4	
<50	38.0	
Contracts with purchasers include bonus or penalty for performance		<0.001
Yes	68.8	
No	41.5	

\* The analysis excluded plans with HMOs based on the staff or group model.

† P values were derived from generalized-estimating-equation modeling that accounted for clustering within the MSA.

method, we created a dummy variable to indicate that 50% or more of HMO payments for primary care were by capitation.

## RESULTS

Of 309 health plans sampled, 57 were found to be ineligible, because they no longer offered a commercial HMO product in the relevant market (36), had closed entirely (11), or were duplicates (10). Of the 252 eligible plans, 242 completed the survey (response rate, 96%). For individual questions on the survey, the response rate was high (93%). For questions related to the existence of pay-for-performance programs, the nonresponse rate was less than 1%; detailed descriptions, particularly the

amount of payment, elicited higher rates of non-response. HMOs that did not respond to individual questions were less likely to require a PCP as a gatekeeper and had greater market share (data not shown) than those that did respond to individual questions.

### CHARACTERISTICS OF HMOs IN THE SAMPLE

The average HMO enrollment in the sampled health plans was 323,553 persons and constituted 75% of the average plan's overall commercial enrollment (data not shown). On average, more than two thirds of those enrolled in the plans in the sample were required to select a PCP as a gatekeeper; another 12.9% were required to select a PCP but not one with a formal gatekeeping role (Table 1). Payment by capitation accounted for the majority of the HMOs' payments to PCPs among 30.6% of the health plans. In terms of performance-based contracting, 44.4% of the HMOs reported at least one contract with a purchaser that included a bonus or penalty for performance.

### HMOs' PAY-FOR-PERFORMANCE PROGRAMS

More than half the HMOs representing more than 80% of persons enrolled use pay for performance in their provider contracts (Table 1). In 37 of the 41 markets sampled, at least one HMO used pay for performance, and in those markets, the median share of persons enrolled in HMOs in plans with a pay-for-performance program was just under 50% (data not shown).

Hospital pay-for-performance programs were less common than physician-oriented programs (Table 2). A minority of hospital programs included the three measures specified by the Leapfrog Group, and nearly three quarters of these programs included other measures of the quality of the hospital.

Among the 113 health plans with physician-oriented pay-for-performance programs, only a few (13.3%) focused solely on the individual physician as the unit of payment. Nearly all the programs included measures of the quality of clinical care (capitated plans, 100%; noncapitated plans, 79%). Use of information technology and measures of patients' satisfaction were also relatively common elements of incentive programs for physicians in HMOs that paid for 50% or more of primary care using capitation (80.4% and 68.6%, respectively). Among the clinical indicators specifically asked about, diabetes care, mammography, and asthma medication were most commonly included in mea-

asures of clinical care used in physician-oriented pay-for-performance programs. The bonus potential in these plans was typically equivalent to 5% or more of the payments from the plan (according to 41.6% of respondents and 60.0% of those who reported the amount of the bonus).

Approximately one third of the physician-oriented incentive programs were designed to reward only the top-rated physicians or groups. In addition, 62.0% offered rewards for the attainment of a predetermined performance threshold, and 20.4% explicitly rewarded improvement (14.3% offered rewards for both attainment and improvement; data not shown).

#### CHARACTERISTICS ASSOCIATED WITH USE OF PAY FOR PERFORMANCE

A number of characteristics of HMOs were associated with having any pay-for-performance program (Table 3). Health plans in the South were significantly less likely to use pay for performance. Four markets in the South had no pay-for-performance programs, whereas every market in the other three regions (Northeast, Midwest, and West) had at least one program (data not shown). Certain characteristics — the requirement to designate a PCP with or without a gatekeeping role, not-for-profit ownership, and payment by capitation — were associated with greater use of pay for performance. HMOs with at least one purchaser contract that included a bonus or penalty for performance were also more likely to engage in pay for performance than those without such contracts (68.8% vs. 41.5%,  $P < 0.001$ ).

