

# **Economic Incentives for Preventive Care**

**Prepared for:**

Agency for Healthcare Research and Quality  
U.S. Department of Health and Human Services  
540 Gaither Road  
Rockville, MD 20850  
[www.ahrq.gov](http://www.ahrq.gov)

**Contract No. 290-02-0009**

**Prepared by:**

University of Minnesota Evidence-based Practice Center, Minneapolis, Minnesota

*Investigators*

Robert L. Kane, MD  
Paul E. Johnson, PhD  
Robert J. Town, PhD  
Mary Butler, MBA

**AHRQ Publication No. 04-E024-2**  
**August 2004**

This report may be used, in whole or in part, as the basis for development of clinical practice guidelines and other quality enhancement tools, or a basis for reimbursement and coverage policies. AHRQ or U.S. Department of Health and Human Services endorsement of such derivative products may not be stated or implied.

AHRQ is the lead Federal agency charged with supporting research designed to improve the quality of health care, reduce its cost, address patient safety and medical errors, and broaden access to essential services. AHRQ sponsors and conducts research that provides evidence-based information on health care outcomes; quality; and cost, use, and access. The information helps health care decisionmakers—patients and clinicians, health system leaders, and policymakers—make more informed decisions and improve the quality of health care services.

This document is in the public domain and may be used and reprinted without permission except those copyrighted materials noted for which further reproduction is prohibited without the specific permission of copyright holders.

**Suggested Citation:**

Kane RL, Johnson PE, Town RJ, Butler M. Economic Incentives for Preventive Care. Evidence Report/Technology Assessment No. 101 (Prepared by the University of Minnesota Evidence-based Practice Center under Contract No. 290-02-0009. AHRQ Publication No. 04-E024-2. Rockville, MD. Agency for Healthcare Research and Quality. August 2004.

## Preface

The Agency for Healthcare Research and Quality (AHRQ), through its Evidence-Based Practice Centers (EPCs), sponsors the development of evidence reports and technology assessments to assist public- and private-sector organizations in their efforts to improve the quality of health care in the United States. The reports and assessments provide organizations with comprehensive, science-based information on common, costly medical conditions and new health care technologies. The EPCs systematically review the relevant scientific literature on topics assigned to them by AHRQ and conduct additional analyses when appropriate prior to developing their reports and assessments.

To bring the broadest range of experts into the development of evidence reports and health technology assessments, AHRQ encourages the EPCs to form partnerships and enter into collaborations with other medical and research organizations. The EPCs work with these partner organizations to ensure that the evidence reports and technology assessments they produce will become building blocks for health care quality improvement projects throughout the Nation. The reports undergo peer review prior to their release.

AHRQ expects that the EPC evidence reports and technology assessments will inform individual health plans, providers, and purchasers as well as the health care system as a whole by providing important information to help improve health care quality.

We welcome written comments on this evidence report. They may be sent to: Director, Center for Outcomes and Evidence, Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, MD 20850.

Carolyn M. Clancy, M.D.  
Director  
Agency for Healthcare Research and Quality

Jean Slutsky, P.A., M.S.P.H.  
Acting Director, Center for Outcomes  
and Evidence  
Agency for Healthcare Research and Quality

The authors of this report are responsible for its content. Statements in the report should not be construed as endorsement by the Agency for Healthcare Research and Quality or the U.S. Department of Health and Human Services of a particular drug, device, test, treatment, or other clinical service.

## **Acknowledgments**

We would like to thank Marilyn Eells for editing and formatting this report.

## Structured Abstract

**Context.** In recent years “pay for prevention” initiatives have been devised to address gaps between the high cost of preventable disease and deaths and the actual prevention practices of health providers and consumers. These initiatives use explicit, or extrinsic, incentives such as bonuses and cash or other in-kind financial incentives for providers and consumers to engage in specific preventive care or health promotion practices. The question is whether such economic incentives are a useful approach. In this report, we evaluate evidence from the literature on the impact of economic incentives targeted at providers and consumers on preventive health behaviors. The review is designed to 1) help develop more effective preventive strategies (evidence-based practice), and 2) help inform key stakeholders about the role of such practices, (evidence-based policymaking).

**Objectives.** A systematic review of the literature was undertaken to address four questions:

- Key Question 1 - How have “preventive care” and “economic incentive” been defined in the literature?
- Key Question 2 - Do incentives work?
- Key Question 3 - Is there evidence of a dose/response curve?
- Key Question 4 - What is the evidence for cost-effectiveness of economic incentive interventions?

**Data Sources.** We identified MEDLINE<sup>®</sup>, the Cochrane Library, EconLit, Business Source Premier, and PsychINFO as the literature sources for this review. Reference lists from previous systematic reviews, including the Cochrane Library were also examined as well. We also culled relevant articles from reference lists of identified studies.

**Study Selection.** Articles for both provider and consumer incentives were subjected to the inclusion and exclusion criteria. Individual articles must be primary studies in which preventive care or health promotion was a primary outcome measure. Preventive care was defined as care prior to illness diagnosis, thus excluding adherence studies. Also excluded were studies which included multiple factors in addition to economic incentives within the intervention arm, as were studies examining payment forms provided by more than one payment system, ie, HMO vs. FFS (as there are too many potential confounding factors). We included only RCTs, time series, and prospective quasi-experimental designs for the structured literature reviews. However, we also provided information from relatively well-designed econometric cross-sectional studies for the provider incentives as another perspective for consideration. Nineteen articles passed the inclusion criteria for provider economic incentives, and 47 articles passed the criteria for the consumer economic incentives.

**Data Extraction.** The abstraction tool was created with the purpose of facilitating the ability to capture emergent themes from the heterogeneous literature. The form was reviewed and commented on by the TEP members, piloted, and subsequently revised. Abstraction of the articles was performed by two independent reviewers. Disagreements were resolved by consensus of the group.

**Data Synthesis.** Formal meta-analysis of the incentive literature was not possible because there were not a large number of studies that examined the same incentive type, research outcome measures, and similar populations. General trends were summarized.

**Conclusions.** Definitions for neither “prevention” nor “economic incentive” are specifically addressed in the literature. Research on the effects of incentive interventions on preventive care and health promotion appears to be driven by policy considerations. Definitions for preventive care and economic incentives are not emphasized in the literature, not only in terms of locating the incentive intervention within larger environmental contexts, but also with regard to the function of the incentive.

There is little evidence available to support the idea that explicit provider financial incentives, particularly of the modest and artificial nature that were evaluated in the studies, are effective. Further, it appears bonuses do not work simply and easily. In the short run, consumer economic incentives are effective for simple preventive care and distinct behavioral goals that are well defined. There isn't sufficient evidence at this time to say that economic incentives are effective for promoting the long-term lifestyle changes required for health promotion.

The reviewed literature cannot answer whether there is a dose response for provider incentives, although one may assume that a sizable enough incentive should produce the desired behavior, if at a high cost. There is a possible dose response for consumer incentives. Even more interesting for consumer incentives is the effectiveness of relatively modest incentives. The threshold dose appears low.

None of the provider studies and few of the consumer studies undertook to make this calculation, thus it is difficult for us to assess the net predicted benefit of a given financial incentive.

Overall, the scientific quality of the current evidence is fair. While many studies were adequately designed to address the specific research question, the question itself was often uninformative.

# Contents

Chapter 1. Introduction .....	1
Overview .....	1
Background .....	1
Conceptual Framework .....	1
Applicable Theory .....	3
Cost Effectiveness .....	7
Definitions of Terms for the Study.....	7
Chapter 2. Methods.....	11
Solicitation of Input and Data.....	11
Literature Search.....	11
Inclusion Criteria.....	12
Exclusion Criteria.....	12
Abstraction.....	13
Emergent Themes .....	13
Rating Strength of the Evidence .....	15
Econometric Research.....	15
Peer Review Process.....	16
Chapter 3. Results .....	19
Simple vs. Complex Prevention.....	19
Key Question 1. How have “preventive care” and “economic incentive” been defined in the literature?.....	20
Key Question 2. Do incentives work?.....	21
Key Question 3. Is there evidence of a dose/response curve?.....	29
Key Question 4. What is the evidence for cost-effectiveness of economic incentive interventions? .....	30
Other Perspectives.....	30
Chapter 4. Discussion .....	39
Key Question 1. Definitions .....	39
Key Question 2. Do Incentives Work? .....	39
Provider .....	39
Consumer.....	40
Special Population Concerns.....	41
Comparison of Provider and Consumer Incentive Research.....	42
Key Question 3. Dose Response .....	43
Key Question 4. Cost-Effectiveness .....	43
Other Perspectives .....	45
General Discussion .....	45
Practical Implications.....	46
Limitations .....	47
Future Research .....	47
Overall .....	47



Conclusion.....	51
References and Included Studies .....	53
Listing of Excluded Studies .....	59

## Tables

Table 1	Conceptual framework: Level of action.....	9
Table 2	Consumer incentive types.....	34
Table 3	Impact of provider incentives.....	34
Table 4	Potential explanations by category.....	35
Table 5	Overall positive findings to total consumer studies .....	35
Table 6	Consumer incentive type by significance .....	36

## Figures

Figure 1	Conceptual framework.....	9
Figure 2	Econometric incentives search results flow chart .....	17

## \*Appendixes

- Appendix A: Technical Expert Panel and Reviewers
- Appendix B: Exact Search Strings
- Appendix C: Screening Form
- Appendix D: Abstraction Forms
- Appendix E: Algorithm
- Appendix F: Evidence Tables

**\*Appendixes and Evidence Tables are provided electronically at**  
<http://www.ahrq.gov/clinic/tp/ecinctp.htm>

# Economic Incentives for Preventive Care

## Summary

### Introduction

The Institute of Medicine's (IOM) recent Quality Chasm report suggests that the U.S. health care system requires major reengineering, including major realignment of incentives, if health care is to provide collaborative quality care and care management and effectively prevent and manage chronic disease.<sup>1</sup> Growing recognition of this need for realignment has led to “pay for quality” initiatives for providers and a parallel search for effective economic interventions for consumer health behavior change.<sup>2</sup> Similar “pay for prevention” initiatives are used to address the gap between the high cost of preventable disease and deaths<sup>3</sup> and the actual practices of health providers and consumers. These initiatives use explicit, or extrinsic, incentives such as bonuses and cash or other in-kind financial incentives for providers and consumers to engage in specific preventive care or health promotion practices. The question is whether such economic incentives are a useful approach.

