

Is Quality Free? The Relationship Between Cost and Quality Across 18 Provider Groups

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Objective: To learn whether the healthcare costs for patients of various care delivery systems are associated with the quality of ambulatory care received. Despite intense interest in the cost and quality of healthcare delivery in the United States, there have been relatively few studies of the relationship between those measures, and none have addressed the relationship for integrated care delivery systems.

Study Design: Results of a retrospective analysis of claims records for overall costs of care for enrollees of 18 care delivery systems were compared with a variety of quality measures for each system.

Patients and Methods: We analyzed the yearly (1996-1998) claims records of 110,000 to 150,000 employees and dependents of member companies of an employer coalition in Minnesota that received all of their medical services from 18 care systems that had at least 1000 employees and dependents. Overall case-mix and inflation-adjusted costs of care for enrollees of each care system were compared with 21 ambulatory care process-oriented quality indicators covering 3 chronic diseases and 5 preventive services.

Results: Regardless of whether the unit of analysis was the care system or the individual enrollee, there was no evidence of a consistent relationship between overall cost of care and quality on any measures. The little association there was tended to suggest that higher quality was provided by the lowest-cost care systems.

Conclusion: Although additional confirmatory research is needed, this analysis of the quality-cost relationship provides some reassurance for those who question whether selecting lower-cost sources of medical care might have a negative effect on quality of care.

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The controversy over the relationship between quality and cost of medical care has gone on for so long that one would think that it should

have been solved by now. Early leaders of total quality management in industries outside of healthcare claimed that quality improvement would save money; in the words of management guru Phillip Crosby, "quality is free."¹ Although there have been no careful studies to prove this premise, a review of the 20 companies scoring highest on the Malcolm Baldrige National Quality Award reported that they had moderate but consistent cost savings from their quality efforts.² In the healthcare industry, there have been similar anecdotal claims of cost reductions from quality improvement projects.^{3,4}

On the other hand, most physicians and an increasing share of the public seem to believe that efforts to cut costs inevitably result in a deterioration in the quality of care, and that belief is the source of much of the current unhappiness with the cost-cutting regimens of managed care.⁵⁻⁷ This parallels the common belief that modern medical technology and the high costs associated with it in the United States have led to improved health. Such beliefs are in conflict with several international comparisons^{8,9} of industrialized countries that suggest that the highest US per capita healthcare costs are associated with

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population-level quality outcomes that are among the worst.

Although many methodological problems face those wishing to study the relationship between cost and quality more carefully, there have been numerous studies on this topic, nearly all in hospital inpatient settings. Although they have produced conflicting findings, most inpatient studies suggest that higher quality costs more.¹⁰⁻¹⁸ One of the few studies of the cost-quality issue in ambulatory care concluded that “quality of care provided for common conditions in primary care is not associated with costs generated by providers,” so choosing low-cost providers “will not necessarily lead to a deterioration in the quality of care.”^{19,20} Nevertheless, this study found that the lowest-cost providers of diabetes, hypertension, and well-adult care had significantly lower care quality for these conditions. However, this study had limited generalizability since it was restricted to individual physicians and studied only the care received by their Medicaid patients (with few patients per physician). Moreover, since the care of these patients was all paid using fee-for-service billing, the physicians had no overall responsibility for the care of the patients studied.

Because medical care is increasingly being provided by large, integrated delivery systems rather than by individual clinicians,²¹⁻²³ and because these care systems (as they are called in the study setting) are being held accountable for both the cost and the quality of the care they provide to a fixed-denominator population, the care system is an appropriate unit of analysis for studies of this issue. In the United States, this new approach to healthcare is probably the farthest advanced in Minnesota,²⁴ as embodied by the direct contracting model (ie, from employer to providers without an intermediary) developed by a large regional employer purchasing coalition called the Buyers Health Care Action Group (BHCAG) for care of its member companies' employees and their dependents.^{25,26} This integrated/managed care model represents the most extreme example of care system accountability. The BHCAG employers were concerned that making all providers in the region available to their employees at a common premium level meant that “cost-efficient provider groups were subsidizing inefficient providers, and higher quality providers masked the performance of lower quality providers.”