The same factors that were found to be important predictors of pay for performance in the bivariate analysis were significant in the multiple regression model, with the exception of for-profit ownership status (Table 4). When we included HMOs with a staff or group model in the analysis, the only qualitative difference was that in the Northeast region the adjusted odds ratio for having any pay-for-performance program was significantly greater than 1 (data not shown).

#### DISCUSSION

Anecdotes and data from convenience samples have suggested that use of pay-for-performance programs is increasingly common. Our data from a representative national sample document that 52.1% of health plans representing 81.3% of persons enrolled in HMOs used such programs in

**Table 4. Adjusted Odds Ratios for Any Pay for Performance Derived from a Regression Model.\***

Factor	Adjusted Odds Ratio (95% CI)	P Value
Region		
Northeast	2.25 (0.65–7.82)	0.20
South	0.08 (0.02–0.28)	<0.001
Midwest	1.14 (0.37–3.51)	0.82
Proportion of plans in which PCP required, but not as gatekeeper†	1.02 (1.01–1.03)	0.007
Proportion of plans in which PCP is gatekeeper†	1.01 (0.99–1.03)	0.18
For-profit status	0.43 (0.16–1.16)	0.10
Market share above median	1.52 (0.61–3.80)	0.37
Payment by capitation	22.03 (7.73–62.78)	<0.001
Contracts with purchasers include bonus or penalty for performance	3.81 (1.72–8.44)	<0.001

\* The analysis included 207 HMOs and excluded those based on staff or group models and any plan with item nonresponse in the dependent or any of the independent variables (a total of 35 respondents.)

† Odds ratios related to market share and gatekeeping by PCPs were evaluated for a meaningful increment of difference (10%). Values reflect the effect of the 10% change.

2005. Several characteristics of HMOs were associated with the use of pay for performance, including geographic region, role of PCPs, method of payment for primary care, and whether the plans themselves faced performance incentives.

A number of our findings have particular relevance to the prospects for a pay-for-performance program for physicians in traditional Medicare and to the appropriate design of such a program. First, HMOs with a large proportion of enrollees who are not required to select a PCP — a feature shared by Medicare — were less likely to undertake pay for performance. This finding may well reflect the challenges of attributing performance to a single doctor or group when many doctors or groups are responsible for a patient's care. The development of appropriate strategies to overcome the current lack of a designated PCP in the Medicare system will be critical to the implementation of a pay-for-performance program. Second, as a corollary, private-sector approaches to paying physicians for performance appear to be heavily concentrated in medical groups rather than among individual physicians, perhaps because of the advantages of using groups or systems as the locus for the measurement of quality and improvement.<sup>14,15</sup> Medicare does not currently recognize groups as contracting entities (with a few notable exceptions), but the

CMS may need to consider doing so to take the greatest advantage of pay for performance. Third, our survey suggests that many private payers use rewards greater than 5% of payments, presumably reflecting their belief that this level of payment to providers is needed to achieve improvement. Given its financial constraints, the CMS may not be able to meet this benchmark without reducing base payments to some physicians.

Although our data did not permit us to assess the use of pay for performance in non-HMO products, the findings related to gatekeeping and capitation suggest that there would be more barriers to implementing pay for performance in these types of managed care arrangements. By extension, if enrollment in HMOs continues to decline, pay for performance might be expected to become less viable.

Our analysis indicates that external pressure from purchasers in the form of performance contracting is an important correlate of pay-for-performance activity. This finding suggests that if the CMS emulates private purchasers by implementing pay for performance for Medicare Advantage Plans, as recommended by the Medicare Payment Advisory Commission (MedPAC),<sup>16</sup> these incentives may ultimately flow downstream to providers.