In this report, we evaluate evidence from the literature on the impact of explicit economic incentives targeted at motivating providers and consumers to adopt preventive health behaviors. The review is designed to 1) help develop more effective preventive strategies (evidence-based practice), and 2) help inform key stakeholders about the role of such practices (evidence-based policymaking). In collaboration with AHRQ, the key research questions identified were:

#### Key Question 1

How have “preventive care” and “economic incentive” been defined in the literature?

#### Key Question 2

Do incentives work?

#### Key Question 3

Is there evidence of a dose/response curve?

#### Key Question 4

What is the evidence for cost-effectiveness of economic incentive interventions?

### Definition of Prevention

In the current environment of growing chronic illness burden and improving identification of risk factors for major diseases such as heart disease, the boundaries between primary, secondary, and tertiary prevention begin to blur. For example, high cholesterol and hypertension, though risk factors, are identified as treatable conditions. However, the purpose of treating high cholesterol is prevention of full-blown heart disease. For the purposes of this report, we defined preventive care and health promotion as those situations in which consumers may consider themselves healthy or physically at risk but have not yet been labeled with a diagnosis. This includes individual-based health promotion and preventives services as defined in Healthy People 2000 and 2010<sup>4,5</sup> 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 diagnosed chronic illnesses such as diabetes and heart disease, was also excluded. We included clinical and non-clinical settings, such as worksite and community-based health promotion settings.

Disease prevention and health promotion cover a wide spectrum of behaviors for both consumers and providers, from simple, one-time vaccinations to complex behavioral changes such as weight control. For the purposes of this review, we define a complex preventive concern as one that requires sustained effort over time on the part of the patient/consumer.



Agency for Healthcare Research and Quality

Advancing Excellence in Health Care • [www.ahrq.gov](http://www.ahrq.gov)

Evidence-Based  
Practice

## Definition of Economic Incentives

This review examines explicit incentives targeted at specific individuals, either providers or consumers. Incentives offered to providers could include direct payments or bonuses to the provider or his/her group. It was expected that economic incentives would vary considerably by the nature of the incentive, the components involved, size, frequency, duration, and the conditions that triggered payment of the incentive. More diffuse incentives offered as part of managed care (e.g., waiving co-payments) were excluded for both consumers and providers because of the difficulty in pinpointing their specific effect. Consumer incentives are fairly straightforward and include cash, gifts, lotteries, and other free or reduced price goods and services for the benefit of the specific consumer.

## Methods

### Literature Search and Data Abstraction

MEDLINE<sup>®</sup>, EconLit, Business Source Premier, and PsychInfo were the on-line reference databases used to conduct the literature review. PsychInfo, EconLit, and Business Source Premier were approached with a simple strategy of combining keyword searches for “incent\$” and “health.”

Reference lists of previous systematic reviews and identified articles were reviewed for other relevant studies. We also searched the Cochrane Collaboration database.

English-language articles published between 1966 and 2002 that addressed behaviors related to prevention as defined above were included in the review. We excluded studies that related to patient adherence to drug therapy or chronic illness management. We also excluded multiple component intervention studies in which the economic incentive was only one component and the study design precluded analyzing the independent effect of the incentive. In all, nine articles were included in the provider-incentive structured literature review, and 47 were included in the consumer review.

A data abstraction form was devised during the initial stages of the literature search. Formal meta-analysis of the incentive literature was not possible because of insufficient numbers of studies that examined the same incentive type, research outcome measures, and similar populations. The abstraction form was created with the purpose of facilitating the ability to capture emergent themes from the heterogeneous literature. Abstraction of the articles was performed by two independent reviewers. Disagreements were resolved by consensus of the group.

## Results

All nine provider incentive studies addressed simple preventive concerns: Six articles examined immunizations,<sup>6-11</sup> two looked at cancer screening,<sup>12,13</sup> one looked at prenatal care,<sup>14</sup> one looked at well-child visits,<sup>10</sup> and one examined cholesterol screening.<sup>6</sup> (Numbers do not add to nine as two

studies used more than one preventive care measure as an outcome.) Twenty-four of the 47 consumer articles were classified as simple prevention: seven on immunization,<sup>15-21</sup> two on cancer screening,<sup>22,23</sup> two on prenatal care,<sup>24,25</sup> three on attendance at educational sessions for STD/HIV prevention,<sup>26-28</sup> one on recruitment for a smoking cessation program,<sup>29</sup> and nine on preventive care followup: cholesterol<sup>30</sup> and tuberculosis screening,<sup>31,32</sup> cancer screening,<sup>33-36</sup> and post-partum exams.<sup>37,38</sup> Twenty-three articles addressed complex preventive care concerns: ten on smoking cessation,<sup>39-48</sup> two on exercise,<sup>49,50</sup> seven on obesity and weight loss,<sup>43,51-56</sup> and one each on breastfeeding,<sup>57</sup> nutrition,<sup>58</sup> cardiovascular disease prevention,<sup>59</sup> and cholesterol management.<sup>60</sup>

### Key Question 1

In general, definitions for “prevention” and “economic incentive” are not specifically addressed in the literature. The term “economic incentives” is used to describe financial incentives. Such incentives include a wide variety of actions. For providers these included bonus payments payable on the basis of number of inputs used or based on the provider achieving a target outcome or target behavior. For consumers, the incentives took the form of cash payments, lotteries, coupons for free or reduced price goods and services, gifts, free or reduced price medical services, and the opportunity to avoid disincentives.

### Key Question 2

**Provider.** All incentives were aimed at physicians; non-physician staff were not targeted. Reports were not clear on whether the financial incentives were paid to the physician or the practice. Incented physicians included family practitioners, general practitioners, internists, and pediatricians. All studies took place in nonacademic solo and group practices. However, “group” was often left undefined. Patient populations for five of the nine studies were vulnerable populations.

Seven studies used bonuses potentially payable to all physicians.<sup>6-9,11,13,14</sup> The remaining two studies were paid in tournament style.<sup>10,12</sup> Only a few studies provided data on the bonus payment average size and range. Of those reporting, potential payments ranged from \$50 to a tournament bonus of \$4,682. No study provided information on payment frequency or timing, nor on the investment costs the physician incurred establishing the clinical and office procedures necessary to support the production and behavioral changes. Therefore, we could not assess how these factors, plus the anticipated bonus program time period, impacted the physician’s calculation of the incentive’s potential overall financial benefit.

No study provided information on the physicians’ expectations of receiving a bonus. Overall awareness of the bonus program was low in two studies that examined physician awareness.<sup>10,12</sup>

Eight studies used performance bonuses that rewarded the physician for achieving a target outcome.<sup>6-13</sup> Two studies also

included a per-input bonus based on actual immunizations provided.<sup>8,9</sup>

Study outcomes were primarily measured as the percent of charts in compliance with a target outcome. Charts were generally classified compliant if the preventive service was documented as having occurred regardless of whether the preventive service was provided by the physician or his/her office staff or provided elsewhere.

Findings for the studies were mixed; overall four found positive effects<sup>6-9</sup> and five found no effects.<sup>10-14</sup> Improvements in chart documentation procedures may account for the positive effects. Positive effects were found in three subgroup analyses for group practice settings.<sup>10-12</sup>

Not all studies reported effect sizes or provided adequate information to construct relative risk ratios. Attempts to contact lead authors to obtain such information met with limited success. Based on the information provided, the effect size is moderate at best. For example, in one study receiving economic incentives was associated with a 7.1 percent increase in immunization rates.<sup>7</sup>

**Consumer.** Patient populations tended to fall into two broad categories that correlated with the simple/complex classification. Vulnerable populations of low socioeconomic status, the first category, were the most frequently studied populations for simple preventive care such as immunizations and cancer screening and followup, constituting 16 of the 24 simple preventive studies but only four of the 23 complex studies. These populations included active drug users, teen mothers, low-income children with mothers in the Women, Infants and Children or Aid to Families with Dependent Children programs, and patients of public clinics and safety-net hospitals. These populations were also considered at high risk for the study's targeted health concern. By contrast, generally healthy, middle-class populations recruited from work sites or the general population were the most frequent recruitment bases for studies of complex health promotion lifestyle changes.

Very few reports outlined a clear link between the design of the economic incentive and the specific population intended to receive the incentive. Only three studies justified the design of the chosen economic incentive.<sup>19, 28, 38</sup> Only nine studies directly tested the uptake of an incentive.<sup>15, 16, 24, 29, 33, 40, 45, 53, 58</sup> Another ten studies used different intervention arms to test the desirability of the incentive.<sup>18, 24, 26, 28, 31, 32, 38, 45, 55, 56</sup>

The type and size of the 59 incentives offered in the 47 studies varied extensively: 10 lotteries, seven gifts, 11 cash incentives, 15 coupons for free or reduced price goods or non-medical services, six free or reduced price medical services, and ten incentives involving negative reinforcement or the opportunity to avoid punishment. Seventy-eight percent of incentives required a target behavior from the participant as a condition for incentive distribution. The remainder required the participant to attain a particular outcome. Several studies included additional intervention components, particularly

social pressures, which potentially confound the impact of the incentive.

All of the simple preventive care studies used hard outcome measures. Complex preventive care studies used self-report in some instances. Whereas smoking cessation has available well established, valid, and reliable laboratory tests to confirm self-reported abstinence, directly observing many relevant lifestyle behavior changes related to health promotion, such as exercise and eating patterns, is difficult.

Facilitating incentives designed to make engaging in the new behavior easier, including structural barrier removal, and studies using disincentives showed significant effects. Incentives as rewards for participating and adhering to goals, whether for simple or complex prevention, are in general effective inducements for behavior change. Most studies matched a short-term incentive with a short-term behavioral change or outcome. While many of the studies in the outcome and negative reinforcement categories showed positive effects in the short run, of the four studies that checked for long-term results, all of the significantly improved measures had returned to their original levels.<sup>42, 47, 48, 59</sup>

### Key Question 3

We could not address dose response for provider incentives given the limited number of studies. There is minimal evidence of a dose response within the consumer research. Cash incentives have the expected rank ordering. Coupons, more convenient and flexible, may be preferred to gifts. Both studies that pitted a coupon incentive against a gift incentive found the coupon more effective.<sup>25, 38</sup> In addition, while coupon incentives were effective, with 12 of 15 incentives showing positive results, only four of seven gift incentives had positive results, and two of the positive results were potentially confounded by additional lottery or competition intervention components. Indeed, some coupons were never redeemed.