In response, in 1997 the BHCAG required that all medical services be provided to its employees and their dependents through contracts with nonover-

lapping integrated care systems. Cost sensitivity of all parties was ensured by the fact that the employee would pay a premium based on “price group tiers.” These tiers were determined by an annual bidding process between the care systems and the BHCAG.²⁷ Claims and other administrative functions for the 25 care systems that signed contracts with the BHCAG were handled by an intermediary health plan, and claims data from 1996-1998 were made available to us as part of a larger evaluation of the BHCAG initiative.²⁸ These data have allowed us to conduct a unique analysis of cost and quality across a 3-year period within these provider networks. We tested the following null hypothesis: care systems with higher costs of care (after controlling for case-mix) do not show evidence of higher quality of care for selected conditions compared with care systems with lower costs.

... METHODS ...

Study Design and Description of the Patient Population and Care Systems

This is a retrospective analysis of medical service and pharmacy claims and membership data for 1996, 1997, and 1998. The study population consisted of all employees and covered family members of BHCAG member companies who selected the new option (called Choice Plus) for care through the contracts between the BHCAG and 25 care systems. This population consisted of 110,826 people in 1996, rising to 150,003 by 1998. The demographic characteristics, case-mix, utilization, and overall costs for this population are described in **Table 1**. Members had to select a single care system for all of their care, and the sample for this analysis was limited to those with at least 6 months' enrollment in a particular care system to allow us to assess care delivery and case-mix.

Ten of the care systems were already in existence at the time of initial bids for participation in the BHCAG initiative, but most were expanded or formed in response to the request for proposals. Care systems had to be nonoverlapping (ie, primary care providers could not participate in multiple care systems) and had to be able to provide or arrange for all medical services, including inpatient and long-term care. Although most members and care systems are in the metropolitan area of Minneapolis and St Paul, some are outside this area or even in the border areas of neighboring states. At the start of the BHCAG program changes in 1997, 25 systems

were included, representing nearly all of the care providers in the metropolitan area. During the 3-year period of this study, 2 care systems merged and another changed its name and composition. To provide a more reliable estimate of costs, the 7 care systems that did not have at least 1000 adult members in 1998 were eliminated from this analysis. **Table 2** provides a description of the care systems remaining in the study population.

Cost Analysis

Under the BHCAG initiative, care systems provided price bids at the beginning of each calendar year, and BHCAG employees chose care systems based in part on premium costs that reflected these price bids. However, the BHCAG's payments to the care systems were based on a risk-adjusted, retrospective "virtual" capitation payment system in which the fee-for-service payments to a care system were adjusted upward or downward based on their cost efficiency during the previous 4 quarters. Using the vernacular, we termed these payments "cost" because this is what care systems received for all covered medical services. To accurately measure healthcare resource use for the purposes of this study, standardized charges were developed and applied consistently across care systems and all 3 years. This approach reduced the impact of price variation due to the differential bids, price inflation over time, and the complex quarterly "bonus/penalty" fee-for-service price adjustments used by the BHCAG payment model. The standardized charges were constructed for inpatient care from Healthcare Cost and Utilization Project data²⁹ and for outpatient care from the Health Care Financing Administration's Medicare Resource-Based Relative Value Scale fee schedule.³⁰ Pharmaceutical charges were not standardized because they were the same across the plan and there was

no quarterly adjustment factor for them. Instead, we applied a yearly, nationally determined price deflator to adjust pharmaceutical charges across the 3 years.³¹

To adjust for differences in case-mix variation among care systems, we adjusted these standardized charges using morbidity clusters from the Adjusted Clinical Group (ACG, formerly known as Ambulatory Care Group) system.^{32,33} The ACGs are determined from the *International Classification of Diseases, Ninth Edition*, diagnosis codes that are assigned by clinicians and captured by the claims system. They represent mutually exclusive actuarial cells that reflect broad morbidity and comorbidity groupings. In evaluating differences in resource use, we used multivariate analysis to control for differences in enrollee demographics, case-mix, and year. After

