Economic Incentives and Physicians’ Delivery of Preventive Care
A Systematic Review

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Abstract: A systematic review of the randomized trial literature examining the impact of financial incentives on provider preventive care delivery was conducted. English-language studies published between 1966 and 2002 that addressed primary or secondary preventive care or health promotion behaviors were included in the review. Six studies that met the inclusion criteria were identified, which generated eight different findings. The literature is sparse. Of the eight financial interventions reviewed, only one led to a significantly greater provision of preventive services. The lack of a significant relationship does not necessarily imply that financial incentives cannot motivate physicians to provide more preventive care. The rewards offered in these studies tend to be small. Therefore, the results suggest that small rewards will not motivate doctors to change their preventive care routines.

Introduction
Increasing preventive care is widely held to be a cost-effective way to improve population health. This belief, which lays the foundation for preventive care—measured as targets in public health initiatives (e.g., Healthy People 2010),1 and even codified in the Hippocratic oath—has empirical support. Yet, many cost-effective preventive services are under-provided.2,3 Underlying this puzzling fact are two interrelated public health questions. First, if many prevention efforts are cost-effective, why are they under-delivered? Second, what interventions can increase the amount of cost-effective preventive care?

Of the many potential causes for the under-provision of preventive care, this paper focuses on the possibility that practicing physicians lack the necessary financial incentives for providing preventive care. If true, this suggests that one potential solution to the public health problem of the under-provision of preventive care lies in restructurin physician incentives. This paper reviews the randomized trial literature examining the impact of financial incentives on provider preventive care delivery, evaluating the evidence on the impact of explicit economic incentives targeted at motivating physicians to provide preventive health services and support consumer preventive health behavior change. This review is designed to (1) assist in the development of more effective preventive strategies (evidence-based practice), and (2) inform key stakeholders about the role of such practices (evidence-based policymaking).

This review focuses solely on the randomized trial literature and does not directly assess the impact of HMOs and other managed care organization risk-sharing, payment, and pricing mechanisms as compared to fee-for-service (FFS) mechanisms. While there is considerable interest in the effects of these larger, general economic incentives, the focus here is on explicit economic incentives for preventive care. The potentially numerous confounding factors derived from different patient populations and physician populations, and structures and processes of different systems might overwhelm the potential usefulness of a review of explicit incentives.4

Methods
Definition of Prevention
For purposes of this review, preventive care and health promotion are defined as those circumstances where consumers may consider themselves healthy or physically at risk, but not yet labeled with a diagnosis. This definition includes individual-based health promotion and preventive services as defined in Healthy People 20005 and Healthy People 2010,1 but excludes mental health, substance abuse, and health protection concerns, such as injury prevention, occupational health and safety, environmental health, and oral health. Tertiary care, including self-care and management of diagnosed chronic illnesses such as diabetes and heart disease, is also
Definition of Economic Incentives

Explicit incentives targeted at specific individual providers were examined, including direct payments or bonuses to the provider or his/her group. More diffuse incentives offered as part of managed care (e.g., waiving co-payments) are excluded because of the difficulty in pinpointing their specific effect.

In general, definitions for “prevention” or “economic incentive” have not been specifically addressed in the literature. The term “economic incentives” describes financial incentives where there is an increase in physician income that is a function of measurable performance criteria. These include bonus payments payable on the basis of number of specific services provided, or based on the provider achieving a target outcome or target behavior.

Literature Search and Data Abstraction

Online reference databases used to conduct the literature review included EconLit, Business Source Premier, and PsychInfo, and MEDLINE. The first three were approached with a simple strategy of combining keyword searches for “incent$” and “health.” MEDLINE was searched using the following keywords: “incent$,” “reimbursement incentive,” “capitation fee,” “physician incentive plans,” “physician practice patterns,” “income,” and “reimbursement mechanisms,” combined with “preventive health services,” “preventive medicine,” “primary prevention,” “health promotion,” “health behavior,” “patient compliance,” and “prenatal care.” Reference lists of previous systematic reviews and identified articles were reviewed to identify other articles of interest. The Cochrane Collaboration database was also searched.