### Key Question 4

**Provider.** No study addressed cost-effectiveness. One study calculated an intervention cost of \$3 per additional immunization.<sup>7</sup>

**Consumer.** Only seven of the 47 studies included cost-effectiveness calculations for the study itself. In five of the seven cases, a treatment arm that consisted of a similar intervention without the incentive itself was reported to be a more cost-effective approach. No study included an attempt to generalize cost-effectiveness over time for the estimated impact of the incentive on potential population morbidity or mortality.

## Discussion

### Findings

The basic findings of the review for the four key questions can be summarized as follows:

**Key Question 1.** Definitions for economic incentives are not emphasized in the literature, not only in terms of locating the incentive intervention within larger environmental contexts, but also with regard to the function of the incentive. That is, if the incentive fails to distinguish its goal as an external reinforcement of behaviors until such time as the individual's internal motivation is sufficient, as a reinforcement until habituation or until some learning task is accomplished, or simply as a means of directing a person's attention to a neglected area. As a whole, the studies lack a clear conceptual context to delineate what an incentive is, its intended purpose, and how it is hypothesized to impact the individual.

In general, research appears to be driven by policy considerations. Policy guidelines developed by national organizations, expert panels, and governmental bodies at the Federal and State levels provide the goals which in turn determine the operational definitions of preventive care. While advancing understanding for specific health conditions and constituencies, this motivation results in a fragmented research agenda, which inhibits transferring the gains across varied preventive domains.

**Key Question 2. Provider.** The literature is scarce. There is little evidence available to support the idea that explicit provider financial incentives, particularly of the modest and artificial nature that were evaluated in the studies, are effective. Further, it appears that bonuses do not work simply and easily. The core beliefs regarding the appropriateness and efficacy of financial incentives have only recently begun to be subjected to examination through either experimentation or well-designed quasi-experimental or observational studies.

While there was some evidence that incentive effects were larger for group practices than solo practices, there is not enough information to sort out the causes. The improvements could signal increased staff and office system resources available to group practices. As it is not clear whether the incentives were paid directly to the physician or to the group, the question remains open.

*Consumer.* We may guardedly say that economic incentives are effective in the short run for simple preventive care and well defined, distinct behavioral interventions. There is insufficient evidence to say that economic incentives are effective for long-term lifestyle changes required for health promotion.

**Key Question 3.** The reviewed literature cannot answer whether there is a dose response for provider incentives, although one may assume that a sizable enough incentive should produce the desired behavior, if at a high cost. There is a possible dose response for consumer incentives. Even more interesting for consumer incentives is the effectiveness of relatively modest incentives. The threshold dose appears low.

**Key Question 4.** None of the provider studies and few of the consumer studies undertook to make this calculation, thus it is difficult for us to assess the net predicted benefit of a given financial incentive.

Overall, the scientific quality of the current evidence is fair. While many studies were adequately designed to address the specific research question, the question itself was often uninformative.

## Practical Implications

Concerns over the quality of care have prompted increasing attention to how to change providers' behaviors.<sup>1</sup> Educational strategies such as guidelines and protocols alone have not proven particularly successful.<sup>1</sup> Economic incentives seem a more direct approach, but this review raises several cautionary flags. The desired behaviors must be very specific and easy to track. Complex rules for success are less effective. The incentive must be of sufficient size to make it worthwhile for the provider to change practice behaviors. In general, offering a chance to win a large prize may be less attractive than the promise of a modest but substantial prize. Moreover, relying on incentives may prove dangerous because it may foster dependency on them. If the provider behaviors are not ingrained, they may disappear when the incentives end or when a new topic is selected to be incentivized.

Those planning to use incentives should be very clear about their goals. Is this intended as a temporary change in behavior or an inducement to make a permanent change? Practitioners feel under great stress and harried by many competing demands for their time. Incentives may buy a temporary priority from the provider, but sustained change in the operation of the practice will require an investment of energy to address the underlying mechanisms that can reinforce the desired behaviors. One might hope that a brief experience in delivering care in a new way, fostered by financial incentives, might lead to permanent changes in the modus operandi of the practice, but there is little empirical evidence to support this hope. Some incentives may be permanent, a direct reward to 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 delegation of authority to support staff. In those cases, the resources earmarked for incentives may be put to more efficient use elsewhere.

The enthusiasm for consumer incentives may be driven by some of the same concerns. Pressures to improve preventive performance may motivate some health care organizations to induce their enrollees to become more active in their own care and health promotion activities. In some cases, it may be possible to simultaneously incent both consumers and providers towards synergistic ends. Consumers seem to be more susceptible to incentives, even modest ones. At least some patients may appreciate the attention that incentive programs represent. However, there is always a temptation to pick the low hanging fruit. The recalcitrant consumers may not be as easily swayed by incentives. The energy required to reach and persuade non-adherent patients may still be high.

## Future Research

### Overall

The limited success of modest and “artificial” incentives to induce long-term change supports the current push for multi-component interventions based on the full environmental or social ecological perspectives such as the McKinley model.<sup>2</sup> There is a need for further studies.<sup>58</sup>

Future researchers need to be clear about the causal chain of prevention or health promotion under investigation and the purpose of the incentive intervention being considered. Evidence of this clarity is 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.

The large literatures in the social and behavioral sciences on incentives should be brought to bear on the empirical questions of when, to whom, and how much. Without theoretical underpinning it is difficult to understand exactly why incentives did or didn't work.

How economic incentives compare to and complement other strategies to improve preventive care, particularly with regard to long-term effects, remains to be fully understood. Within multi-component research there may be joint effects between incentives and other components. Do explicit incentives improve or impede, or are they unnecessary when a larger ecological effort is made, especially for consumers?

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

Mixed-method research projects would improve our understanding of the meaning and value of the incentives to the populations for which they are intended and the attitudes and beliefs those populations hold.

Personality research and other ways to understand individual differences may provide insights toward understanding and addressing the problem at which the incentive is aimed. Cultural differences should be more specifically examined.

Different types and sizes of economic incentives may trigger different modes of decision-making processes. We do not understand how a targeted individual determines when psychological or economic decision-making models are used.

### Providers

Which metric to use for determining if preventive care is under-provided from an economic perspective remains unresolved. Possible perspectives are cost-effectiveness, effectiveness, consumer welfare, HMO welfare, or the opportunity cost of other types of care.

Consideration needs to be given to the organizations in which physicians work. Organizational dynamics affect the financial incentives and the rules under which physicians practice. Economic incentives do not exist in a vacuum.

Consideration also needs to be given to measurement issues. Incentives must be based on things that can be measured, which then create the potential for slackening of effort in other unmeasurable but potentially important domains of care. Paying provider incentives on health outcome measures becomes a default choice when we cannot measure the process. We are often unable to determine with confidence what a unit of preventive services is. Furthermore, success in prevention is generally a nonevent. It is much easier to count something that does occur than to estimate the number of events that might have occurred but did not.

Attention should also be paid to teasing out the differential effects of two major components of economic incentives for physicians: motivation and information content.

Future researchers should also keep in mind that scalability matters. For an incentive system to be widely put to use, it has to be large enough to make the task seem worthwhile. We know little about how large such incentives need to be.

### Consumers

Researchers need to address the potential for the coercive effect of incentives on patient autonomy. No study has investigated this concern.

Competitions, or tournaments, as a work-site economic incentive program component, need more testing before widescale adoption.

### Provider-Consumer Interaction

Future research should investigate possible synergistic effects of coordinated incentives simultaneously applied to both providers and consumers for a particular preventive concern. The patient-provider relationship itself is also important. There is extensive literature in this area to inform future research on the potential impact of incentives on the consumer's acceptance of the provider as a collaborator in health promotion activities. In turn, providers may become more enthusiastic about a preventive activity when they are aware that it is being offered at lower costs to their patients.

### Conclusion

If we accept the value of preventive efforts, we must recognize the inadequacies of existing systems to encourage such practices. The literature reviewed here suggests that financial incentives have been used, in an uncoordinated fashion, at three levels in an attempt to increase prevention behaviors: 1) as 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; 2) as provider incentives to induce discrete behavioral changes; and 3) as consumer incentives to remove

barriers, improve health education, and reward healthy behavior. System-level economic incentives can help to change the larger health care environment, in turn prompting the individual providers and consumers to adapt to a new environment. Financial incentives, if they are big 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. Whereas 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 targeted at a new topic. So questions remain regarding whether investing in office system changes which support long-term changes in practice is a better choice than relying on incentives. 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.

## Availability of the Full Report

The full evidence report from which this summary was taken was prepared for the Agency for Healthcare Research and Quality (AHRQ) by the University of Minnesota Evidence-based Practice Center under Contract No. 290-02-0009. It is expected to be available in August 2004. At that time, printed copies may be obtained free of charge from the AHRQ Publications Clearinghouse by calling 800-358-9295. Requesters should ask for Evidence Report/Technology Assessment No. 101, *Economic Incentives for Preventive Care*. In addition, Internet users will be able to access the report and this summary online through AHRQ's Web site at [www.ahrq.gov](http://www.ahrq.gov).

## Suggested Citation

Kane RL, Johnson PE, Town RJ, Butler M. Economic Incentives for Preventive Care. Summary, Evidence Report/Technology Assessment No.101. (Prepared by the University of Minnesota Evidence-based Practice Center under Contract No. 290-02-0009). AHRQ Publication No. 04-E024-2. Rockville, MD: Agency for Healthcare Research and Quality. August 2004.

## References

1. Institute of Medicine. Crossing the quality chasm: a new health system for the 21st century. Washington, DC: National Academy Press; 2001.
2. Casalino L, Gillies RR, Shortell SM, et al. External incentives, information technology, and organized processes to improve health care quality for patients with chronic diseases. *JAMA* 2003;289(4):434-41.
3. McGinnis JM, Foege WH. Actual causes of death in the United States. *JAMA* 1993;270(18):2207-12.
4. US Department of Health and Human Services. Healthy people 2000: national health promotion and disease prevention objectives. Washington, DC: U.S. Department of Health and Human Services, Public Health Service; 1991. 91-50212.

