The Effect of Explicit Financial Incentives on Physician Behavior

Brian S. Armour, PhD; M. Melinda Pitts, PhD; Ross Maclean, MD, MBA; Charles Cangialose, PhD; Mark Kishel, MD; Hirohisa Imai, MD, PhD; Jeff Etchason, MD

Managed care organizations use explicit financial incentives to influence physicians’ use of resources. This has contributed to concerns regarding conflicts of interest for physicians and adverse effects on the quality of patient care. In light of recent publicized legislative and legal battles about this issue, we reviewed the literature and analyzed studies that examine the effect of these explicit financial incentives on the behavior of physicians. The method used to undertake the literature review followed the approach set forth in the Cochrane Collaboration handbook. Our literature review revealed a paucity of data on the effect of explicit financial incentives. Based on this limited evidence, explicit incentives that place individual physicians at financial risk appear to be effective in reducing physician resource use. However, the empirical evidence regarding the effectiveness of bonus payments on physician resource use is mixed. Similarly, our review revealed mixed effects of the influence of explicit financial incentives on the quality of patient care. The effect of explicit financial incentives on physician behavior is complicated by a lack of understanding of the incentive structure by the managed care organization and the physician. The lack of a universally acceptable definition of quality renders it important that future researchers identify the term explicitly.

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A dynamic health care environment continues to affect and change the way physicians practice medicine. Health services research studies have evaluated only a fraction of the changes occurring throughout the health care system. Reducing costs and unnecessary variation in clinical practice have become goals of managed care organizations (MCOs) striving to deliver effective patient-centered care and efficient population-level care. To that end, changing the clinical practice behavior of physicians remains one of the great challenges facing the health care sector.

The use of financial incentives is one means by which MCOs attempt to influence physician behavior. There are numerous articles in the medical literature examining the impact of financial incentives on physician behavior. This literature has been reviewed in 4 recently published studies that examine the effect of implicit financial incentives (salary, capitation, and fee-for-service) on physician resource use and the quality of care. This article extends previous work by reviewing studies that examine the effect of explicit financial incentives (bonuses and withholdings) on physician resource use. The focus on explicit financial incentives has additional relevance in light of a recently publicized Supreme Court case. At issue in the case is whether explicit financial incentives, in particular, year-end bonuses linked to reductions in physician resource use, represent a breach of fiduciary duty by the defendant health maintenance organization (HMO) (CarleCare) under the Employment Retirement Income Security Act. The court ruled that under the act, patients cannot sue HMOs.
Medical expenditures increased by approximately $1125 billion between 1960 and 1998, as shown in Table 1. In real terms, this represents a 6-fold increase ($142.6 billion to $1106.1 billion). As a percentage of gross domestic product, medical expenditures have increased from 5.1% to 13.5%. As a result, explaining the growth rate in medical expenditures is a central issue in health economics. In addition, reducing the growth rate in medical expenditures has become a key public policy issue. Policy strategies designed to slow the growth rate in medical expenditures have tended to focus on physicians, or the supply side of medical care.

Under fee-for-service reimbursement, in which physician compensation is primarily a function of the supply of services and procedures, physicians have an implicit financial incentive to increase the quantity of medical services, provided the demand for medical care is inelastic and the price is greater than the average cost of medical care. Furthermore, economic theory suggests that the likelihood of providing such services increases when out-of-pocket expenditures for patients are low, because most of the cost of the services is passed on to a third party (insurers) for payment. The effects of different reimbursement schemes on physician and consumer behavior are summarized in Table 2. The combination that produces the lowest possible volume of medical services occurs when physicians are paid by capitation or salary and bonus payments are high. The use of fixed payment reimbursement schemes (salary and capitation) is believed to be the most effective means of containing costs, by reducing the incentive for physicians to increase the quantity of their services. The percentage of the population affected by fixed payment reimbursement schemes increased from 2.8% (6 million persons) in 1976 to 28.6% (76.6 million persons) by 1998, with the number of managed care plans increasing from 174 to 651 during this same period.