English-language articles published between 1966 and 2002 that addressed primary or secondary preventive care or health promotion behaviors were included in the review. Studies that used financial incentives whose only purpose was to reward participation in a research study were excluded. Studies that related to patient adherence to drug therapy or chronic illness management were excluded, as prevention was defined as occurring before diagnosis. Also excluded were studies using multiple component interventions in which the economic incentive was only one component of the intervention, and the study design precluded analyzing the independent effect of the incentive. Studies examining payment incentives that varied only by payment system (i.e., HMO vs FFS) were excluded, as it is difficult to separate the impact of the payment structure from the payment system.

A data abstraction form was used to capture emergent themes from the heterogeneous literature. The abstraction form recorded the article source, the type of study, the behavioral target (e.g., immunizations), current reimbursement system (e.g., FFS), structure of the intervention (e.g., bonus payments), setting (e.g., hospital, clinic), demographics of the patient population, nature of the control group, structure of the randomization, and, of course, study outcome(s). Two independent reviewers abstracted each article. Disagreements were resolved by consensus of the group. Formal meta-analysis of the incentive literature was not possible because of an insufficient number of studies that examined the same incentive type, research outcome measures, and similar populations.

Results

Only six studies met the inclusion criteria. These six studies, summarized in Table 1, generated eight separate outcomes. Two studies analyzed two interventions each (FFS and bonus). Four articles examined immunizations, two looked at cancer screening, and one looked at an assortment of preventive services. These figures do not add to six (the number of studies) because two studies used more than one preventive care measure as an outcome. Only one of the eight results found that increasing financial incentives translated into the provision of more preventive care. (A positive and significant outcome was defined as one in which the likelihood that physicians provided more preventive care as a consequence of the financial component if the intervention is $>0.95$.)

Five studies investigated the impact of bonuses payable upon reaching a target. Two studies included a per input bonus based on actual immunizations. It is noteworthy that the patient populations for six of the eight findings were vulnerable ones. Most of these studies focused on Medicaid enrollees.

Table 1 also lists the type of financial incentives studied and the preventive care classifications. The payments are divided into two mutually exclusive categories: performance bonus and enhanced FFS payments. The target of the preventive care is also divided into two categories: immunizations and screenings. The study that found a significant relationship between the incentive and preventive care delivery used FFS payments to physicians for providing immunizations. Studies that found no relationship between increasing financial incentives and preventive behavior are roughly evenly split between bonus and increased FFS payments. This suggests that neither the type of payment nor the type of preventive service targeted drives the lack of findings. Although those factors may ultimately be related to the efficacy of an incentive, there is no evidence they are the underlying cause of the lack of significant findings.

One trial reported that bonus plus feedback was significantly different from the control group, but it did not appear that it was significantly different from feedback alone. Therefore, these findings are classified as insignificant. Another study by a similar set of authors found that most of the increase in measured immunization rates due to the financial incentives was a consequence of better documentation and not the result of physicians providing more immunizations. Likewise, these findings are classified as not significant.

Performance incentives inherently include an element of performance feedback. Feedback may be for-
Table 1. Studies of impact of provider incentives on preventive care