5. US Department of Health and Human Services. Healthy People 2010. Washington, DC: US Department of Health and Human Services; 2000.
6. Morrow RW, Gooding AD, Clark C. Improving physicians' preventive health care behavior through peer review and financial incentives. *Arch Fam Med* 1995;4(2):165-9.
7. Kouides RW, Bennett NM, Lewis B, et al. Performance-based physician reimbursement and influenza immunization rates in the elderly. The Primary-Care Physicians of Monroe County. *Am J Prev Med* 1998;14(2):89-95.
8. Fairbrother G, Hanson KL, Friedman S, et al. The impact of physician bonuses, enhanced fees, and feedback on childhood immunization coverage rates. *Am J Public Health* 1999;89(2):171-5.
9. Fairbrother G, Siegel MJ, Friedman S, et al. Impact of financial incentives on documented immunization rates in the inner city: results of a randomized controlled trial. *Ambul Pediatr* 2001;1(4):206-12.
10. Hillman AL, Ripley K, Goldfarb N, et al. The use of physician financial incentives and feedback to improve pediatric preventive care in Medicaid managed care. *Pediatrics* 1999;104(4 Pt 1):931-5.
11. Ritchie LD, Bisset AF, Russell D, et al. Primary and preschool immunisation in Grampian: progress and the 1990 contract. *BMJ* 1992;304(6830):816-9.
12. Hillman AL, Ripley K, Goldfarb N, et al. Physician financial incentives and feedback: failure to increase cancer screening in Medicaid managed care. *Am J Public Health* 1998;88(11): 1699-701.
13. Grady KE, Lemkau JP, Lee NR, et al. Enhancing mammography referral in primary care. *Prev Med*, 1997;26(6):791-800.
14. Fox MH, Phua KL. Do increases in payments for obstetrical deliveries affect prenatal care? *Public Health Rep* 1995;110(3):319-26.
15. Nexoe J, Kragstrup J, Ronne T. Impact of postal invitations and user fee on influenza vaccination rates among the elderly. A randomized controlled trial in general practice. *Scand J Prim Health Care* 1997;15(2):109-12.
16. Satterthwaite P. A randomised intervention study to examine the effect on immunisation coverage of making influenza vaccine available at no cost. *N Z Med J* 1997;110(1038):58-60.
17. Birkhead GS, LeBaron CW, Parsons P, et al. The immunization of children enrolled in the Special Supplemental Food Program for Women, Infants, and Children (WIC). *JAMA* 1995;274(4):312-6.
18. Yokley JM, Glenwick DS. Increasing the immunization of preschool children; an evaluation of applied community interventions. *J Appl Behav Anal* 1984;17(3):313-25.
19. Moran WP, Nelson K, Wofford JL, et al. Increasing influenza immunization among high-risk patients: education or financial incentive? *Am J Med* 1996;101(6):612-20.
20. Hutchins SS, Rosenthal J, Eason P, et al. Effectiveness and cost-effectiveness of linking the special supplemental program for women, infants, and children (WIC) and immunization activities. *J Public Health Policy* 1999;20(4):408-26.
21. Kerpelman LC, Connell DB, Gunn WJ. Effect of a monetary sanction on immunization rates of recipients of aid to families with dependent children. *JAMA* 2000;284(1):53-9.
22. Mayer JA, Kellogg MC. Promoting mammography appointment making. *J Behav Med* 1989;12(6):605-11.
23. Mayer JA, Clapp EJ, Bartholomew S, et al. Facility-based in reach strategies to promote annual mammograms. *Am J Prev Med* 1994;10(6):353-6.
24. Laken MP, Ager J. Using incentives to increase participation in prenatal care. *Obstet Gynecol* 1995;85(3):326-9.

25. Melnikow J, Paliescheskey M, Stewart GK. Effect of a transportation incentive on compliance with the first prenatal appointment: a randomized trial. *Obstet Gynecol* 1997;89(6):1023-7.
26. Deren S, Stephens R, Davis WR, et al. The impact of providing incentives for attendance at AIDS prevention sessions. *Public Health Rep.* 1994;109(4):548-54.
27. Dahl DW, Gorn GJ, Weinberg CB. Encouraging use of coupons to stimulate condom purchase. *Am J Public Health.* 1999;89(12):1866-9.
28. Kamb ML, Rhodes F, Hoxworth T, et al. What about money? Effect of small monetary incentives on enrollment, retention, and motivation to change behaviour in an HIV/STD prevention counselling intervention. The Project RESPECT Study Group. *Sex Transm Infect.* 1998;74(4):253-5.
29. Emont SL, Cummings KM. Using a low-cost, prize-drawing incentive to improve recruitment rate at a work-site smoking cessation clinic. *J Occup Med.* 1992;34(8):771-4.
30. Owen N, James R, Henrikson D, et al. Community cholesterol screenings: The impact of follow-up letters and incentives on retest rates and biometric changes in follow-up screenings. *Am J Health Promotion.* 1990;5(1):58-61.
31. Malotte CK, Hollingshead JR, Rhodes F. Monetary versus nonmonetary incentives for TB skin test reading among drug users. *Am J Prev Med.* 1999;16(3):182-8.
32. Malotte CK, Rhodes F, Mais KE. Tuberculosis screening and compliance with return for skin test reading among active drug users. *Am J Public Health.* 1998;88(5):792-6.
33. Freedman JD, Mitchell CK. A simple strategy to improve patient adherence to outpatient fecal occult blood testing. *J Gen Intern Med.* 1994;9(8):462-4.
34. Marcus AC, Crane LA, Kaplan CP, et al. Improving adherence to screening follow-up among women with abnormal Pap smears: results from a large clinic-based trial of three intervention strategies. *Med Care.* 1992;30(3):216-30.
35. Marcus AC, Kaplan CP, Crane LA, et al. Reducing loss-to-follow-up among women with abnormal Pap smears. Results from a randomized trial testing an intensive follow-up protocol and economic incentives. *Med Care.* 1998;36(3):397-410.
36. Kaplan CP, Bastani R, Belin TR, et al. Improving follow-up after an abnormal pap smear: results from a quasi-experimental intervention study. *J Womens Health Gender-Based Med.* 2000;9(7):779-90.
37. Stevens-Simon C, O'Connor P, Bassford K. Incentives enhance postpartum compliance among adolescent prenatal patients. *J Adolesc Health.* 1994;15(5):396-9.
38. Smith PB, Weinman ML, Johnson TC, et al. Incentives and their influence on appointment compliance in a teenage family-planning clinic. *J Adolesc Health Care* 1990;11(5):445-8.
39. Dey P, Foy R, Woodman M, et al. Should smoking cessation cost a packet? A pilot randomized controlled trial of the cost-effectiveness of distributing nicotine therapy free of charge. *Br J Gen Pract* 1999;49(439):127-8.
40. Hughes JR, Wadland WC, Fenwick JW, et al. Effect of cost on the self-administration and efficacy of nicotine gum: a preliminary study. *Prev Med* 1991;20(4):486-96.
41. Windsor RA, Lowe JB, Bartlett EE. The effectiveness of a worksite self-help smoking cessation program: a randomized trial. *J Behav Med* 1988;11(4):407-21.
42. Koffman DM, Lee JW, Hopp JW, et al. The impact of including incentives and competition in a workplace smoking cessation program on quit rates. *Am J Health Promotion* 1998;13(2):105-11.
43. Jeffery RW, Forster JL, French SA, et al. The Healthy Worker Project: a work-site intervention for weight control and smoking cessation. *Am J Public Health* 1993;83(3):395-401.
44. Donatelle RJ, Prows SL, Champeau D, et al. Randomised controlled trial using social support and financial incentives for high risk pregnant smokers: significant other supporter (SOS) program. *Tob Control* 2000;9(Suppl 3):III67-9.
45. Stitzer ML, Bigelow GE. Contingent payment for carbon monoxide reduction: Effects of pay amount. *Behav Ther* 1983;14(5):647-56.
46. Gottlieb NH, Nelson A. A systematic effort to reduce smoking at the worksite. *Health Educ Quarterly* 1990;17(1):99-118.
47. Curry SJ, Wagner EH, Grothaus LC. Evaluation of intrinsic and extrinsic motivation interventions with a self-help smoking cessation program. *J Consult Clin Psych* 1991;59(2):318-24.
48. Klesges RC, Glasgow RE, Klesges LM, et al. Competition and relapse prevention training in worksite smoking modification. *Health Educ Res* 1987;2(1):5-14.
49. Wing RR, Jeffery RW, Pronk N, et al. Effects of a personal trainer and financial incentives on exercise adherence in overweight women in a behavioral weight loss program. *Obes Res* 1996;4(5):457-62.
50. Harland J, White M, Drinkwater C, et al. The Newcastle exercise project: a randomised controlled trial of methods to promote physical activity in primary care.[comment]. *BMJ* 1999;319(7213):828-32.
51. Jeffery RW, French SA. Preventing weight gain in adults: the pound of prevention study. *Am J Public Health* 1999;89(5):747-51.
52. Jeffery RW, Wing RR, Thorson C, et al. Use of personal trainers and financial incentives to increase exercise in a behavioral weight-loss program. *J Consult Clin Psych* 1998;66(5):777-83.
53. Follick MJ, Fowler JL, Brown RA. Attrition in worksite weight-loss interventions: the effects of an incentive procedure. *J Consult Clin Psych* 1984;52(1):139-40.
54. Jeffery RW, Thompson PD, Wing RR. Effects on weight reduction of strong monetary contracts for calorie restriction or weight loss. *Behav Res Ther* 1978;16(5):363-9.
55. Jeffery RW, et al. Effectiveness of monetary contracts with two repayment schedules of weight reduction in men and women from self-referred and population samples. *Behav Ther* 1984;15(3):273-9.
56. Jeffery RW, Gerber WM, Rosenthal BS, et al. Monetary contracts in weight control: effectiveness of group and individual contracts of varying size. *J Consult Clin Psych* 1983;51(2):242-8.
57. Sciacca JB, Phipps BL, Dube DA, et al. Influences on breast-feeding by lower-income women: an incentive-based, partner-supported educational program. *J Am Diet Assoc* 1995;95(3): 323-8.
58. Anderson JV, Bybee DI, Brown RM, et al. 5 a day fruit and vegetable intervention improves consumption in a low income population. *J Am Diet Assoc* 2001;101(2):195-202.
59. Gomel M, Oldenburg B, Simpson JM, et al. Work-site cardiovascular risk reduction: a randomized trial of health risk assessment, education, counseling, and incentives. *Am J Public Health.* 1993;83(9):1231-8.
60. Francisco VT, Paine AL, Fawcett SB, et al. An experimental evaluation of an incentive program to reduce serum cholesterol levels among health fair participants. *Arch Fam Med* 1994;3(3):246-51.





