Medical Groups Can Reduce Costs By Investing In Improved Quality Of Care For Patients With Diabetes

John E. Kralewski, Bryan E. Dowd and Yi "Wendy" Xu

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Medical Groups Can Reduce Costs By Investing In Improved Quality Of Care For Patients With Diabetes

ABSTRACT A major feature of many new contracts between providers and payers is shared savings programs, in which providers can earn a percentage of the savings if the cost of the care they provide is lower than the projected cost. Unless providers are also held accountable for meeting quality benchmarks, some observers fear that these programs could erode quality of care by rewarding only cost savings. We estimated the effects on Medicare expenditures of improving the quality of care for patients with diabetes. Analyzing 234 practices that provided care for 133,703 diabetic patients, we found a net savings of $51 per patient with diabetes per year for every one-percentage-point increase in a score of the quality of care. Cholesterol testing for all versus none of a practice’s patients with diabetes, for example, was associated with a dramatic drop in avoidable hospitalizations. These results show that improving the quality of care for patients with diabetes does save money.

The effective management of chronic illnesses, such as diabetes, is a central feature of the accountable care organization concept and other shared savings models. It is argued that these organizations will have the capacity to implement disease management programs and will benefit financially by doing so.1,2

Shared savings payment programs are being developed based on pay-for-performance arrangements in which quality of care and total patient-level costs are the main measures by which practices are judged. Consequently, the economic incentives for medical group practices that participate in these programs will shift from maximizing fee schedules to providing high-quality care at comparatively lower costs.

Although disease management programs are an important dimension of pay-for-performance health care and have been shown to have considerable potential to improve care outcomes for patients with diabetes, the cost savings are uncertain.3–6 The challenge in documenting cost savings is that although the potential exists for some immediate savings—for example, through reducing the number of inappropriate emergency department visits—these savings might be offset by the increased costs of the disease management program. Moreover, the major savings may be a result of preventing complications in the distant future, when the patient may no longer be enrolled in the same health plan.

Even the near-term savings may be suspect unless differences in characteristics of the participating providers are taken into account. We know, for example, that risk-adjusted costs of care, especially those of emergency department use, vary considerably among medical group practices that are potential partners in shared savings programs.7–9 Consequently, medical group practices are concerned about shared savings proposals that do not adequately account or risk-adjust for patient characteristics for both costs and quality of care.

In this article, we report the findings from a study designed to estimate the near-term savings.
that can be achieved by improved quality of care for patients with diabetes in medical group practices when practice characteristics are taken into account.

Both the quality of care that is provided and the mix of patient visits, technologies, and inpatient services that are employed to provide that care influence patient care costs, but they do so in different ways. Better-quality care saves money by reducing the illus-driven use of resources. For example, patients with diabetes who receive higher-quality care are expected to experience fewer adverse events such as emergency care for uncontrolled blood glucose levels.

However, when the medical group practice responsible for the patient’s care fails to use an optimal mix of resources to control blood glucose levels, the total cost of care for the patient will be higher even if better-quality care reduces costs. Consequently, to estimate the cost savings contributions of the quality of care, the practice characteristics that influence cost must be accounted for.

**Study Data And Methods**

Our study is based on the theory that the characteristics of medical group practices influence costs directly through the more effective use of resources and the provision of better-quality care. Consequently, both of these factors must be considered in an analysis of the influence of quality of care on costs.

We analyzed the influence of three scores of quality of care for patients with diabetes and ten practice structure attributes on costs of care for 133,703 Medicare patients with diabetes served by 234 medical group practices during 2009. Cost and quality data were obtained from claims files from the Centers for Medicare and Medicaid Services (CMS).

Cost effects were calculated three ways: total costs, inappropriate emergency department use, and avoidable hospitalization rates. All costs were risk-adjusted for patient age, sex, and Medicare risk-adjustment scores, calculated at the individual patient level.