<table>
<thead>
<tr>
<th>Study, year, ref</th>
<th>Number of physicians</th>
<th>Patient population (n)</th>
<th>Location/practice setting</th>
<th>Intervention/outcome measure</th>
<th>Targeted behavior</th>
<th>Type of payment</th>
<th>Positive effect of intervention?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fairbrother (2001)</td>
<td>57 inner-city physicians</td>
<td>Children aged 3 to 35 months (2850)</td>
<td>Primary care/New York City</td>
<td>Randomly assigned physicians into three arms: bonus, enhanced fee for service, and control. Outcomes were immunizations (and documentation) for DTP, Hib, oral polio, and MMR.</td>
<td>Immunizations</td>
<td>Increased FFS/ performance bonus</td>
<td>No/No</td>
</tr>
<tr>
<td>Hillman (1999)</td>
<td>49 primary care practices</td>
<td>Children aged 1 to 6 years enrolled in Medicaid HMO (NR)</td>
<td>Primary care/Philadelphia PA</td>
<td>Randomly assigned physicians into three arms: bonus and feedback, bonus only, and control. Outcomes were compliance with preventive care guidelines including immunizations and disease screening.</td>
<td>Immunizations and cancer screenings</td>
<td>Increased FFS</td>
<td>No</td>
</tr>
<tr>
<td>Fairbrother (1999)</td>
<td>50 inner-city practices</td>
<td>Children aged between 3 and 35 months enrolled in Medicaid (2500)</td>
<td>Primary care/New York City</td>
<td>Randomly assigned physicians into four arms: bonus and feedback, enhanced fee for service and feedback, feedback only, and control. Outcomes were immunizations (and documentation) for DTP, oral polio, and MMR.</td>
<td>Immunizations</td>
<td>Increased FFS/ performance bonus</td>
<td>No/No</td>
</tr>
<tr>
<td>Kouides (1998)</td>
<td>54 practices (solo and group)</td>
<td>Medicare ambulatory patients (21,196)</td>
<td>Primary care/Rochester NY</td>
<td>Randomly assigned physicians into incentive and control groups. The outcome was percentage of patient given influenza vaccinations. Incentives were $0.80 per shot or $1.60 per shot if an immunization rate of 70% or 85%, respectively, was attained.</td>
<td>Immunizations</td>
<td>Performance bonus</td>
<td>Yes</td>
</tr>
<tr>
<td>Hillman (1998)</td>
<td>52 practices (solo and group)</td>
<td>Women aged ≥50 years in Medicaid HMO (7228)</td>
<td>Primary care/Philadelphia PA</td>
<td>Randomly assigned physician groups into bonus arm and control. Bonus given to top sites based on compliance with cancer-screening guidelines for women.</td>
<td>Cancer screening</td>
<td>Increased FFS</td>
<td>No</td>
</tr>
<tr>
<td>Grady (1997)</td>
<td>61 practices</td>
<td>Women aged ≥50 years (11,716)</td>
<td>Primary care/Dayton OH and Springfield MA</td>
<td>Randomly assigned physicians into three arms: education only, education plus cue enhancement, and education plus cue enhancement plus feedback and rewards. Outcome was mammography referral and completion.</td>
<td>Cancer screening</td>
<td>Performance bonus</td>
<td>No</td>
</tr>
</tbody>
</table>

FFS, fee for service; NR, not recorded.
mal through the use of reports, or informal in which the receipt of the incentive itself functions as feedback of performance levels. Some studies included formal feedback reports. Several studies examined the impact of formal physician performance feedback on the outcomes of interest. For example, in one study the “feedback only” cohort increased their mammography screening referrals, but their mean behavior was not significantly different from the “feedback with a token bonus” ($50). In one study, the “feedback only” group was not significantly different from the “feedback plus financial incentive” group or the control group.

Only a few studies provided data on the average size and range of the bonus payment. Of those, potential payments ranged from $50 to a bonus of $4682. The lack of information on the average size of payments makes cost-effectiveness analysis difficult if the studies found that incentives change behavior. (In order for the intervention to be cost-effective, at a minimum it must change provider behavior.) In the one study finding a significant relationship between the financial incentive and the delivery of preventive care, at the end of the study revenue increased an average of $82 for physicians in the incentive group. That amount of incentive increased the immunization rate by 7 percentage points, which translates into a cost of $3 per additional influenza immunization. In this case, absent the intervention cost, influenza vaccines have been shown to save $117 in direct medical expenditures in the elderly. Thus, the one instance in which the intervention changed physician behavior was also cost-effective.

All incentives were aimed at physicians; nonphysician staff members were not targeted. The papers were not clear on whether the financial incentives were paid to the physician or the practice, and if the payment was made to the practice, how the practice financial incentives were transmitted to the individual physician. Physician specialties included family practitioners, general practitioners, internal medicine, and pediatricians. All studies took place in nonacademic solo and group practices. However, the definition of physician group was left undefined. (Physician groups vary in their organizational structure from loosely integrated individuals who are defined as a physician group only for purposes of negotiating contracts with payers to tightly integrated practices.)

No study provided information on physicians’ expectations of receiving a bonus. Expectations could be affected by how the criteria of success were determined, whether the incentive was potentially payable to all physicians if they met target levels, or if the incentive was distributed tournament style. Overall awareness of the bonus program itself was low in two studies that examined physician awareness. Both of these studies found no significant relationship between incentives and preventive care. Reviewed studies also did not include information on pre-test assessments of preventive care performance against set criteria; thus, it is uncertain whether physicians would have had low or high expectations of earning the incentive payments.

Studies by Fairbrother et al. noted that physicians perceived that the incentive goals were not attainable. Since they were not the primary source for immunizations, they were less likely to take responsibility for patient immunizations. Lastly, two studies noted that physicians were unaware of the bonus.