Under managed care arrangements in which physician compensation is based on a capitated fee, physicians have a financial incentive to increase their number of patients, as long as the fee is greater than the average cost of caring for those patients. This, in turn, leads to the implicit incentive to reduce the average cost of providing care by reducing the amount of time spent with each patient and increasing the number of specialty referrals. Because unnecessary specialty referrals increase the cost of care to the MCOs, explicit financial incentives often are used to reduce such referrals.

This use of these explicit financial incentives may adversely affect the quality of patient care. For example, bonuses and withholdings may provide the physician with an explicit incentive to reduce all specialist referrals, not just unnecessary ones. The Omnibus Budget Reconciliation Act of 1986 placed limitations on explicit incentive payments for specialty referrals between physicians and both hospitals and MCOs serving patients covered by Medicare. Included in the act is a provision preventing explicit incentive payment arrangements between MCOs and physicians. However, the law exempts explicit financial arrangements between MCOs and physicians in which the gains from improvements in efficiency (cost containment) outweigh small decreases in the quality of care. As a result of this exception, patient protection legislation has been enacted in several states to safeguard quality and to alleviate public concern surrounding the influence of MCOs over their physicians.

In addition to the use of explicit financial incentives to con-

### Table 1. Health Care Expenditures in the United States*

<table>
<thead>
<tr>
<th>Year</th>
<th>Nominal health expenditures, billion</th>
<th>Real health expenditures, billion</th>
<th>Nominal per capita health expenditures, $</th>
<th>Health expenditures as a percentage of gross domestic product</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>26.9</td>
<td>141</td>
<td>5.1</td>
<td>5.1</td>
</tr>
<tr>
<td>1970</td>
<td>73.2</td>
<td>341</td>
<td>7.1</td>
<td>7.1</td>
</tr>
<tr>
<td>1980</td>
<td>247.3</td>
<td>1052</td>
<td>8.9</td>
<td>8.9</td>
</tr>
<tr>
<td>1990</td>
<td>699.5</td>
<td>2691</td>
<td>12.2</td>
<td>12.2</td>
</tr>
<tr>
<td>1996</td>
<td>1039.4</td>
<td>3772</td>
<td>13.6</td>
<td>13.6</td>
</tr>
<tr>
<td>1997</td>
<td>1088.2</td>
<td>3912</td>
<td>13.4</td>
<td>13.4</td>
</tr>
<tr>
<td>1998</td>
<td>1149.1</td>
<td>4094</td>
<td>13.5</td>
<td>13.5</td>
</tr>
</tbody>
</table>

*Data are from National Health Statistics Group, US Bureau of the Census.†Data are given as billions of dollars.‡Data are given as billions of 1996 dollars, converted using the all-item Consumer Price Index.

### Table 2. The Likelihood of a Primary Care Physician Providing a Large Volume of Medical Services for Different Reimbursement and Consumer Copayment Schemes*

<table>
<thead>
<tr>
<th>Type of Physician Base Compensation (Implicit Financial Incentives)</th>
<th>Capitation/Salary</th>
<th>Fee-for-Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Out-of-pocket price to consumer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>Moderate likelihood</td>
<td>High likelihood</td>
</tr>
<tr>
<td>High</td>
<td>Low likelihood</td>
<td>Moderate likelihood</td>
</tr>
<tr>
<td>Bonus payments (explicit financial incentives)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>Low likelihood</td>
<td>Moderate likelihood</td>
</tr>
<tr>
<td>High</td>
<td>Very low likelihood</td>
<td>High likelihood</td>
</tr>
<tr>
<td>Indeterminate</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Data are from Santerre and Neun,7 Aaron,8 and Reinhardt.9
tains costs, several authors and health care plans share the view that the US health care system would be better served if MCOs also used explicit financial incentives to improve the quality of patient care. In response to these calls and to attempt to alleviate public concern surrounding managed care cost-containment measures, many MCOs have used explicit financial incentives to improve the quality of care. Therefore, the primary aim of this article is to review evidence from the literature to help us understand whether and how explicit financial incentives affect physician resource use and the quality of medical care.