The structural characteristics of the medical group practices were obtained from the 2009 practice performance surveys of the Medical Group Management Association. The structure variables were those previously found to influence costs of care and include practice size, specialty and nonphysician clinician mix, ownership, electronic health record capacity, and number of on-site support services.

Our data set was created by obtaining the names of the medical group practices that completed the survey and selecting those practices that reported having a primary care component.

Then we matched these practices to CMS claims data and included practices with at least fifty patients with diabetes.

Patients with diabetes were identified by **International Classification of Diseases**, Ninth Revision (ICD-9), codes 250, 357.2, 362.0, 366.41, or 648.0. We included only patients who had at least two diabetes-related outpatient visits on different days during 2009. Patients were attributed to the practice in which they had received a plurality of their evaluation and management visits during 2009. All claims for those patients were then attributed to that home practice.

We matched 133,703 patients with diabetes and 234 practices. These practices varied in size from 5 to more than 750 physicians; they were located in all of the lower forty-eight states. Quality measures for the patients with diabetes were based on CMS group practice performance parameters (Exhibit 1).

An important limitation of our study is that we were not able to use variables to randomly assign practices to groups, such as practices that were owned by physicians, used electronic health records, had nurse practitioners, and used low-density lipoprotein (LDL) cholesterol testing. Just as cholesterol testing might represent a host of quality measures, so physician ownership or the acquisition of an electronic health record system might stand in for other unobserved practice characteristics.

Although the effects that we estimate might not be strict causal effects, they do offer evidence that under a payment system rewarding the efficient use of resources, there is a business case for the quality of care.

**Study Results**

All of the practices in our study provided primary care, but 58 percent also provided other specialty services. The majority of practices (56 percent) were owned by physicians. Nearly half had electronic health records, and the practices using that technology had an average of 2.4 years experience with it.

Our first cost regression included only the practice characteristics. The coefficients in this regression measured the full effect of practice characteristics on costs.

The second cost regression added as a proxy measure of quality of care the percentage of patients receiving LDL testing. Our expectation was that including quality of care measures would reduce the magnitude of the coefficients on the practice characteristics, if quality of care truly was one way in which practice characteristics influence costs. Costs in all of these analy-
ses were risk-adjusted for per member per year costs at the patient level (Exhibit 2).

Several of the practice structure variables influenced the costs of care for these patients. Physician-owned practices had significantly lower costs than hospital-owned practices. Practices owned by government agencies, health plans, or community health centers had lower costs than either of the other ownership categories.

We did not emphasize this latter finding because our understanding was that some claims

source Authors’ analysis of Centers for Medicare and Medicaid Services 2009 claims data and Medical Group Management Association practice performance surveys conducted during 2009. Notes LDL is low-density lipoprotein cholesterol. ED is emergency department. *Not applicable. Multispecialty practices are the excluded reference variable. For conditions resulting from inadequate ambulatory care.

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might have been missing for community health centers during our observation period. Larger practices and those with more on-site support services had significantly higher costs, probably reflecting the tendency to use more tests and procedures when these services are readily available. This higher level of costs does not appear to result from a larger number of specialist physicians in the practice because that variable—primary care only—was not significantly related to costs.

Using an electronic health record system was shown to reduce costs. However, that is not the case for these patients with diabetes. Although the coefficient was negative, it was significant only at the 0.08 level. Moreover, more experience with an electronic health record, a measure of the extent of use, did not improve the influences on costs.

A higher ratio of nurse practitioners and physician assistants in the practice increased costs. This finding was difficult to evaluate for Medicare patients because CMS pays these clinicians less than it pays physicians for the same services. Either the nurse practitioners used more services per patient, or the increased staffing encouraged more visits per patient.