[www.ahrq.gov](http://www.ahrq.gov)  
AHRQ Pub. No. 04-E024-1  
August 2004

ISSN 1530-440X

# Chapter 1. Introduction

## Overview

The IOM's recent Quality Chasm report argues that the U.S. health care system requires major re-engineering, including major realignment of incentives, if health care is to provide collaborative quality care and care management and effectively prevent and manage chronic disease.<sup>1</sup> Growing recognition of this need for realignment has led in recent years to "pay for quality" initiatives for providers.<sup>2</sup> Similar "pay for prevention" initiatives are used to address the gap between the high cost of preventable morbidity and death through recognized disease prevention and health promotion<sup>3</sup> and the actual practices of health providers and consumers. These initiatives use explicit, or extrinsic, incentives such as bonuses and cash or other in-kind financial incentives for providers and consumers to engage in specific preventive care or health promotion practices. This report explores the impact of explicit economic incentives targeted at motivating providers and consumers to adopt preventive health behaviors. The review is designed to 1) help develop more effective preventive strategies (evidence-based practice), and 2) help inform key stakeholders about the role of such practices, (evidence-based policymaking). It poses four key questions:

- Key Question 1    How have "preventive care" and "economic incentive" been defined in the literature?
- Key Question 2    Do incentives work?
- Key Question 3    Is there evidence of a dose/response curve?
- Key Question 4    What is the evidence for cost-effectiveness of economic incentive interventions?

## Background

### Conceptual Framework

Disease prevention and health promotion cover a wide spectrum of behaviors for both consumers and providers, from simple, one-time vaccinations to complex behavioral changes such as weight control. Where a particular preventive concern falls on the spectrum is determined by: 1) the complexity of attitudinal or behavioral changes and commitment required by the consumer; 2) the complexity of attitudinal or behavioral changes and commitment required by the provider; and 3) the relative complexity of the prevention technology itself, e.g., nicotine patches or counseling. For the purposes of this study, the determining factor for whether a study was classified as a simple or complex preventive health concern was whether a sustained behavior change over time was required of the consumer.

From an economist's point of view, the proper question to ask is not whether economic incentives work, but rather how large they need to be, when they should be used, and to whom they should be given. It is likely that the impact of a given incentive on preventive behavior will depend on whether the prevention is simple or complex. If one views the creation of an incentive as overcoming barriers of some sort, the magnitude of those barriers will likely be complex functions of social, psychological, and philosophical values, beliefs, attitudes, conscious and sub-conscious cognitive processes. Contextual and economic issues help define and shape the understanding of the perceived problem the incentive is intended to address, and appropriate attention to these issues would improve the potential success of the incentive.

The basic conceptual model that includes both provider and consumer actions is shown in Figure 1. This model does not reflect a specific theoretical base, but instead describes the actions that occur as preventive services are encouraged. As indicated in Figure 1, prevention and health promotion operate along a pathway of preventive behaviors. The framework condenses the process and begins with the consumer's orientation to a preventive concern. This orientation is partially determined by the level of awareness of the various preventive concerns and their impact on the consumer's health and well-being. Increased levels of awareness may lead the consumer to take responsibility for personal behavioral and lifestyle changes, to seek care or counsel from a health provider, or to be open to unsolicited preventive care or counsel from the health provider. The provider may offer preventive care and health promotion counseling, which the consumer then chooses whether to accept or not. Each place along the pathway represents a possible point to apply economic incentives to change the level of preventive care and health promotion.

Preventive services offered by a provider are likely influenced by many factors in addition to reimbursement concerns. These include factors such as convenience, held beliefs regarding the appropriateness and effectiveness of the preventive service, patient volume, external pressures on clinic office procedures arising from quality programs such as HEDIS, or uncoordinated practice guidelines from multiple managed care organizations. Barriers to changing levels of preventive services offered may include such concerns as resistance to changes in information technology systems, lack of organizational support, incongruence between economic and other philosophical views held by the provider, the opportunity cost of office visit time, and social cognition processes. Even if undertaken, the consequences of preventive care and health promotion counseling may create further unexpected barriers to change. For example, Bowman et al. found that patients reported declines in social and emotional functional status, including mental health, social health, self-esteem, and higher anxiety and depression scores for up to three months after physician recommendations for behavioral change during routine health maintenance visits and suggested such declines may inhibit a physician from making such recommendations.<sup>4</sup>

Preventive services demanded by the consumer are likewise influenced by many factors. Convenience, out-of-pocket outlays, and held beliefs about the effectiveness of preventive care and health promotion efforts are clearly important, perhaps particularly for the simple preventive concerns. Complex preventive concerns and health promotion, however, requiring sustained effort, over time, may be more strongly impacted by the readiness of the consumer to embrace a behavior change, self-discipline, feelings of self-efficacy and the belief that change is possible, and the willingness of the consumer to accept the provider's authority or collaboration in matters of personal lifestyle. Again, social psychological processes and potential incongruence between economic, patient autonomy and agency, and other philosophical views of the consumer would be expected to come into play.

There are, then, many possible attitudes and behaviors within both providers and consumers, and many places along the pathways of preventive care and health promotion, which might be identified to promote or support change. Within the overarching diagram of Figure 1 are the components of simple/complex and levels of action. Providers and consumers have several options that can be influenced by incentives. Table 1 provides a few simple examples within each category. Consumers might be motivated to simply attend sessions where preventive actions might be offered, or they can be induced to actually follow the desired behavior. Likewise, providers can be encouraged to recognize the problem that needs attention and to give the preventive service needed. These actions can occur separately or they could be combined into a comprehensive program. In the case of simple preventive services, such as immunizations, the two levels of action are usually combined; getting a patient in contact with the service can usually mean administering the service.

The financial incentive to provide a service may extend beyond direct reimbursement. The provision of preventive care may enhance the provider's quality reputation and that in turn may lead to increased payments from insurers or patients. Incentives offered to providers could include direct payments to the provider or their group, bonuses, or enhanced status by virtue of profiling, or meeting external regulatory pressures (e.g., HEDIS). Incentives for consumers could include monetary payments and gifts, lower costs for designated services, coverage of necessary components, or lower premiums for those who participate.

The overall perceived value of an incentive may reflect a number of expectations and assumptions held by the provider and consumer. A provider may perceive the incentive, aggregated over the caseload, as inadequate given the case mix as defined by the stages of change. Or, a consumer may give more salience to economic incentives for simple preventive services because the decision to utilize such services requires relatively less cognitive processing. Alternatively, economic incentives may be less salient for complex decisions that require significant cognitive processing which draws on multiple sources of input. Incentives offered to consumers may affect the provider's beliefs and behaviors as well as the consumer's.

Economic and contextual issues may also affect the impact of economic incentives, even well-designed ones, through unnoticed or unintended disincentives. Perhaps of largest concern is the effect of practice environments, including managed care, group practice, and individual practice arrangements, on economic incentives. There is also the potential impact of incentives on trust and patient autonomy within the provider/patient relationship.

## **Applicable Theory**

The purpose of financial incentives is to induce behavior that otherwise would not occur. If appropriately designed, financial incentives move providers and consumers toward better (in a societal sense) behaviors.<sup>a</sup> Financial incentives can take many forms. Providers can be paid per service provided (often called fee-for service, FFS), paid per service with a bonus or penalty paid based on assessed performance (often called fee-for-service with withhold) on the basis of their costs (often called cost-based or retrospective payment), a fixed payment (often called capitation or prospective payment), or a mixture of payment types.

---

<sup>a</sup> Some economists prefer to reserve "economic incentives" for situations that involve the analysis of opportunity costs, and use "financial incentives" for the kinds of questions posed in this review. Because the request for proposal for this review used the term "economic incentive" and the more general readership finds the term useful, we chose to retain the original wording.

The ability of several academic disciplines to provide meaningful insight into the question of effective economic incentives touched upon in this introduction, and the complexity of the processes and structures of decision making and processes of care, point out the importance of social ecological approaches to health care improvement. Addressing macro-level economic forces embedded within the health care system, and broad environmental and social supports for healthy and unhealthy behaviors, it is argued, requires multi-component interventions that address multiple factors.<sup>2</sup>

In a simple world, basic economic theory suggests that providers should be paid the value of their marginal product for the provision of preventive services. However, there are several real world complications that prevent this optimal payment structure from being implemented. First, there are important externalities in preventive care. Disease prevention on the part of one patient (e.g., stop smoking, vaccinations) reduces the health risk to the population as a whole.<sup>5</sup> Thus, paying the provider the value of the marginal benefit to a patient would lead to an under-provision of preventive care. Second, the importance of third party payers implies that patients rarely pay the full cost of their care. Third, there are important informational asymmetries between providers and patients and providers and payers. Economic theory has long recognized that the presence of informational asymmetries can result in a wedge between the actual and optimal payment levels. Agency theory and mechanism design branches of economics have arisen to study the role of information and the optimal incentive structures.

Agency theory studies the behavior of two or more groups whose welfare is interdependent but whose incentives are not naturally aligned. An example is the patient-physician relationship. Physicians and patients both need each other, however, physicians may not have the incentive to prevent illness since, in general, the sicker the patient is the more they can earn. Agency theory steps into the problem and designs a payment mechanism that brings the interests of the physician into alignment with the patient. In this example, a solution to this agency problem might be to pay the physician a capitated payment regardless of whether the patient is sick or well. Under this arrangement it is in the physician's interest to have the patient avoid illness thereby reducing the effort and expenditure the physician must spend on treating an ill patient. However, as we show in the following discussion on the basic forms of provider economic incentives, capitation generates other incentives that may be less desirable.

The payment for services is the basic form of economic incentives for providers. Roughly speaking, provider incentives may be divided into two types, FFS or capitation for some portion of the medical services under their control. These two payment methods give physician organizations differing incentives to provide preventive services.

Under FFS it may be difficult for the physician to get reimbursed for implementing preventive services (e.g. smoking/alcohol counseling). Health plans have been disinclined to cover preventive services under FFS payment system because it is difficult to verify if they have been performed. If physicians can attract more patients by performing preventive care, they may be more inclined to do so. In addition, it is difficult ex ante for patients to judge the quality of preventive services provided by physicians and thus they may be unable to select physicians on that basis. Thus, physicians may have little incentive to provide these services if they do not gain more (or better paying) patients for this provision.