Table 1. Characteristics of the BHCAG Initiative Enrolled Population

Characteristic	1996	1998	Change, %
Demographics			
Enrollees, No.	110,826	150,003	+35.4
Enrolled >5 mo, No.	98,118	132,507	+35.0
Age <18 y, %	30.5	29.8	-2.3
Mean age, y	29.5	30.1	+2.0
Female, %	52.4	52.4	0
Metropolitan area, %	93.1	92.0	-1.2
Disenrolled at end (1996) or start (1998) of year, %	2.7	5.1	+88.9
Switched care systems, %	*	10.5	NA
Case-mix			
Patients with chronic conditions, %	28.4	31.9	+12.3
Adjusted Clinical Group index [†]	0.95	1.05	+10.5
Utilization and Cost			
Nonusers, %	14.8	14.0	-5.4
Hospitalized, %	4.8	4.7	-2.1
Standardized total costs PMPM, \$ [‡]	103	117	+13.6
Ambulatory	52	60	+15.4
Hospital	36	37	+2.8
Pharmacy	15	20	+33.3

BHCAG = Buyers Health Care Action Group; NA = not applicable; PMPM = per member per month.

*Assignment of BHCAG employees to care systems in the year before the initiative began was attempted, but the data on this are insufficiently accurate to permit reporting this number.

[†]1.00 = 1997 case-mix (Johns Hopkins Adjusted Clinical Group Methodology).^{29,30}

[‡]Standardized for inflation based on a Resource-Based Relative Value Scale-like fee schedule (not risk adjusted).

Table 2. Characteristics of the 18 Provider Care Systems*

Characteristic	Value
In metropolitan area, No. (%)	14 (78)
BHCAG study enrollees, mean (SD) [range], No.	7277 (8613) [1125-35,986]
Primary physicians, mean (range), No.	128 (17-334)
Primary care sites, mean (SD) [range], No.	23 (12) [2-67]
Structure, No.	
Hospital/medical group alliance	9
HMO owned or organized	6
Medical group alliance	3

BHCAG = Buyers Health Care Action Group; HMO = health maintenance organization.

*Includes only those care systems with >1000 BHCAG enrollees in 1998.

calculating the mean cost of members in each cluster, a ratio of the observed value of total costs to the expected value was calculated for each care system. Then the care systems were empirically divided into high-, medium-, and low-cost tertiles for each of the 3 years to test the relationship between actual medical payments and quality. Nine care systems changed cost tertiles during the study, so each was assigned to the cost tertile it was in for 2 of the 3 years. Two of these care systems were in each of the 3 cost tertiles, so they were assigned to the middle tertile. We also conducted a sensitivity analysis for individual years, which showed similar results as the multiyear analysis; therefore, these data are not shown.

Table 3. Quality Indicators: Case Identification and Process Quality Criteria

Condition	Case Identification	Quality Criteria
Depression	Aged >18 y, >1 depression-coded visit in 12 mo, and new antidepressant medication with none in previous 4 mo	<ol style="list-style-type: none"> >2 follow-up visits within 12 wk ≥54 d of medications in 12 wk ≥129 d of medications in 6 mo % of time with medications per year (weighted by months of enrollment)
Child asthma	Aged <18 y and >1 asthma-coded visit in a year or >1 prescription asthma inhaler per year	<ol style="list-style-type: none"> >1 follow-up visit per year >1 prescription for a corticosteroid inhaler per year Any emergency department visit per year
Adult asthma	Aged 18-50 y and 1 asthma-coded visit in a year or >1 prescription asthma inhaler per year	Same as for child asthma
Diabetes mellitus	Aged >30 y and >1 diabetes mellitus-coded visit in a year or ≥1 prescription for a diabetes mellitus medication	<ol style="list-style-type: none"> 1 glycosylated hemoglobin test per year 1 eye examination per year 1 lipid profile per year 1 microalbuminuria test per year ≥1 statin prescription per year
Preventive services		
Cholesterol screen	Male >35 y or female >45 y	Lipid panel in 2 y
Colon cancer screen	≥50 y	Rectal endoscopy in 2 y
Pap smear	Female 18-50 y	Pap smear in 2 years
Mammogram	Female ≥50 y	Mammogram in 2 y
Flu immunization	≥65 y or 3 chronic disease codes	Immunization in 1 y
Services up to date	All age- and sex-appropriate services in 1 y	Eligible services up to date in that year