--- MATERIALS AND METHODS ---

The method used to undertake the literature review followed the approach set forth in the Cochrane Collaboration handbook. The approach is described in an appendix that is available from the authors.

--- RESULTS ---

PHYSICIAN PERCEPTIONS OF EXPLICIT INCENTIVES

Grumbach et al analyzed survey responses from 766 physicians to determine the effects of payments that MCOs use, in addition to base compensation, to influence service use decisions and productivity. Their responses revealed that physicians believe that HMOs use financial incentives to influence productivity, service use (referrals and hospitalizations), the quality of patient care, patient satisfaction, and prescription use. Physicians reported that financial incentives in the form of bonus payments, on average, amounted to 7% of their median net practice income, or approximately $10,500. Fifty-eight percent of respondents who were eligible to receive incentive payments reported that these payments were linked to individual and group performance. Fifty-seven percent of respondents reported feeling pressure to limit referrals, and, of these, 17% believed that this pressure negatively impacted the quality of patient care. Respondents whose practices contained a greater share of MCO enrollees indicated that they felt more financial pressure to limit referrals and that this compromised the quality of patient care.

EMPIRICAL EVIDENCE

Whether physician perceptions are correct and explicit financial incentives actually affect physician behavior is an empirical question that has been the subject of relatively few studies. We have identified several such studies from our review of the literature, the results of which are summarized herein. In addition, we reviewed several observational studies that infer a connection. First, we review studies that examine the relationship between explicit financial incentives and resource use, followed by a review of studies that examine the association between explicit financial incentives and the quality of medical care.

RESOURCE USE

Hillman and colleagues used data from a 1987 national survey of 595 HMO chief executive officers to determine whether financial incentives affect physician use of services. Specifically, regression analysis was used to examine the effect of financial incentives on resource use (measured by hospitalization rates and primary care visits per enrollee) and profitability (whether the HMO was fiscally viable). The types of financial incentives included base compensation (salary, capitation, and fee-for-service), bonuses, bonuses based on productivity, individual risk, specialist risk, risk beyond specialist withholding, risk beyond hospital withholding, ancillary risk (risk for the payment of outpatient medical tests), and the percentage of HMO enrollees.

In addition, the regression model controlled for market area characteristics and HMO descriptive variables. Market area characteristics included physician demographic information and sample socioeconomic characteristics. Health maintenance organization de-

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use than is a bonus system targeted at groups of physicians.

To examine the effect of compensation arrangements on physician behavior, 2 measures of service use were used: the total number of hospital admissions per 1000 enrollees and the number of hospital visits per member. The independent variables included in the regression model by Debrock and Arnould were grouped under physician compensation arrangements, hospital incentives, managerial control, HMO characteristics, patient characteristics, and market characteristics.

Regression analysis of the data indicated that explicit financial incentives were effective in reducing physician resource use. Explicit financial incentives directed at individual physicians reduced the number of hospital admissions per 1000 enrollees by 16% and the mean number of visits per member from approximately 4 to approximately 2 per year. Debrock and Arnould concluded that explicit incentives should be directed at individual physicians whose contracts include a withholding agreement. An individual physician who bears all the risk has a greater incentive to use resources more parsimoniously than do physicians who share their risk with a group.

QUALITY OF CARE

Hillman and colleagues analyzed data on patients covered by Medicaid who enrolled in a Philadelphia, Pa, MCO between 1993 and 1995 to, in part, determine the effectiveness of explicit financial incentives in improving physician delivery of breast, cervical, and colorectal cancer screening. Fifty-two primary care practices participated in the 1990 Medicare Influenza Vaccination demonstration project. Practices were randomly assigned to an intervention or a control group. Physicians in both groups agreed to track the immunization rates for their older patients (≥65 years) on a weekly basis. In addition to the standard $8 fee for influenza immunization, physicians in the intervention group were paid an additional $0.80 per shot if their practice attained an immunization rate of 70%. The bonus payment doubled to $1.60 per shot if a practice attained an immunization rate of 80%.