Under capitation, since the risk is shifted to the provider, the physician faces many of the same financial incentives to provide preventive care as a health plan. Providers functioning as insurers face a complex web of often offsetting incentives to cover and promote the use of preventive services. They must consider the net cost of its potential preventive care promotion

versus the gain in revenue of a given program. Most preventive care, even if cost effective, is not cost saving. Thus, the incentives for a provider to cover a particular preventive service will depend on their ability to recoup the increased cost of preventive care coverage through increases in revenue or through decreased costs due to changing the risk profile of its enrollees. If enrollees appropriately value cost-effective preventive care (and there are several reasons why they may not), then the insurer may indeed increase revenues sufficiently to cover its increased costs through the provision of preventive services.

The financial incentives to provide preventive services under capitation are tied to the ability of the physician to recoup preventive care expenditures. If an enrollee stays with the provider for a long time, it is immediately in the provider's interest, independent of how the enrollees value the service, to cover and promote the use of cost-saving preventive services. However, the time lag between preventive care expenditure and benefits can be long (e.g. diet and exercise).<sup>6</sup> Because the provider may not keep an enrollee long enough to benefit from the provision of cost-saving care, they may have little financial incentive to provide this care in spite of the potential societal gain from the provision of these services. Given the disincentive caused by enrollee churning, it likely makes more sense for large employers to engage in preventive interventions. However, while employees stay longer with employers than with health plans, there is still significant turnover of employees and the employer faces the same dilemma as the insurer for the provision of preventive services.

The use of bonuses as a means to direct the attention of the provider to preventive services is a relatively new development within the overall provider remuneration structures. While bonus qualification may be directly linked to a specific procedure, such as immunization, it may also be linked to quality of care measures, of which preventive concerns are only contributing factors.

Conditional upon their health insurance status, consumers typically face a less complex array of direct financial incentives for obtaining preventative services. They may have to pay a co-pay to visit the provider and, if the service is not covered under their insurance or they do not have health insurance, they may have to pay a substantial amount to receive preventative care. Perhaps more relevant for consumers in determining their preventive behavior is the opportunity cost. If the care requires a trip to the physician, the transportation, opportunity cost in time, and the psychological cost of the physician visit may loom larger than the out-of-pocket expenditures. If the preventive activity requires a sustained behavior change (e.g. weight loss), the primary disincentive to engage in this behavior may simply be the cost of the time devoted to preventive care and the discomfort that the new behavior may induce. For example, the financial incentives designed to induce weight loss will have to be sufficient to overcome these time costs and the psychic cost of discomfort.

The first managed care organizations emphasized the role of preventive services in maintaining the overall health of their enrollee population. However, there is a sense that the emphasis on preventive care that was one of the hallmarks of the first HMOs is no longer common among managed care organizations. Thus, it is reasonable to ask: "If health care consumers value preventive services, what might deter health plans from offering these services?" Below we discuss some of the market imperfections that may impede individuals from getting the right amount of care.

First, we note that individuals appear to be price sensitive towards preventive services. Kenkel finds that women with insurance are five percentage points more likely to have breast exams and cervical screenings.<sup>7</sup> Mullahy finds that those with insurance are three percentage points more likely to get a flu shot.<sup>8</sup> Cherkin et al. finds that \$5 co-pay resulted in fewer physical

exams.<sup>9</sup> In the Rand Health Insurance experiment women with free care were three to seven percentage points more likely to receive preventive care.<sup>10</sup>

Individuals seeking preventive care face monetary, time, and psychological costs. Poor segments of the population may simply not have the monetary means as they may not have health insurance or the access to the necessary infrastructure (e.g. transportation) to obtain preventive services. Many preventive behaviors by individuals require them to make significant time investments. Changing life style by exercising or quitting smoking is psychologically more costly than getting an immunization. It means giving up things that are pleasant. Sustained change is harder to achieve than one-time events.

Recent developments in economic theory have emphasized the importance of observed departures from the rational decision making model.<sup>11-13</sup> These models highlight that individuals may have time-inconsistent preferences and are therefore procrastinators. That is, individuals know that certain behaviors are bad for them, but they are unable to change their behavior even though they realize that changing their behavior would ultimately make them better off. Therefore, in these models, individuals who engaged in unhealthy behaviors may be better off if commitment mechanisms are put in place to help them change their behavior.<sup>11</sup>

Since many individuals have access to health insurance (or certainly will at age 65) they have less incentive to engage in preventive care, as they will not have to pay the direct cost of treatment. However, the evidence on this indicates that insured individuals are less likely to engage in “dangerous” health behaviors.<sup>14</sup> That is, those who select into insurance are likely to be less risk averse or have lower discount rates and therefore invest more in their health. Individuals may already have an incentive to engage in healthy behavior to avoid the disutility of illness.

Information may be an important barrier for individuals in seeking out preventive care. Many individuals rely on their physicians to inform them on what preventive services they should have performed and, as discussed above, physicians may not have the appropriate incentives to inform their patients. It is possible that individuals may not know about the health benefits/risks of certain behaviors/screening. However, there is evidence that people do respond to information regarding health consequences of behavior (e.g., Surgeon General’s Report on Smoking, 1962) and diet.<sup>15,16</sup> Furthermore, individuals may not be able to assess their risk of various diseases. There is mixed evidence on whether individuals under or over estimate the risks of particular behaviors. Viscusi et al. find that smokers overestimate the risks associated with smoking.<sup>17-19</sup> However, Schoenbaum finds that heavy smokers over-estimate the likelihood they will live to 75.<sup>20</sup>

Designing the appropriate incentive structures are non-trivial problems requiring an understanding of the information structures (e.g. who knows what and what behaviors are observable or measurable) and the responsiveness of providers, consumers, and payers to different incentive structures. The economics literature within the field of “mechanism design” has devoted significant amounts of effort to understanding the structure of the optimal incentive design. Viewed somewhat differently, instituting a new incentive structure is presumably a response to a perceived problem in how actors in the health care system are currently behaving. It is important to recognize that understanding the source of the problem is required in order to create an appropriate incentive design.

The question necessarily arises then – what would an effective economic incentive arm of a multi-component intervention for preventive care and health promotion look like. This is itself a complex question. While remaining mindful of the larger health care quality context, we can

deepen our understanding of the role of economic incentives for preventive care by confining an examination of the literature to those studies which allow us to directly address the effectiveness of economic incentives for preventive care and health promotion.

This review focuses on evaluating the evidence for an intervention intended to modify behaviors, not health states. That is, we are looking for marginal changes in specific behavior embedded within a complex context. As such, study outcome measures should focus on measuring behaviors, such as utilization of preventive services, rather than, or in addition to, patient health outcomes.

This review does not directly assess the impact of HMOs and other managed care organization risk-sharing and payment mechanisms as compared to FFS. While there is considerable and understandable interest in the effects of these larger economic incentives, the focus is on explicit economic incentives for preventive care. In addition, the potentially numerous confounding factors derived from different patient populations, physician populations, and structures and processes of different systems might overwhelm the potential usefulness of a review of explicit incentives.<sup>21</sup>

## Cost Effectiveness

A frequent criticism of the US health care system is that not enough preventive care is performed. In these critiques, several reasons for the dearth of preventive care are usually offered, and the list of causal forces that cap the level of care below what it “should” be is that providers and consumers are not given the appropriate economic incentives to perform or seek out preventive care. However, while the calls for more preventive services have been made, it is unclear whether more preventive services would make the health care system more cost-effective.<sup>22</sup>

Cost-effectiveness can be thought about in two basic ways: 1) achieving a given preventive goal at a lower cost (sometimes called productive efficiency) and 2) achieving an improvement in health per unit of cost that exceeds a societally acceptable threshold (sometimes called allocative efficiency). Most of the work addressed here is restricted to the first definition, although ultimately the cost effectiveness of the incentive will depend on the cost effectiveness of the underlying preventive behavior it is designed to encourage. Screening for diseases and prevention of illness is very expensive. Russell estimates that if the recommendations of the US Preventive Services Task Force and the American Cancer Society were followed, screening for cervical cancer, prostate cancer, and cholesterol alone would cost as much as \$80 billion per year.<sup>22</sup> Tengs and Graham conclude that the most cost-effective interventions are not those most frequently used, suggesting that what is needed is not more preventive care, but rather a reallocation of preventive services.<sup>23</sup> The Tengs and Graham finding also suggests that the appropriate incentives (financial or otherwise) are not currently in place for providing the right mix of preventive services.

## Definitions of Terms for the Study

**Prevention.** Clinical preventive medicine is that part of preventive medicine concerned with the maintenance and promotion of health and the reduction of risk factors that result in injury and disease.<sup>24</sup> The three main types of prevention are primary prevention aimed at not allowing a disease or adverse event to occur, secondary prevention aimed at the early detection of an



asymptomatic disease, and tertiary prevention aimed at reducing the adverse consequences of a diagnosed disease. Immunizations are primary preventive acts. So is health promotion, such as smoking cessation, exercise, and attention to nutrition.

In the current environment of growing chronic illness burden and improving identification of risk factors for major diseases such as heart disease, the boundaries between primary, secondary, and tertiary prevention begin to blur. For example, high cholesterol and hypertension, though risk factors, are identified as treatable conditions. However, the purpose of treating high cholesterol is prevention of full-blown heart disease.

The fuzziness of the distinction between prevention and treatment compelled us to place specific boundaries on the literature search in order to narrow the scope of the project. For the purposes of this report, we defined preventive care and health promotion as involving those situations where consumers may consider themselves healthy or physically at risk but not yet labeled with a diagnosis. This would include individual-based health promotion and preventives services as defined in Healthy People 2000 and 2010, but excluding 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, was also excluded. The scope definition accords with the recent US Preventive Services Task Force's scope and selection of topics.<sup>12</sup>

Prevention and health promotion is the purview of both medical and public health professionals. We recognized this shared contribution by including non-clinical settings, such as worksite and community-based health promotion settings.

**Economic Incentive.** This review examines explicit incentives targeted at specific individuals, either providers or consumers. Consumer incentives are fairly straightforward and include cash, gifts, lotteries, and other free or reduced price goods and services for the benefit of the specific consumer.