Quality Analysis

A number of indicators of technical care quality were considered to determine whether there were enough in-scope patients across care systems to make the indicator useful for this study. Potential indicators were sought from Health Plan Employer Data and Information Set (HEDIS) measures^{34,35} and from the clinical guidelines developed at the Institute for Clinical Systems Integration in Minneapolis.³⁶⁻³⁸ This organization is a unique quality improvement consortium of medical groups that includes 40% of the physicians in the state, and its

resulting guidelines have become the recognized quality reference in the region. These guidelines are particularly relevant here because the Institute for Clinical Systems Integration was created as part of the original BHCAG effort to address cost and quality, and it has been the main vehicle for implementation of quality of care guidelines in the region.^{39,40} The quality indicators adopted for use in this study are described in **Table 3**. They were assessed for members of a care system who qualify for the specific indicator for the most recent relevant period of the 3 years. Because we were limited to insurance

Table 4. Mean Care System Quality Scores for Each Cost Tertile and Overall*

Indicator	Cost Tertile			P†	Overall Mean (Range)
	Low	Middle	High		
Child asthma					
Care systems, No.	5	7	4		
Visits	91.1	89.0	89.5	NS	89.8 (82.8-96.9)
Corticosteroid inhalers	9.5	7.7	5.0	NS	7.6 (1.8-20.0)
ED visits‡	4.1	4.6	5.6	NS	4.7 (0.0-12.5)
Adult asthma					
Care systems, No.	3	8	4		
Visits	83.8	83.5	81.9	NS	83.1 (76.8-86.6)
Corticosteroid inhalers	19.4	17.6	14.2	NS	17.0 (8.3-30.0)
ED visits‡	3.7	2.2	1.4	.08	2.3 (0.0-6.3)
Diabetes mellitus					
Care systems, No.	3	7	3		
Glycosylated hemoglobin	76.4	81.2	80.0	NS	79.8 (65.9-87.3)
Lipid profile	41.9	46.1	41.4	NS	44.1 (29.1-56.7)
Microalbuminuria	35.4	21.2	26.5	NS	25.7 (8.1-43.6)
Eye examination	38.9	40.9	42.7	NS	40.8 (26.8-50.7)
Statin treatment	18.9	18.3	20.9	NS	19.0 (15.1-21.8)
Depression					
Care systems, No.	3	7	4		
Visits	31.5	29.2	34.9	NS	31.4 (14.6-47.4)
Medications—acute phase	76.4	71.0	71.6	NS	72.4 (46.3-82.3)
Medications—continuation phase	51.8	48.9	44.9	NS	48.4 (22.0-59.1)
Medication possession ratio	54.7	55.5	55.8	NS	55.4 (43.6-62.9)
Preventive services					
Care systems, No.	5	8-9	3-5		
Cholesterol test	23.6	24.7	22.4	NS	23.9 (2.6-32.3)
Colorectal cancer test	16.3	12.6	9.8	.02	13.0 (5.8-22.0)
Flu shot	15.6	19.9	22.3	NS	19.4 (7.0-37.4)
Mammogram	60.2	62.6	59.8	NS	61.4 (36.0-76.1)
Pap smear	56.5	49.7	42.9	NS	49.7 (20.0-63.9)
Services up to date	31.6	29.9	28.0	NS	29.8 (17.9-34.5)

ED = emergency department; NS = not significant.

*Quality score represents the percentage of eligible members in each care system who achieved the indicator (see Table 3). The mean of the in-scope care system quality scores is presented for each cost tertile. The higher the score, the better the quality.

†Significance testing by analysis of variance.

‡For ED visits, the lower the score, the better the quality.

claims data over a limited enrollment period, some of the specifications for quality that we used are different from those of either HEDIS indicators or other evidence-based standards (eg, screening intervals for cholesterol and colorectal cancer). As a result, the findings cannot be directly compared with published results that are based on “hybrid” methods of quality measurement using both claims and medical charts. Given the uniform planwide data collection approach, there is no reason to believe that our use of this limited data source should affect the relative ranking of the care systems within our analysis.

Because the number of care systems with enough members to be included in any given indicator varied considerably, it was not possible to produce an aggregate quality score for each care system. Therefore, each indicator for which a care system has at least 30 eligible members is shown separately in the results. Eligibility required both enrollment for at least 6 months in a care system *and* diagnostic or age and sex matching with the indicator criteria. To simplify the interpretation, care systems eligible for each indicator were divided into 3 empirical quality tertiles based on the mean score on that indicator. Thus, care systems were categorized as having high, medium, or low quality for that indicator, depending on the relation between their score and the mean score for the group (same as for the cost measure).