The mean immunization rate for the intervention practices, 68.6%, was approximately 6 percentage points higher than the mean control group rate. The median change in immunizations was 10.3% for the intervention group, compared with 3.5% for the control group. Fifty-two percent (14/27) of practices in the intervention group attained the 70% immunization target, compared with 44% (12/27) in the control group. Four practices attained the 80% target in the intervention group, compared with 2 in the control group.

To further examine the relationship between influenza immunization rates and explicit financial incentives, multiple regression analysis was conducted. The dependent variable was defined as the change in the percentage of patients immunized between the 1990 and 1991 influenza seasons. The main independent variable of interest was a binary variable that distinguished the intervention group practices from the control group practices. Other variables included the percentage of elderly patients in each practice, the number of physicians in each practice, the practice type (HMO or private), and the number of preventative service reminders each practice received, and the number of visits the study personnel made to each practice. The regression results indicated that assignment to the intervention group resulted in a 7% increase in the immunization rate among older persons (P = .05). Finally, the authors reported that 1433 more immunizations were observed than were expected in the intervention group practices. They therefore concluded that small explicit incentives improve immunization rates.

Hemenway reported that in Northern Ireland in the early 1980s childhood immunization rates were only about 12%. To improve immunization rates, the British government introduced an incentive scheme for general practitioners who reached childhood immunization targets. If 70% of the children on a general practitioner's patient list received their immunizations on schedule, then the practitioner received an annual bonus of approximately $1000. If he or she attained an immunization target of 80%, the bonus increased to $3000. By 1991, 90% of general practitioners had reached the lower target and 77% had reached the higher one.

One limitation of Hemenway’s investigation is that the evidence presented is observational. It is not possible to establish a connection between the British government’s use of explicit financial incentives and improvements in childhood immunization rates in Northern Ireland, because there were no control or comparison groups to help differentiate the effects of ex-
licit incentives from those of non-financial incentives, advertising, and other promotional campaigns designed to improve immunizations.

To receive accreditation, many MCOs are participating in the National Committee for Quality Assurance–Health Plan Employee Data and Information Set performance measurement program. Hanchak reported that Aetna U.S. Healthcare Inc, Hartford, Conn, used several Health Plan Employee Data and Information Set measures to design a performance-based compensation scheme for obstetricians and gynecologists.

Each physician or physician group that contracts with Aetna receives a bonus payment based on the “quality” of patient care. Quality is assessed using 5 dimensions: (1) patient satisfaction, (2) appropriateness, (3) efficiency, (4) effectiveness, and (5) managed care philosophy. Physicians receive points based on their performance in each of these dimensions. A quality-based distribution is then determined by multiplying the practitioners’ score (points accumulated/total possible points) by a predetermined bonus threshold amount. The quality-based distribution is then allocated to the group. Hanchak reported that Aetna considered the performance-based compensation model to be successful because cesarean section rates fell by 2%, length of hospital stay was reduced by 25%, the use of biopsies increased by 85%, and precertification approached 95% during the first 2 years of the program. There was a reported improvement in all quality areas except patient satisfaction.

The model used by Aetna to gauge and subsequently reward physician performance is important in that it illustrates possible tradeoffs that exist in improving the quality of patient care. Patient satisfaction may not have improved because the various areas that were used to generate the performance-based incentive may be inversely related to patient satisfaction. The issue is whether Aetna’s performance measures are proxies for quality or cost containment. That is, reductions in length of hospital stay and cesarean section rates will reduce program costs. If these cost-containment measures result in lower patient satisfaction scores, then it will be difficult for a physician to improve in all these areas. However, by recognizing that some quality dimensions may be inversely related, a health care plan may reduce this problem by assigning weights to the dimensions used to reward performance. Indeed, Aetna weighs cesarean section rates and adjusted lengths of hospital stay more than the other quality dimensions. Hanchak did not quantify the weights used to derive the quality score.