**Discussion**

This analysis suggests several conclusions. First, and perhaps most important, the literature is very sparse. Only six studies met the inclusion criteria. This suggests that future well-conceived studies could make a significant contribution to our state of knowledge. Second, only one of the findings found a significant link between financial incentives and the provision of preventive care. The lack of a significant relationship should not be interpreted as implying that financial incentives cannot motivate physicians to provide more preventive care. Rather, the rewards offered in these studies tend to be small, even in the one study that found a significant relationship. Therefore, in general, the evidence hints that small rewards will not motivate doctors to change their preventive care routines. This tentative conclusion is based on very few studies, and thus may be overturned as more research is performed. Third, the literature has examined only relatively simple preventive interventions, such as the impact of immunizations and screenings, as opposed to the more complex interventions, such as smoking cessation and weight control. The success of a financial intervention is likely to be inversely related to the complexity of the tasks it seeks to have the physicians undertake. Fourth, none of the studies performed cost–benefit calculations. Since most studies did not find a significant relationship, this is a sensible omission. However, future work should collect the information so that cost–benefit analysis can be performed. For a given financial intervention to make sense from a societal standpoint, the costs of the intervention should be less than the resulting benefits. Ultimately, the cost-effectiveness of the intervention will be strongly influenced by the cost-effectiveness of the underlying preventive activity. A basic question is whether other approaches, such as change in the information infrastructure of the practice, may be more cost-effective.

In general, the research design of the typical paper in this literature appears primarily driven by policy considerations. The research question has generally been: Can a financial incentives result in more preventive activity? This may be the wrong question to ask. Financial incentives will affect behavior if they are generous.
enough. Rather, the questions should be: How large an incentive does it take to change behavior? Are incentives cost-effective? What is the best way to structure an incentive? How does the framing of the incentive affect behavior? What role does the physician practice’s organizational structure play in determining the effectiveness of an incentive?

In the Hippocratic oath, physicians vow to “prevent disease whenever I can, for prevention is preferable to cure.” To argue that incentives will affect physician behavior if they are generous enough does not ignore the fact that physicians vow to provide preventive care without reference to potential compensation. Physicians undergo intense professional socialization, which likely impacts the efficacy of financial incentives on their behavior. While this socialization may affect the marginal impact of incentives, the direction and magnitude of this impact are not obvious, making it a topic worthy of investigation.

The role of the patient in impacting preventive care has been ignored in this review, but it is addressed in a companion article. The patient is not a passive participant in the process of delivering preventive care. However, many patients look to physicians for guidance and direction in prevention. In most of the studies reviewed here, physicians have played a predominant role. For some types of preventive care, the patient’s role may very well dominate the physician’s (e.g., weight loss, smoking cessation). These observations suggest that in designing effective financial interventions, the policymaker should assess the role that the physician and patient have in determining the outcome and how sensitive each actor’s behavior is to financial incentives.

The research was also conducted with little guidance from economic, organizational, or psychology theory. This is unfortunate, as these fields have much to say about the use of incentives in changing behavior. The use of a theoretical framework can help shape study design so as to maximize the likelihood that new information is created. This, in turn, allows the cumulative gain of knowledge. In this small literature, there is little sense that a foundation of knowledge is being created from which future studies can build upon. Without theoretical underpinnings, it is difficult to understand why incentives worked in one of the studies, and did not work in all of the others.

The search criteria for inclusion in this review were purposefully tight. Several studies that examine the impact of financial incentives on physician preventive care using observational data in quasi-experimental settings are excluded from the formal analysis. These studies generally focus on the impact of capitation (vs FFS payments) on the delivery of preventive services. While lacking the advantages of randomized assignment, this literature has the advantage of examining the impact of incentives in real-world contexts. The findings of this literature are inconclusive—roughly half of the observational data studies found no significant relationship between the payment structure and physician behavior. This suggests that the conclusions are not sensitive to the inclusion criteria.

Concerns over the quality of care have prompted increasing attention on how to change providers’ behaviors. Educational strategies such as guidelines and protocols alone have not proven successful. Economic incentives seem a more direct approach, but this review raises several cautionary flags. The desired behaviors must be specific and easy to track. Complex rules for determining rewards are less effective. Incentives must be of sufficient size to make them worthwhile for the provider to change his/her practice behaviors. Relying on incentives may also prove dangerous because it may foster dependency on them. If provider behaviors are not ingrained, they may disappear when the incentives end, or when a new topic is selected.