Cost and Quality Relationships

To assess our hypothesized relationship between cost and quality, a variety of analyses were under-

taken at both the care system and the subscriber levels. First, we compared the percentage of care systems in each cost tertile meeting the various quality standards shown in Table 3. We used the F ratio from an analysis of variance to compare the average variability between cost tertile means with the average variability of quality scores within tertiles. However, the few degrees of freedom for this analysis limited our power to detect statistically significant differences. For a significance level of $\alpha = 0.05$, the maximum power obtained for analysis of variance was 0.55, and the median power was 0.16. The results for overall relationships across all years are given in Table 4 and discussed in the “Results” section. We also conducted a sensitivity analysis of this relationship for individual years because there was some movement of care systems between cost tertiles across the 3-year study.

We also looked at the correspondence between each care system’s cost tertile and an analogous measure of quality. This was determined by ranking the care systems on each quality criterion for a set of standards (eg, adult diabetes mellitus and prevention services) and averaging the ranks for each care system. The care systems were then divided into tertiles based on the average rank score. Cochran-Mantel-Haenszel correlation was used in this analysis (Table 5).

The final set of analyses at the person level consisted of logistic regressions on the likelihood that the care received by an individual subscriber met the various quality standards (Table 6). As person-level independent variables, we included age, sex, and year-round enrollment, as well as limiting the

Table 5. Distribution of Care Systems by Indicator and Cost and Quality Tertiles for Summarized Indicators*

Indicator	Cost and Quality (Q) Tertiles								
	High Cost			Middle Cost			Low Cost		
	Hi Q	Med Q	Lo Q	Hi Q	Med Q	Lo Q	Hi Q	Med Q	Lo Q
Child asthma	1	2	1	0	4	3	1	3	1
Adult asthma	1	1	2	2	6	0	2	1	0
Depression	2	1	1	1	4	2	2	1	0
Adult diabetes mellitus	2	0	1	3	1	3	2	0	1
Prevention	2	1	2	3	5	0	3	1	1

*See the text, “Cost and Quality Relationships,” for a description of the cost and quality tertile calculation method.

sample to persons eligible to receive the relevant care standard (eg, having the condition of interest or being of the appropriate age and sex). Sex was not included in prevention care models in which it was an eligibility requirement. The care system-level independent variables included were number of persons enrolled, average ACG case-mix, and indicators for the lowest and highest cost tertiles. The middle tertile was the reference category.

... RESULTS ...

There were sizable differences in the number of members enrolled in the various care systems under study, with a strong relationship to the number of providers contracting with those systems. Three care systems had more than 10,000 BHCAG enrollees by the end of the study, 11 had 2500 to 10,000 enrollees, and 11 had less than 2500 enrollees. Two of the largest care systems were in the low-cost tertile, and the third was in the middle tertile; the smallest care systems were distributed relatively equally in each cost tertile. The 7 care systems with fewer than 1000 members were eliminated from these results because they had too few members to reliably measure attainment of the quality of care standards.

For the remaining 18 sites, the mean standardized monthly charge per covered member in 1997 was \$143.39 for the high-cost tertile, \$110.65 for middle cost, and \$88.47 for low cost. These differences are significant at $P = .006$ and amounted to \$659 per member per year (62%) greater for the high-cost than the low-cost tertiles.

Mean quality scores (using the care system as the unit of analysis) for each of the 18 care systems, by cost tertile, are presented in Table 4, along with the overall mean (range) scores for all care systems. For most indicators, the difference in mean quality score among cost tertiles is relatively small. Where there are apparent differences, the high-cost tertile score tends to be the lowest and the low-cost tertile tends to have more relatively high scores, although only the colorectal cancer screening score difference attains statistical significance at the .05 level. This trend seems to hold across each category of quality indicator, with the possible exception of dia-

Table 6. Adjusted Odds Ratios for the Association Between Care System Cost and Quality*

