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.

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 studies1-4 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.5 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.
for using financial incentives to encourage physicians to contain costs. 

To reduce public concern surrounding MCO cost-containment measures, several health care plans are using explicit financial incentives in an attempt to improve the quality of patient care. Given the increasing prominence of financial incentive programs, it is equally important to review the literature and analyze studies that examine the effect of explicit financial incentives on the quality of patient medical care.

**BACKGROUND**

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 are often used to reduce such referrals.

This use of 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 payment arrangements 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-

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Table 1. Health Care Expenditures in the United States

<table>
<thead>
<tr>
<th>Year</th>
<th>Nominal health expenditures</th>
<th>Real health expenditures</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>229.7</td>
<td>141</td>
<td>5.1</td>
</tr>
<tr>
<td>1970</td>
<td>73.2</td>
<td>309.7</td>
<td>141</td>
<td>7.1</td>
</tr>
<tr>
<td>1980</td>
<td>247.3</td>
<td>470.9</td>
<td>1052</td>
<td>8.9</td>
</tr>
<tr>
<td>1990</td>
<td>699.5</td>
<td>837.7</td>
<td>2691</td>
<td>12.2</td>
</tr>
<tr>
<td>1996</td>
<td>1039.4</td>
<td>1063.8</td>
<td>3772</td>
<td>13.6</td>
</tr>
<tr>
<td>1997</td>
<td>1088.2</td>
<td>1106.1</td>
<td>3912</td>
<td>13.4</td>
</tr>
<tr>
<td>1998</td>
<td>1149.1</td>
<td>1106.1</td>
<td>4094</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</th>
<th>(Implicit Financial Incentives)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Capitation/Salary</td>
</tr>
<tr>
<td>Out-of-pocket price to consumer</td>
<td>Moderate likelihood</td>
</tr>
<tr>
<td>Low</td>
<td>Low likelihood</td>
</tr>
<tr>
<td>High</td>
<td>Low likelihood</td>
</tr>
<tr>
<td>Bonus payments (explicit financial incentives)</td>
<td>Low likelihood</td>
</tr>
<tr>
<td>Low</td>
<td>Very low likelihood</td>
</tr>
<tr>
<td>High</td>
<td>Indeterminate</td>
</tr>
</tbody>
</table>

*Data are from Santerre and Neun,7 Aaron,8 and Reinhardt.9
tained 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.\(^1\) 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.\(^1\) The approach is described in an appendix that is available from the authors.

**RESULTS**

**PHYSICIAN PERCEPTIONS OF EXPLICIT INCENTIVES**

Grumbach et al\(^1\) 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 $10500. 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\(^1\) 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 descriptive variables included type (independent practice association, staff model, or group), size (number of enrollees), visits per enrollee, and whether an HMO was affiliated with another organization.

The multiple regression results for this study suggest that explicit financial incentives that place individuals at financial risk for deficits in their referral funds decreased the number of primary care visits per enrollee by approximately 11%. Placing physicians at risk for deficits in the hospital fund beyond the hospital “withholding” resulted in a decrease in the number of primary care visits per enrollee per year of approximately 8%. In addition, physicians at risk for the costs of outpatient medical tests (ancillary risk) substituted primary care visits for outpatient tests, which increased outpatient visits per enrollee per year by 5%.

Hillman et al also found that ancillary payments, such as withholding accounts and bonuses based on productivity, were not associated with a change in physician resource use. The authors suggest that the absence of an association might have been because of a contractual arrangement that delayed rewards and, as a consequence, caused physicians to discount the value of the bonus payments.

A limitation of the analysis by Hillman and colleagues is the possibility of model specification error. Managed care organizations also typically use nonfinancial incentives to influence physician resource use. To the extent that nonfinancial incentives complement financial incentives, failing to include them in the model will bias the results. Hillman and colleagues acknowledge this limitation and suggest that future work should consider the effect of both nonfinancial incentives and financial incentives on resource use.

To extend the work of Hillman et al, Debrock and Arnould\(^1\) analyzed data reports filed with the Illinois Department of Insurance for 35 MCOs operating in the state between 1985 and 1987. They sought to test whether the awarding of bonuses to individual physicians is more effective in reducing resource
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 were randomly assigned to an intervention or a control group. Practitioners had reached the lower 10% of 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 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-
plicit incentives from those of non-
financial incentives, advertising, and
other promotional campaigns de-
dered to improve immunizations.