Those planning to use incentives to promote preventive care should be clear about their goals. Is the incentive intended as a temporary change in behavior or an inducement to make a permanent change? Practitioners feel that they are under great stress and harried by many competing demands for their time. Incentives may buy a temporary priority, but sustained change in the delivery of preventive care may require an investment of energy to address the underlying mechanisms that can reinforce the desired behaviors in a more permanent way. Although some might hope that brief experience in delivering care in a new way that is fostered by financial incentives might lead to permanent changes in the practice, there is little empirical evidence to support this hope. Some incentives may be permanent in the form of a direct reward for doing a defined task. Under those conditions, the necessary shifts in practice behavior may be incorporated, but it may be possible to catalyze this transition by studying the logistics of the practice. In many cases, the critical actions rely on simple changes to prompt actions and delegate authority to support staff. In those cases, the resources earmarked for incentives may be put to more efficient use elsewhere.

One must ask whether economic incentives are the most efficient route to induce sustained practice changes. Would it be wiser, for example, to invest in information infrastructure changes, such as prompts or reminder systems that might have a longer impact? Or might such innovations go unused without the spur of a direct incentive? Given the current state of research, this review cannot answer whether economic incentives are the most efficient route. However, the answer is central to the improvement of population preventive care.
Future Research

More research is needed on the impact of financial incentives on the provision of preventive care by healthcare providers. However, for this future work to make substantial progress in unraveling important relationships between incentives and physician behavior, several issues should be addressed and/or accounted for. Eight issues that the previous literature has overlooked that are fundamental in making progress in this area are listed below.

1. The research should explicitly take into account the literatures from economics, organizational behavior, and psychology.

2. Prior to undertaking the intervention, a clear picture of the reasons for the under-provision of preventive care should be developed. That is, the simplest solution to the problem of under-provision of preventive care might not be a change in payment but some change in the process and organization of physician work.

3. Research designs should be structured to uncover how sensitive physician behavior is to targeted payments or varying sizes.

4. Future researchers need to clearly delineate the causal chain of prevention or health promotion under investigation and the purpose of the incentive intervention being considered. Evidence of this clarity would be demonstrated in careful definitions of the process of care for a given preventive concern; careful matching of the nature of the economic incentive in terms of type, size, duration, frequency, and the use of other components such as education, social support or competition; and the projected long-term effects of the intervention once the incentive is withdrawn.

5. Because most physicians practice in groups, there will not necessarily be a direct link between how the group is compensated and how the physicians in the group are compensated. Organizational dynamics affect the structure of financial incentives and work routines. Economic incentives do not exist in a vacuum. Workplace routines can substitute for direct financial incentives, and may serve to mitigate their impact. Incentive experiments need to take these factors into account.

6. Incentive structures under consideration need to be capable of being instituted on a wide scale.

7. Natural settings for incentive research are important. The potential cost-effectiveness of incentives is compromised if any positive results of an incentive are so fragile that they survive only in controlled settings.

8. Consideration also needs to be given to measurement issues. The need to base incentives on what can be measured creates the potential for slackening effort in other difficult-to-measure but potentially important domains of care. Paying provider incentives on health outcome measures becomes a default choice when the process of care delivery cannot be measured. It is often difficult to determine with confidence a unit of analysis for the delivery of preventive services. Success in prevention is generally a non-event. It is much easier to count something that does occur than estimate the number of events that might have occurred but did not.

If it is accepted that preventive efforts provide value, we must recognize the inadequacies of existing systems to encourage such practices. Financial incentives have been used in an uncoordinated fashion as (1) motivators in the larger economic context of the health plan level, where savings associated with prevention are believed to be efficient, or where market interventions have instituted preventive care performance measures as quality indicators; and (2) provider incentives to induce discrete behavioral changes. System-level economic incentives can help to change the larger healthcare environment, in turn prompting individual providers and consumers to adopt new behaviors. Financial incentives, if they are large enough, can influence discrete behavior at the individual level in the short run. The benefits of such incentives may be magnified if they are coordinated with each other and with system level incentives, although this potential synergy remains untested. Where provider incentives do work, they may not provide a sustained behavior change. There is always a danger that they will be displaced by a new set of incentives targeted at a new topic. So, questions remain regarding whether investing in office system changes that support long-term changes in practice is a better choice than relying on incentives alone. More importantly, since various observers have noted that the business case for quality improvement is still weak, we must ask who is prepared to bear the cost of either strategy.
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