Indicator	Cases, No.	Odds Ratio	
		Low Cost	High Cost
Child asthma	4085		
Visits		1.14	0.86
Corticosteroid inhalers		0.93	1.06
ED visits		1.35	1.62
Adult asthma	4990		
Visits		0.92	1.33
Corticosteroid inhalers		1.31	1.27
ED visits		1.25	0.82
Diabetes mellitus	2479		
Glycosylated hemoglobin		0.97	0.87
Lipid profile		0.85	1.07
Microalbuminuria		1.68 [†]	1.25
Eye examination		1.38	0.88
Statin treatment		0.85	1.20
Depression	3150		
Visits		0.99	1.44 [‡]
Medications for 54 of 84 d		1.34 [‡]	1.51 [‡]
Medications for 129 of 182 d		1.24	1.23
Preventive services			
Cholesterol test	46,288	1.16	0.92
Colorectal cancer test	22,078	1.66 [§]	0.99
Flu shot	8539	0.49 [§]	1.19
Mammogram	11,431	0.88	1.04
Pap smear	51,152	1.85 [†]	1.14 [‡]

ED = emergency department.

*The logistic regression controlled for size of enrollment, age, sex, and Adjusted Clinical Group case-mix. The individual enrollee is the unit of analysis, and the middle tertile is the reference group (odds ratio = 1.0).

[†] $P < .001$ compared with the middle tertile.

[‡] $P < .05$.

[§] $P < .01$.

betes mellitus. A sensitivity analysis of these data for single years rather than lumping all years together confirms that there is no relationship between cost tertiles and these quality measures. The only significant differences were for adult asthma visits and flu shots in 1996 only, and in both cases, the highest quality scores were for the low-cost tertiles.

In Table 5, all indicators are summarized for each condition and each care system. In this table, the high, medium, and low ranking of both cost and quality are cross tabulated. It is clear that one cannot predict which quality tertile a care system will be in by knowing its cost tertile. The only deviation from this is that 1 of the 5 care systems in the high-cost tertile was in the low-quality tertile on every individual indicator. However, each of the others had mixed quality scores, tending to do better for some conditions than for others.

The number of care systems in each cost or quality tertile does not provide enough power for meaningful statistical comparisons. Therefore, Table 6 reports the results of a set of logistic regressions that used the individual member as the unit of analysis. This regression allowed us to calculate odds ratios for each indicator being met for a particular patient, and the effect of membership in a high- or low-cost tertile (relative to the middle tertile) could be ascertained. Only 3 of the disease indicator odds ratios were statistically significant, but they showed a higher quality score for microalbuminuria testing for the low-cost tertile, higher quality for the high-cost tertile for visits after prescription of a new antidepressant drug, and similar higher quality for both tertiles for antidepressant persistence. Three of the 5 preventive services odds ratios were significant, and they all favored the low-cost care systems.

... DISCUSSION ...

This analysis represents one of the first reported studies of the relationship between a care system's overall costs of care and the quality of that care for 3 common conditions and 5 key preventive services. The results of the analysis do not support the common assumption that higher cost means higher quality. In fact, there is at least some evidence to the contrary, since a number of the lower-cost care systems also had higher measures of quality attainment. However, before purchasers decide to choose lower-cost alternatives based on this analysis, they also need to consider that the relative quality of individual care systems seems to vary considerably,

depending on which type of care and which indicator are being assessed. Our data do not support the idea of generalized excellence.

Although these are important findings using the best available methods, these conclusions must be tempered by the fact that this analysis involved a relatively small number of care systems in one highly competitive region of the country during a period of dynamic change. Many of the care systems and the overall BHCAG model of contracting and consumer choice were being formed during the study period.²⁷ In addition, half of the in-scope care systems had fewer than 2500 member-subjects for this study, and many of the care systems had fewer than 100 patients with the disease conditions we studied. Other limitations are that all of the indicators assessed process of care rather than outcomes and that all relied solely on claims data from a limited time period. It is also possible that other quality measures not assessed here, or other aspects of the care provided by these competing systems, might still warrant choice of a higher-cost alternative. Finally, although our quality measures focus on only selected aspects of the ambulatory care process for some conditions (those that can be assessed from claims data only), the costs we assessed reflect total costs, not just those associated with ambulatory care or with the indicator conditions.