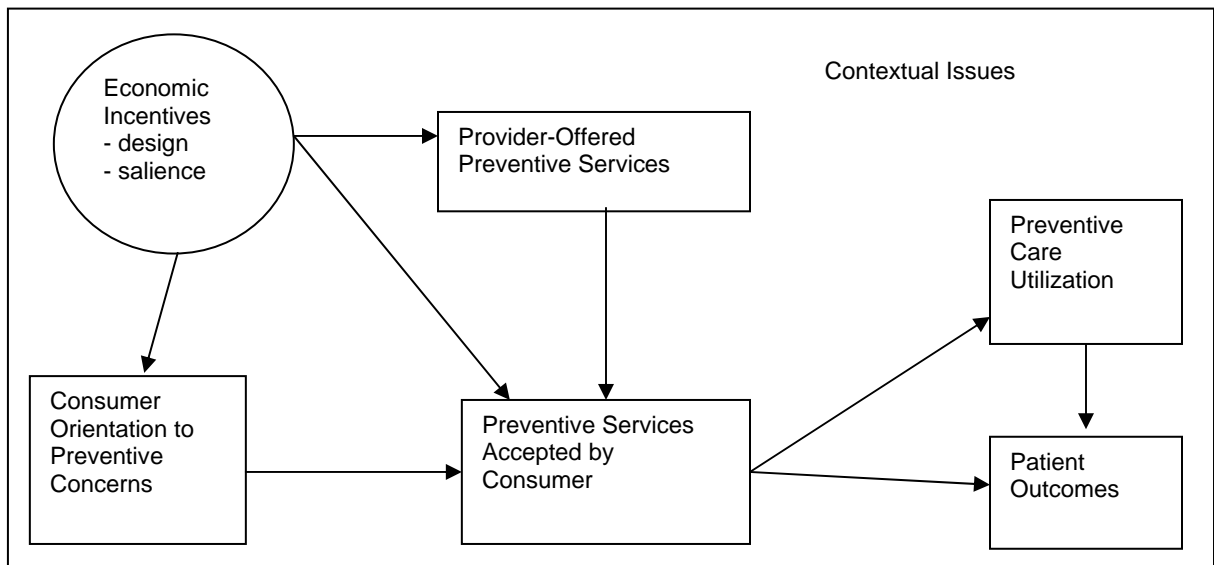
Any provider fee or reimbursement system within health care is by definition an economic incentive. Financial incentives are paid at the organizational level, both at health plan to independent practice associations (IPA), and from IPAs to medical groups. Financial incentives are paid at the direct provider level as well. Financial incentives can be designed to direct attention to different measures of quality of care, utilization management, and other administrative and organizational concerns regarding shared risk and profits. As we are focused on target incentives for specific individuals for preventive care, this review examines incentives that are below the organizational level, directly payable to physicians or other health care staff members, and affect the providers' marginal income, not base income.

Incentives offered to providers could include direct payments or bonuses to the provider or his/her group. It was expected that economic incentives would vary considerably by the nature of the incentive, the components involved, size, frequency, duration, and the conditions that triggered payment of the incentive.

The definitions of preventive care and economic incentives given above are not easily applied cleanly to the literature. Research questions regarding the effectiveness of financial incentives are conceptualized such that they shade into questions regarding insurance status, access to care, and utilization of resources, rather than preventive care behaviors and outcomes. For example, Adams investigated whether fee generosity for Medicaid's Early and Periodic Screening, Diagnostic, and Treatment (EPSTD) program affects the number of physicians providing the services and improved access to care for an underserved population.<sup>25</sup> Also, as

stated previously, prevention is often used as only one component of quality of care when measuring effectiveness of incentives. For example, Dudley conducted a literature review on the effect of financial incentives on quality of care that relied on IOM's definition of quality (the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge) and included a general category of preventive services utilization as one of eight study outcome measures.<sup>26, 27</sup>

**Figure 1. Conceptual framework**



**Table 1. Conceptual framework: Level of action**

	<b>Participate</b>	<b>Act</b>
<b>Consumer</b>	Attend educational sessions	Accept service Change behavior
<b>Provider</b>	Identify prevention needs	Give service



## Chapter 2. Methods

### Solicitation of Input and Data

We began the review process conferencing with AHRQ to clarify the scope of the project and other background information. Six experts also agreed to serve as members of a technical expert panel group (TEP, see Appendix A). The comments and suggestions provided by the TEP were helpful in clarifying the conceptual framework used for the project. The research strategy consulting staff at the University of Minnesota Biomedical Library was invaluable in developing the search strategies, which the TEP members also reviewed.

### Literature Search

We conducted the searches for both the provider and the consumer incentives simultaneously, as most search terms were in common to both. We identified MEDLINE<sup>®</sup>, the Cochrane Library, EconLit, Business Source Premier, and PsychInfo as the literature sources for this review. We searched MEDLINE<sup>®</sup> for relevant articles published between 1966 and 2002 using the strategy shown in Appendix B. Results of this search, transferred to an EndNote database and cleaned of nine duplicate records, identified 306 articles. PsychInfo, EconLit and Business Source Premier, were approached with a very simple strategy of combining keyword searches for “incent\$” and “health”. The results of these keyword searches added an additional 76 articles to the database for a total of 382 articles.

The 382 articles were subjected to a review of the abstracts. For the provider incentive review, experimental, quasi-experimental, including observational with controls, and simple pre-post designs were included in this stage of the screening to avoid premature loss of potentially useful information. From this number, eight articles for provider incentives were pulled for full text review. Given the sparsity of the literature, we also conducted a title scan of the 2,834 entries tagged merely as “journal articles” from the original MEDLINE<sup>®</sup> search results to identify potentially relevant articles. This resulted in an additional eight articles for full text review.

Reference lists from previous systematic reviews,<sup>26, 28-37</sup> including the Cochrane Library, were examined as well, resulting in further four articles. In all, including six articles culled from reference lists of articles pulled for full text review, 26 articles were identified for possible inclusion in the structured review for provider incentives.

For the consumer incentives, 50 articles were identified from MEDLINE<sup>®</sup>, six from PsychInfo, 11 were pulled from review articles. An additional 17 were culled from reference lists of identified studies pulled for review. In total, 84 articles were identified for possible inclusion in the structured review for consumer incentives.

Articles for both provider and consumer incentives were subjected to the inclusion and exclusion criteria using the screening tool found in Appendix C.

## **Inclusion Criteria**

- Published between 1966 and Oct 2002.
- Address primary preventive care defined as vaccination, screening, and health promotion behaviors such as smoking cessation and weight loss.
- Be a primary study.
- Take place in an industrialized country.
- Be written in English.
- Examine preventive care as at least one primary outcome.

## **Exclusion Criteria**

- Patient adherence to drug therapy. For example, the treatment of tuberculosis, which has been the subject of many adherence studies and could be considered a preventive step because it prevents the spread of the disease, is excluded. For our purposes, primary prevention is defined as occurring pre-diagnosis.
- Financial rewards for participating in a research study. The economic incentive must be conceived as part of the intervention.
- Multiple component interventions in which the economic incentive is only one component and the study design precluded analyzing the effect of the incentive separate from the other components. Education and outreach efforts are examples of components in addition to economic incentives. This was most strongly noted with community and education-based prevention programs and worksite health promotion programs.
- Studies examining payment forms provided by more than one payment system, i.e., HMO vs. FFS were excluded because there are too many potential confounding factors. It was therefore too difficult to isolate the effect of specific economic incentives.

Selection bias is a major concern for outcomes research on economic incentives. The opportunity for self-selection of consumers, in particular, is high, given all of the unmeasured economic and contextual issues that may come into play for any specific economic incentive intervention. A strong research design including randomization greatly minimizes this concern. Therefore, we included only RCTs, time series, and prospective quasi-experimental designs for the structured literature reviews. However, we also provided information from relatively well-designed econometric cross-sectional studies for the provider incentives as another perspective for consideration.

A list of the identified articles was distributed to the TEP members and other colleagues, asking for whether they were aware of other relevant studies that were not represented. No

further articles were identified from this query. Figure 2 provides a tree diagram of included and excluded references.

## Abstraction

A single data abstraction form for both the provider and consumer incentive reviews was devised during the initial stages of the literature search. Formal meta-analysis of the incentive literature was not possible because there were not a large number of studies that examined the same incentive type, research outcome measures, and similar populations. The abstraction tool was created with the purpose of facilitating the ability to capture emergent themes from the heterogeneous literature. The form was reviewed and commented on by the TEP members, piloted, and subsequently revised. Abstraction of the articles was performed by two independent reviewers. Disagreements were resolved by consensus of the group. See Appendix D for the full abstract forms.

## Emergent Themes

Given the lack of consensus and implied, rather than specifically reported, concepts and assumptions underlying explicit economic incentives, we characterized the incentives based on what appeared to emerge as the predominant, if implicit, conceptualizations within the identified studies. We used three different approaches for this process: psychological, economic, and functional views. These characterizations, imposed upon the studies as they are, do not fit perfectly and certainly there is room for debate as to which category each is slotted into.

The psychological approach established four major incentive categories of reward, negative reinforcement and/or punishment, structural barrier removal, and attitudinal barrier removal. The approach was informed by several theories and frameworks that are standard fare in psychological or health services research literature and were directly cited or implied in at least one study article.

One set of psychological theories are the non-motivational operant and information-processing theories. Basic operant or behavioral theory implies a causal model of Stimulus → Organism → Response (SOR) which essentially states an external stimulus acts upon the organism, or human, through reinforcements, and the human responds with a behavior. In the operant view, people respond to stimuli because they were reinforced for responding to those stimuli in the past. Cognitive models introduced into the SOR models a focus on expectations of future reinforcements or rewards, and people's attributions about why they engaged in certain behaviors in the past.

Many of the health psychology theories applied in health services research, such as social learning theory and the Health Belief Model, were outgrowths of SOR models.<sup>38, 39</sup> The incentive categories of rewards and negative reinforcement/punishments, then, are incentives or disincentives that act as consequences, reinforcements, or behavioral goals.

A second set of psychological theories views the causal model as Organism → Stimulus → Organism → Response (OSOR). Here, the human is seen as selecting and interpreting stimuli or information based on their individual drives, needs, and orientations. The environment and events surrounding the human are seen as ambiguous enough that a person can apply considerable discretion as to the salience placed on, and interpretation of, these events.

Frame's framework of barriers to the practice of preventive care and health promoting behavior could be viewed as limited attempts to introduce this broader view into the discussion of contributions to preventive health behavior.<sup>40</sup> From this perspective, one might apply an incentive as a device to attract attention to what is believed an appropriate stimulus, such as the healthy effects of exercise, increasing the salience of the stimulus, an attitudinal barrier removal.

Several studies also clearly stated the incentive was intended to remove a specific economic structural barrier, such as transportation costs, or lower the cost of a health care service. The majority of structural barrier removals are found within simple preventive care, seven of ten, and both punishment disincentives. Rewards were well represented within both simple (58 percent) and complex (78 percent) preventive care categories.