To receive accreditation, many
MCOs are participating in the Na-
tional Committee for Quality Assur-
ance—Health Plan Employee Data
and Information Set performance
measurement program. Hanchak20
reported that Aetna U.S. Health-
care Inc, Hartford, Conn, used sev-
eral Health Plan Employee Data and
Information Set measures to design
a performance-based compensa-
tion scheme for obstetricians and gy-
 necologists.

Each physician or physician
group that contracts with Aetna re-
ceives a bonus payment based on the
“quality” of patient care. Quality is
assessed using 5 dimensions: (1)
patient satisfaction, (2) appropri-
ateness, (3) efficiency, (4) effective-
ness, and (5) managed care philo-
osophy. Physicians receive points based
on their performance in each of these
dimensions. A quality-based dis-
tribution is then determined by mul-
tiplying the practitioners’ score
(points accumulated/total possible
points) by a predetermined bonus
threshold amount. The quality-
based distribution is then allocated
to the group. Hanchak20
reported that Aetna considered the perfor-
ance-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 pro-
gram. There was a reported improve-
ment in all quality areas except pa-
tient satisfaction.

The model used by Aetna to
gauge and subsequently reward phy-
sician 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 vari-
ous areas that were used to generate
the performance-based incentive may
be inversely related to patient satis-
faction. The issue is whether Aet-
na’s performance measures are prox-
ies for quality or cost containment.
That is, reductions in length of hos-
ital 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 di-
ensions may be inversely related,
a health care plan may reduce this
problem by assigning weights to the
dimensions used to reward perform-
ance. Indeed, Aetna weighs cesar-
ean section rates and adjusted lengths
of hospital stay more than the other
quality dimensions. Hanchak20
did not quantify the weights used to de-
rive the quality score.

Our review of the literature sug-
gests that explicit financial incen-
tives that place individual physi-
cians at financial risk can be effective
in influencing physician resource
use. However, the empirical evi-
dence regarding the effectiveness of
bonus payments on physician re-
source use is mixed. Similarly, our
review disclosed mixed effects of the
influence of explicit financial incen-
tives on the quality of patient med-
cal care. Hillman et al16 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 colleagues17
found that bonus payments im-
proved the quality of patient care as
defined by an increase in the influ-
zena immunization rate.

With one exception,20 the ar-
ticles reviewed separate the quality
of patient medical care from re-
source use. Presumably, this sepa-
ration stems from the recognition of
a potential quality vs resource use
tradeoff. Hanchak20 attempts to re-
duce this tradeoff by including re-
source use as one of several dimen-
sions of the quality of the Aetna plan.
Given that this definition of quality
may reflect Aetna’s preference for re-
ducing costs, this may be inconsis-
tent with patient and physician pref-
ferences.

The results from existing ob-
servational studies are insufficient to
establish definitively a connection be-
tween bonus payments and the
quality of patient care in terms of im-
proved preventive activities and pro-
cess-of-care measures. Further-
more, 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 im-
prove the quality of patient care. If
MCOs intend to use explicit finan-
cial incentives to influence physi-
cian behavior, improving the qual-
ity of patient care, health care plan
policy makers may wish to con-
sider the following factors when
making contractual arrangements with
their physicians:

1. Health maintenance orga-
nizations 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. There-
fore, it is important that HMOs and
other MCOs: (a) determine the type
of contractual arrangement be-
tween intermediary organizations
and physicians, (b) know whether
the explicit financial incentives are
directed at individual physicians or
a group, and (c) ensure that physi-
cians are aware of the extent of their
financial risk.

2. The differential impact of
explicit incentives on physician be-
havior in the setting of MCOs and
traditional indemnity plans is not al-
ways clear, as physicians often con-
tract with several insurance plans
and, in turn, are compensated dif-
ferently by the various organiza-
tions. As a consequence, an organi-
zation that plans to use explicit finan-
cial incentives to improve qual-
ity of care must consider the physi-
cians’ share of patients covered by
the MCO. If the number of patients
covered by a health care plan rep-
resents a small percentage of a phy-
cian’s total patients, then it is un-
likely that explicit financial incen-
tives unique to that plan will be ef-
effective in changing that physi-
cian’s behavior.

3. The magnitude of the risk
represented by withholding incen-
tives 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.21 Al-
though empirical evidence suggests
that risk-bearing will affect physician
behavior,22 there is no empirical evi-
ence...
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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Corresponding author and reprints: Brian S. Armour, PhD, Kerr L. White Institute for Health Services Research, 315 W Ponce de Leon Ave, Suite 321, Decatur, GA 30030 (email: barmour@klwi.org).

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