Next we added a quality-of-care measure to the regression. In simple one-variable regressions, improvement in all three quality measures for diabetic care (hemoglobin A1c, LDL, and nephropathy testing) were significantly associated with lower risk-adjusted costs. However, the measures were highly correlated, and when all were included in the cost equation, only LDL testing remained significant at the 0.05 level. Thus, in our final runs we included only LDL testing, recognizing that the estimated coefficient may underestimate the savings from comprehensive care for patients with diabetes.

The results in Exhibit 3 show that LDL testing for an additional one percentage point of the patients with diabetes in the practice was associated with a net reduction in annual per capita costs of approximately $51.

The coefficients on almost all of the practice characteristics were reduced when the quality of care measure was added to the risk-adjusted cost regression. Physician-owned practices showed the largest decrease, indicating that these practices achieved more of their cost savings by providing higher-quality care than practices owned by hospitals or other agencies.

Conversely, costs related to practice size were

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### Exhibit 3

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter estimate for costs ($)</th>
<th>p value</th>
<th>Parameter estimate for primary care–treatable emergency visits (number)</th>
<th>p value</th>
<th>Parameter estimate for avoidable hospital admissions (number)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients with diabetes who had an LDL lab test during the past year</td>
<td>-50.8</td>
<td>0.001</td>
<td>-0.0002</td>
<td>0.001</td>
<td>-0.0010</td>
<td>0.001</td>
</tr>
<tr>
<td>Number of full-time-equivalent physicians</td>
<td>22.6</td>
<td>&lt;0.05</td>
<td>0.00004</td>
<td>&lt;0.001</td>
<td>0.0004</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Ratio of nurse practitioners and physician assistants to physicians</td>
<td>5,575.8</td>
<td>&lt;0.01</td>
<td>0.00326</td>
<td>&lt;0.001</td>
<td>0.0437</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Owned by government agency/community health center&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-6,366.6</td>
<td>&lt;0.001</td>
<td>-0.00819</td>
<td>&lt;0.001</td>
<td>-0.0934</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Practice owned by physicians&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-2,255.4</td>
<td>&lt;0.01</td>
<td>-0.00440</td>
<td>&lt;0.001</td>
<td>-0.0373</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Net revenue after operating costs</td>
<td>340.37</td>
<td>—</td>
<td>0.00024</td>
<td>—</td>
<td>0.0335</td>
<td>—</td>
</tr>
<tr>
<td>Has an electronic health record system</td>
<td>-878.3</td>
<td>—</td>
<td>0.00043</td>
<td>—</td>
<td>-0.0026</td>
<td>—</td>
</tr>
<tr>
<td>Number of years using electronic health record system</td>
<td>18.8</td>
<td>—</td>
<td>0.00024</td>
<td>—</td>
<td>-0.0004</td>
<td>—</td>
</tr>
<tr>
<td>Primary care practice&lt;sup&gt;c&lt;/sup&gt;</td>
<td>426.1</td>
<td>—</td>
<td>0.00106</td>
<td>—</td>
<td>-0.0016</td>
<td>—</td>
</tr>
<tr>
<td>Number of support services on site</td>
<td>113.4</td>
<td>&lt;0.10</td>
<td>0.00048</td>
<td>&lt;0.05</td>
<td>0.0018</td>
<td>&lt;0.10</td>
</tr>
<tr>
<td>In a community of ≤10,000 people</td>
<td>428.9</td>
<td>—</td>
<td>0.00476</td>
<td>&lt;0.10</td>
<td>0.0117</td>
<td>—</td>
</tr>
<tr>
<td>R&lt;sup&gt;2&lt;/sup&gt;</td>
<td>0.33</td>
<td>—</td>
<td>0.19</td>
<td>—</td>
<td>0.29</td>
<td>—</td>
</tr>
<tr>
<td>Mean of the dependent variable</td>
<td>9,452.5</td>
<td>—</td>
<td>0.054</td>
<td>—</td>
<td>0.143</td>
<td>—</td>
</tr>
</tbody>
</table>