We underscore several strengths and limitations of the study. Our data reflect 2005 activity and, to our knowledge, represent the only systematic survey of national health plans that provides a detailed description of the current use of pay for performance. Within the 41 randomly sampled markets, we included all health plans with HMO products and achieved a 96% response rate. We

focused on MSAs with a minimum of a total of 100,000 persons enrolled in HMOs because of our interest in value-based purchasing and our assumption that such activity would be focused in markets with a minimum of HMO penetration. The results may not be generalizable to markets with lower levels of HMO activity. The markets from which we chose our sample include 91% of the persons enrolled in HMOs. Our findings are applicable only to HMOs and probably cannot be generalized to preferred-provider organizations, among which pay for performance has been found to be less prevalent.<sup>7</sup> In addition, our enrolled-persons-weighted results are likely to overstate the reach of pay for performance somewhat, because we assumed that pay-for-performance programs affected all persons enrolled in HMOs within a plan. Finally, the well-known weaknesses of self-reporting represent a limitation of the data, particularly with respect to the accuracy of estimates such as the magnitudes of average bonuses.

Pay for performance has become an established feature of many payment systems of HMOs in the private sector. Patterns of diffusion of pay for performance are largely consistent with the notion that health plans that are better situated to benefit from these programs are more likely to incorporate them into their payment systems than HMOs that are less well situated to do so. As the CMS begins to design a pay-for-performance program for Medicare, information on commercial models may prove critical.

Supported by a grant from the Agency for Healthcare Research and Quality (R01HS13335, to Dr. Epstein).

No potential conflict of interest relevant to this article was reported.

## REFERENCES

1. Institute of Medicine. *Crossing the quality chasm: a new health system for the 21st century*. Washington, DC: National Academy Press, 2001.
2. Berwick DM, DeParle NA, Eddy DM, et al. Paying for performance: Medicare should lead. *Health Aff (Millwood)* 2003; 22(6):8-10.
3. Christianson JB, Knutson DJ, Mazze RS. Physician pay-for-performance: implementation and research issues. *J Gen Intern Med* 2006;21:Suppl 2:S9-S13.
4. Epstein AM, Lee TH, Hamel MB. Paying physicians for high-quality care. *N Engl J Med* 2004;350:406-10.
5. Weber DO. The dark side of P4P. *Physician Exec* 2005;31:20-5.
6. Leapfrog's incentive and reward compendium guide, 2005. (Accessed October 6, 2006, at <http://www.leapfroggroup.org/ircompendium.htm>.)
7. Baker G, Carter B. The evolution of pay for performance models for rewarding providers. In: *Case studies in health plan pay for performance (introduction)*. Washington, DC: Atlantic Information Services, 2004.
8. Rosenthal MB, Fernandopulle R, Song HR, Landon B. Paying for quality: providers' incentives for quality improvement. *Health Aff (Millwood)* 2004;23(2):127-41.
9. Census 2000: summary file 1 (SF 1). Washington, DC: U.S. Census Bureau, 2000.
10. *The competitive edge: HMO database*. Bloomington, MN: InterStudy, 2004.
11. Fisher ES, Wennberg DE, Stukel TA, Gottlieb DJ, Lucas FL, Pinder EL. The implications of regional variations in Medicare spending. Part 1: the content, quality, and accessibility of care. *Ann Intern Med* 2003;138:273-87.
12. Landon BE, Epstein AM. For-profit and not-for-profit health plans participating in Medicaid. *Health Aff (Millwood)* 2001;20(3):162-71.
13. Schneider EC, Zaslavsky AM, Epstein AM. Quality of care in for-profit and not-for-profit health plans enrolling Medicare beneficiaries. *Am J Med* 2005;118:1392-400.
14. Landon BE, Normand SL, Blumenthal D, Daley J. Physician clinical performance assessment: prospects and barriers. *JAMA* 2003;290:1183-9.
15. Normand SL, Glickman ME, Gatsonis CA. Statistical methods for profiling providers of medical care: issues and applications. *J Am Stat Assoc* 1997;92:803-14.
16. Milgate K, Cheng SB. Pay-for-performance: the MedPAC perspective. *Health Aff (Millwood)* 2006;25:413-9.

Copyright © 2006 Massachusetts Medical Society.