Nevertheless, our findings add to the small but growing base of literature and are similar to those produced in another region of the country that assessed the relationship between cost and quality among 135 providers in a variety of practice setting types serving Medicaid fee-for-service enrollees.^{19,20} Although that other study did not examine the role of care systems or even provider groupings and is subject to concerns about the unreliability of measures based on individual physician report cards, it also found that quality of care was not associated with provider costs.^{38,41}

So, have we supported Crosby¹ and other quality improvement leaders when they say that quality is free and that improving quality can even lower costs? Perhaps not, since we do not know whether there is a relationship between quality scores and either quality cultures or specific quality improvement initiatives in the participating care systems. Moreover, the recent literature review by Jarlier and Charvet-Protat¹⁴ found some evidence that such projects, or broader total quality management initiatives, may have led to cost savings. Johnson et al⁴² described a method (clinical process cost analysis) to better link costs to the process of care in a way

that might address some of the deficiencies in the literature on this subject. Otherwise, we are left with case histories, such as that detailed by Keston and Enthoven¹⁶ illustrating how the cost of total hip replacement has declined dramatically while the quality has improved. These authors also identified 14 clinical and management innovations that were associated with that example, most of which have application in many other areas of healthcare.

What do these findings mean to the BHCAG and its employees as well as to other policy makers and researchers who are increasingly concerned about the cost and quality of medical services? At the very least, they should provide some reassurance to those who choose lower-cost care systems rather than the higher-cost alternatives. It should also reinforce questions about our already high—and rising—costs of care. Perhaps it will even lead to more questions about our national tendency to believe that more care (and more cost) is necessarily better. Although this may be the first study to explore the relationship between cost and quality within organized care systems, it should not be the last, given the increasing importance of these systems.

As long ago as 1977, Brook and Davies-Avery⁴³ pointed out the need to address this issue in ambulatory care as well as in hospitals and asked, “Is it possible to control costs and improve the quality of care at the same time?” While calling for more research on the issue, they were convinced that “conscientious members of the medical profession are capable of reviewing and improving the quality of care without substantially escalating the costs.” Perhaps they were right.

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... REFERENCES ...

1. **Crosby PB.** *Quality Is Free.* New York, NY: McGraw-Hill Book Co; 1979.
2. **US General Accounting Office.** *Management Practices: US Companies Improve Performance Through Quality Efforts.* Washington, DC: US General Accounting Office; 1991. GAO/NSIAD-91-190.
3. **Coffey RJ, Eisenberg M, Gaucher EM, Kratochwill EW.** Total quality progress at the University of Michigan Medical Center. *J Qual Part* 1991;14:22-31.
4. **Godfrey AB, Berwick DM, Roessner J.** Can quality manage-

ment really work in health care? *Qual Prog* 1992;25:23-27.