**Source:** Authors’ analysis of Centers for Medicare and Medicaid Services 2009 claims data and Medical Group Management Association practice performance surveys conducted during 2009. **Notes:** For the parameter estimate for costs: intercept = 9,013.2 (p < 0.001). For the parameter estimate for primary care–treatable emergency visits: intercept = 0.05781 (p < 0.001). For the parameter estimate for avoidable hospital admissions: intercept = 0.1680 (p < 0.001). LDL is low-density lipoprotein. ED is emergency department. Not statistically significant. Hospital-owned practices are the omitted reference variable. Multispecialty practices are the excluded reference variable.
not changed when quality was added to the analysis, indicating that the effect of practice size on costs was not a function of quality of care. Practice level profit (net revenue divided by revenue) did decline somewhat when quality was added to the analysis, but the coefficients were not significant.

Next, we examined the effects of practice characteristics and quality of care on inappropriate emergency department use (Exhibit 3). LDL testing for all versus none of the practice’s patients with diabetes was associated with a significant drop in avoidable emergency department use. It was the only variable in our analysis that reduced these emergency department use rates.

The number of on-site support services and a rural location increased emergency department rates. The ownership coefficients indicated that hospital-owned practices had slightly higher inappropriate emergency department rates because the physicians and other ownership coefficients were negative, but these coefficients were not significant at the 0.05 level.

Exhibit 3 shows the effect of LDL testing and practice characteristics on avoidable hospitalization rates. As in the case with avoidable emergency department use, LDL testing for all versus none of the practice’s patients with diabetes was associated with a dramatic drop in avoidable hospitalizations.

This finding was one of the strongest to show that improved quality of care reduced near-term costs of care. Avoidable hospital admissions reflected the overall care provided by physicians in medical group practices, and the structure of the practice greatly influenced this attribute.

The coefficient on physician-owned practices suggests that those practices achieved their cost advantage over hospital-owned practices, in part, by reducing avoidable hospital admissions. Avoidable admissions also appear to account for a portion of the positive effect of nurse practitioners on costs.

Discussion
Our data indicated that medical group practices can reduce the near-term costs of care for patients with diabetes by improving the quality of care for these patients. These near-term cost reductions were the result, in part, of decreased inappropriate emergency department use and of decreased avoidable hospital admissions that appeared, in turn, to be partly the result of higher rates of LDL testing.

An additional finding of interest was that quality of care for patients with diabetes reduced costs by a level greater than could be explained by variance in physician practice characteristics across medical group practices. The data in this study show that after attending to the structural characteristics of their practices, medical groups can reduce costs further by investing in improved quality of care.

NOTES

12 All of the practices had high rates of
眼保健对于糖尿病患者是必要的，但这些差异不足以在我们的分析中发挥作用。因此，这个变量被排除在进一步的分析之外。

关于作者：约翰·E·克拉列夫斯基，布赖恩·E·多德及‘惠蒂’温迪·许

在本月的《健康事务》杂志中，克劳利夫斯基和合著者报告了他们对改善为糖尿病住院患者提供医疗服务的医疗集团中患者整体医疗费用的影响的研究。作者发现这样做是有利的，每提高一个百分点的质量改进，每名患者每年的净节约为51美元。

克劳利夫斯基是明尼苏达大学公共卫生学院卫生政策与管理系名誉教授。他于1990年加入明尼苏达医学研究研究所，并负责创建了明尼苏达大学健康服务研究和管理研究中心。目前，他担任健康事务杂志的副主编，以及医学护理研究与审查杂志的编辑委员会成员。

布赖恩·道德是明尼苏达大学公共卫生学院的梅奥医学教授。他的研究兴趣包括马里昂政策，医疗保健服务市场的研究，以及经济计量方法在医疗保健研究中的应用问题。

温迪·许是明尼苏达大学公共卫生学院的研究生。她正在攻读医院卫生服务研究政策与管理的博士学位。她还完成了健康服务研究政策与管理学士学位。