Our review of the literature suggests that explicit financial incentives that place individual physicians at financial risk can be effective in influencing physician resource use. However, the empirical evidence regarding the effectiveness of bonus payments on physician resource use is mixed. Similarly, our review disclosed mixed effects of the influence of explicit financial incentives on the quality of patient medical care. Hillman et al found that bonus payments were ineffective in improving the quality of patient care as defined by physician adherence to cancer screening guidelines. In contrast, Kouides and colleagues found that bonus payments improved the quality of patient care as defined by an increase in the influenza immunization rate.

With one exception, the articles reviewed separate the quality of patient medical care from resource use. Presumably, this separation stems from the recognition of a potential quality vs resource use tradeoff. Hanchak attempts to reduce this tradeoff by including resource use as one of several dimensions of the quality of the Aetna plan. Given that this definition of quality may reflect Aetna’s preference for reducing costs, this may be inconsistent with patient and physician preferences.

The results from existing observational studies are insufficient to establish definitively a connection between bonus payments and the quality of patient care in terms of improved preventive activities and process-of-care measures. Furthermore, our review failed to find any empirical studies attempting to link explicit financial incentives to health outcomes. Nevertheless, MCOs are using explicit financial incentives to try to encourage physicians to improve the quality of patient care. If MCOs intend to use explicit financial incentives to influence physician behavior to improve the quality of patient care, health care plan policy makers may wish to consider the following factors when making contractual arrangements with their physicians:

1. Health maintenance organizations and other managed care plans may contract with physicians directly, or they may contract with a middle tier or physician group. The intermediary may blunt the effect of explicit financial incentives. Therefore, it is important that HMOs and other MCOs: (a) determine the type of contractual arrangement between intermediary organizations and physicians, (b) know whether the explicit financial incentives are directed at individual physicians or a group, and (c) ensure that physicians are aware of the extent of their financial risk.

2. The differential impact of explicit incentives on physician behavior in the setting of MCOs and traditional indemnity plans is not always clear, as physicians often contract with several insurance plans and, in turn, are compensated differently by the various organizations. As a consequence, an organization that plans to use explicit financial incentives to improve quality of care must consider the physicians’ share of patients covered by the MCO. If the number of patients covered by a health care plan represents a small percentage of a physician’s total patients, then it is unlikely that explicit financial incentives unique to that plan will be effective in changing that physician’s behavior.

3. The magnitude of the risk represented by withholding incentives should not be so great that it would cause physicians to behave in a way that might be detrimental to the patient’s health status. Although empirical evidence suggests that risk-bearing will affect physician behavior, there is no empirical evidence
to indicate what the optimal level of risk-bearing should be.

4. Using explicit financial incentives to simultaneously reduce resource use and improve quality of care may be problematic if cost-containment strategies and quality are inversely related. The problem may be reduced by assigning weights to the performance measures used to reward physicians. However, there is no empirical evidence to indicate what these weights should be. Furthermore, measures and definitions of health care quality need to be explicitly defined so that it is clear to the provider exactly what the financial incentive is meant to achieve.

CONCLUSIONS

Managed care organizations are using explicit financial incentives to influence physician behavior, despite a paucity of empirical evidence as to the effectiveness of these strategies. More research is needed to examine the effect of performance-based incentives on the use of resources and the quality of patient care. In particular, there needs to be research that examines the impact of explicit financial incentives on the quality of care when those incentives are implemented for the purpose of controlling resource use. To carry out such research, it is important for investigators to be explicit about the use of terms containing the word “quality.” There is also a need to determine how physicians respond to the magnitude of incentive amounts at the individual and group levels.

Given the limited amount of research that has been applied to the use of explicit financial incentives, along with the growing public and professional distrust of the motives behind offering them, MCOs should undertake the use of explicit financial incentives with great caution, if at all. Perhaps they should be treated analogously to experimental therapies and only be used within the context of rigorous evaluations to determine their impact on health care quality and resource use.

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REFERENCES