5. **Angell M, Kassirer JP.** Quality and the medical marketplace: Following elephants. *N Engl J Med* 1996;335:883-885.
6. **Kassirer JP.** Managed care and the morality of the marketplace. *N Engl J Med* 1995;333:50-52.
7. **Silver G.** The road from managed care [editorial]. *Am J Public Health* 1997;87:8-9.
8. **Anderson GF.** In search of value: An international comparison of cost, access, and outcomes. *Health Aff* 1997;16(6):163-171.
9. **Starfield B.** Primary care and health: A cross-national comparison. *JAMA* 1991;266:2268-2271.
10. **Mukamel DB, Spector WD.** Nursing home costs and risk-adjusted outcome measures of quality. *Med Care* 2000;38:78-89.
11. **Chen J, Radford MJ, Wang Y, Marciniak TA, Krumholz HM.** Performance of the “100 top hospitals”: What does the report card report? *Health Aff* 1999;18(4):97-101.
12. **Taylor DH Jr, Whellan DJ, Sloan FA.** Effects of admission to a teaching hospital on the cost and quality of care for Medicare beneficiaries. *N Engl J Med* 1999;340:293-299.
13. **Fleming ST.** The relationship between quality and cost: Pure and simple? *Inquiry* 1991;28:29-38.
14. **Jarlier A, Charvet-Protat S.** Can improving quality decrease hospital costs? *Int J Qual Health Care* 2000;12:125-131.
15. **Carey K, Burgess JF Jr.** On measuring the hospital cost/quality trade-off. *Health Econ* 1999;8:509-520.
16. **Keston VJ, Enthoven AC.** Total hip replacement: A case history. *Health Care Manage Rev* 1998;23:7-17.
17. **Skelton AG.** The relationship among cost, quality, and competition: An analysis of obstetrics services in Missouri hospitals. *J Health Care Finance* 1997;24:30-44.
18. **Bradbury RC, Golec JH, Steen PM.** Relating hospital health outcomes and resource expenditures. *Inquiry* 1994;31:56-65.
19. **Starfield B, Powe NR, Weiner JR, et al.** Costs vs quality in different types of primary care settings. *JAMA* 1994;272:1903-1908.
20. **Powe NR, Weiner JP, Starfield B, et al.** Systemwide provider performance in a Medicaid program. *Med Care* 1996;34:798-810.
21. **Kassirer JP.** Mergers and acquisitions: Who benefits? Who loses? *N Engl J Med* 1996;334:722-723.
22. **Relman AS.** The changing climate of medical practice. *N Engl J Med* 1987;316:333-334.
23. **Robinson M.** Health care becomes big business. *Bus & Health* 1996;14(suppl C):29-32.
24. **Bell H.** Joining the ranks of the employed. *Minn Med* 1996;79:14-18.
25. **Robinow AL.** The Buyers Health Care Action Group: Creating a competitive care system model. *Manag Care Q* 1997;5:61-64.
26. **Baumgarten A.** The Minnesota experiment. *Bus & Health* 1996;14:23-24, 26.
27. **Christianson J, Feldman R, Weiner JP, Drury P.** Early experience with a new model of employer group purchasing in Minnesota. *Health Aff* 1999;18(6):100-114.
28. **Lyles A, Weiner JP, Shore A, et al.** Cost and quality trends in direct contracting arrangements. *Health Aff* 2002;21(1):89-102.
29. **Healthcare Cost and Utilization Project (HCUP), 1988-97: A Federal-State-Industry Partnership in Health Data, August 2000.** Available at: www.ahrq.gov/data/hcup/hcupnis.htm. Accessed October 19, 2001.
30. **Centers for Medicare and Medicaid Services.** *National Physician Fee Schedule Relative Value File (1997).* Available at: www.hcfa.gov/stats/natlcrst.htm. Accessed October 26, 2001.
31. **Bureau of Labor Statistics.** Producer Price Index (Prescription Drugs) data for January 1996, 1997, and 1998. Available at: <http://data.bls.gov/cgi-bin/survey/most?pc>. Pharmaceutical Preparations Series PCU2834. Accessed November 20, 2001.

- 32. Starfield B, Weiner J, Mumford L, Steinwachs D.** Ambulatory care groups: A categorization of diagnoses for research and management. *Health Serv Res* 1991;26:53-74.
- 33. Weiner JP, Starfield BH, Steinwachs DM, Mumford LM.** Development and application of a population-oriented measure of ambulatory case-mix. *Med Care* 1991;29:452-472.
- 34. Corrigan JM, Nielsen DM.** Toward the development of uniform reporting standards for managed care organizations: The Health Plan Employer Data and Information Set. *Jt Comm J Qual Improv* 1993;19:566-575.
- 35. National Committee for Quality Assurance.** *HEDIS 3.0*. Washington, DC: National Committee for Quality Assurance; 1998.
- 36. Mosser G.** Clinical process improvement: Engage first, measure later. *Qual Manage Health Care* 1996;4:11-20.
- 37. Institute for Clinical Systems Integration.** *Health Care Guidelines: Products of Ongoing Quality Improvement, Vol. 1*. Bloomington, MN: Institute for Clinical Systems Integration; 1997.
- 38. Institute for Clinical Systems Integration.** *Health Care Guidelines: Products of Ongoing Quality Improvement, Vol. 2*. Bloomington, MN: Institute for Clinical Systems Integration; 1997.
- 39. Reinertsen JL.** Collaborating outside the box: When employers and providers take on environmental barriers to guideline implementation. *Jt Comm J Qual Improv* 1995;21:612-618.
- 40. Solberg LI, Mosser G, McDonald S.** The three faces of performance measurement: Improvement, accountability, and research. *Jt Comm J Qual Improv* 1997;23:135-147.
- 41. Hofer TP, Hayward RA, Greenfield S, et al.** The unreliability of individual physician "report cards" for assessing the costs and quality of care of a chronic disease. *JAMA* 1999;281:2098-2105.
- 42. Johnson LC, Batalden PB, Corindia JT, et al.** Clinical process cost analysis: A promising tool for clinical improvement. *Qual Manage Health Care* 1997;5:52-62.
- 43. Brook RH, Davies-Avery A.** Trade-off between cost and quality in ambulatory care. *Qual Rev Bull* 1977;3:4-7.