The economic approach established two major categories based on whether the incentive was triggering a purchasing behavior or income-generating behavior on the part of the participant. "Purchasing behavior" was defined as behavior characterized by a money-saving orientation. In such cases, the participant would realize the benefit of the incentive only through a "purchase" of the targeted behavior or service. Examples would include free postage if a package was mailed, free flu shots if the participant showed at the clinic for immunization, or free nicotine patches if the participant filled the prescription.

"Income-generating behavior" was defined as behavior that leads to a payment of some kind (cash or in-kind transfer). That is, how could the participant maximize the potential money in his or her pocket for discretionary use, either in cash or goods. Examples of this approach would include cash, vouchers and coupons, proceeds from a lottery, and gifts. We note all of the mixed intervention studies were of this category. We found a relatively clean correlation between structural barrier removal and purchasing behavior, and rewards/punishment and income-generating behavior.

The functional approach established categories based on what appeared to be the problem the researchers were intending to address. We identified four major types: facilitating, participating, adhering, and outcome.

"Facilitating incentives" included incentives aimed at making it easier for the consumer to engage in the behavior. This category includes reducing the costs of specific preventive medical services or necessary steps in the process to seek or complete such care.

"Participating incentives" included those incentives aimed at increasing the rate at which consumers participated in a desirable behavior. These incentives attempted to draw people into the specific preventive care or health promotion process in question, to join in, and would include such situations as enticing people to attend educational sessions. It is generally assumed participation in education or other experiential programs that increase understanding of and exposure to a desired behavior will lead to downstream effects of adapting positive health and lifestyle changes. The measure of the effectiveness of the incentives would be reflected in direct measures of the targeted behavior.

"Adhering incentives" are incentives aimed at increasing the rate at which consumers adhered to the specific preventive care guidelines or change in health or lifestyle behaviors. In the case of complex preventive care behaviors, the incentives may be applied to reinforce a behavior until such time as a person's internal motivation is activated and sufficient to sustain the behavior. Direct measures of adhering incentives would then focus on the maintenance of the target behavior.

"Outcome incentives" are incentives that promote achievement of a particular outcome or goal. As both simple and complex preventive care concerns may involve possible multiple paths

to achieve the target goal, the researcher would need to take care to assess whether the desired behaviors are actually increased or whether the participant had employed unintended, or even potentially unhealthy, behavior to gain the incentive. For example, a person may choose to attain weight loss through healthy means of exercise and moderate calorie intake or through behaviors such as skipping meals or extreme calorie reduction—behaviors which undermine weight loss in the long run.

## Rating Strength of the Evidence

Given the presence of both experimental and quasi-experimental designs within the relevant literature, the checklist for assessing methodological quality devised by Downs and Black<sup>41</sup> and recommended by the EPC Technology Report #47, “Strength of the Evidence” was chosen for this project.<sup>42</sup> After assessing the checklist for each article, a grade of 1 (poor) to 4 (excellent) was assigned to each article. A minimum level of study validity was assured in part by the selection criteria listed above.

It would be good to remember the social science experiments involving economic incentives differ from clinical trials in that it is not possible to mask the intervention from the patient or provider, nor always blind the researchers to the participant’s group assignment. Empirical research into the critical components of social science experimentation is not at the level of clinical trials.<sup>42</sup> There is, therefore, necessarily subjectivity and expert opinion involved in the grading process.

In addition, this review is at the edge of evidence-based practice in that it includes econometric studies of the type usually performed to guide policy. Study quality and strength of evidence literature for evidence-based reviews has not addressed econometric research. Thus, we created an assessment tool to assist in this review. (See Appendix E.) The application of the assessment tool was performed by two independent reviewers. Disagreements were resolved by consensus of the group.

## Econometric Research

Studies that rely on non-randomized trials (we will refer to these as observational studies) can teach us a great deal about health care provider and consumer behavior.<sup>b</sup> In fact, data from observational studies in which subject are not randomized into “treatment” categories form the foundation of the empirical body of knowledge for both health economics and medical sociology. However, because the subjects are not randomized, the data analysis often requires special statistical attention to address potential biases induced by the nonrandomization. If the data meet certain criteria and appropriate statistical methods are applied given the nature of the data, observational studies can yield inferences that are equally valid (and in some circumstances the inferences are more easily generalized to real world practice) than those inferences made from a randomized trial. While observational studies can yield valid inferences if the appropriate statistical methods are applied, often those methods are not applied, or there are no methods that can correct for the biases given the nature of the data, and the resulting inferences are incorrect. Thus, in assessing the validity of the conclusions from a body of observational studies, careful

---

<sup>b</sup> In our experience, it is rare that a so-called randomized clinical trial is truly randomized. While subjects may be successfully randomized into different treatment arms, subject attrition often unravels the efficacy of the initial randomization.



consideration of the nature of the data and the appropriateness of the statistical methods is necessary. In order to provide a systematic method for assessing the strength of the evidence for literatures in which observational studies comprise an important component of the body of work, we developed an instrument to assess the validity of a given study's conclusions. This algorithm is provided in Appendix E.

The instrument attempts to jointly assess the quality of the data used in the analysis and, given the nature of the data, the appropriateness of the statistical methods applied to the data. Specifically, the instrument places studies into one of three categories: Very Informative, Informative, and Not Informative. The underlying logic of the instrument is that the greatest risk in making biased inferences from observational studies is from poor identification of the variables of interest from the lack of appropriate exogenous variation in the variables of interest. Thus, the instrument measures two categories of characteristics: ones that may bias the coefficient estimates, and dimensions of the study that affect the generalizability of the findings.

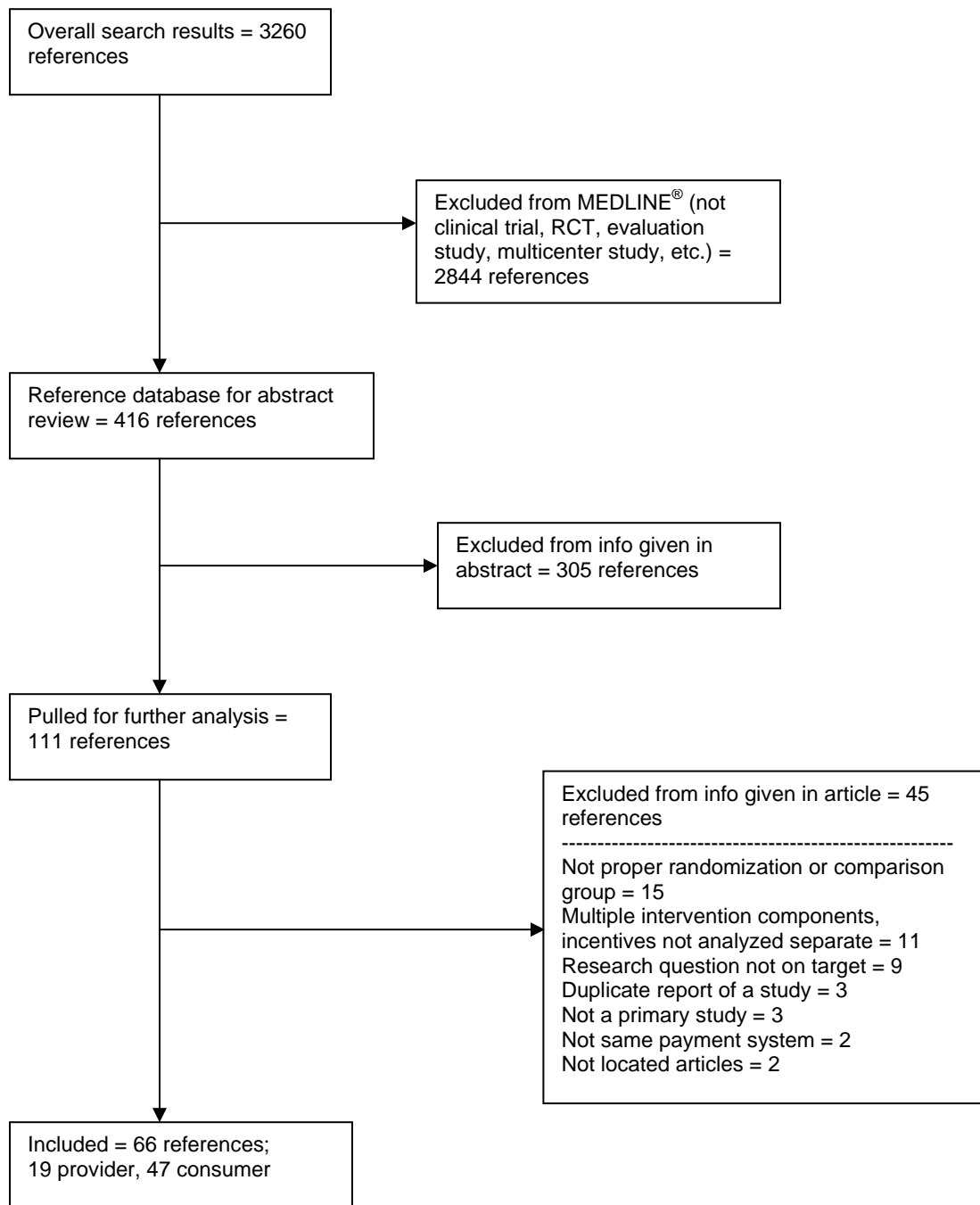
In order to place a given study in one of these three categories the algorithm first assesses if there is the appropriate variation in the data to measure the coefficients of interest. Then, the instrument assesses the nature of the variation in the data. That is, observational studies are at risk for "endogenous" variation in the variables of interest. An endogenous variable is one in which there is correlation between the error term and the right hand side variables. That is, there is some unobserved factor that impacts both the outcome of interest and the intervention thereby confounding inferences regarding the independent impact of the intervention on the outcome. The instrument ascertains whether the data generating process can be viewed as exogenous of the unobserved factors. It is often the case in observational data the variables of interest are endogenous and the study uses an appropriate statistical method to correct for any bias that would result from Ordinary Least Squares analysis. In a given study, if data is likely endogenous, then the instrument asks if appropriate statistical methods have been employed to correct for this potential bias. For a study to be categorized as 'Very Informative' it must have both appropriate variation in the data and either exogenous variation in the data or employ an appropriate statistical method to correct for the potential bias (e.g. instrumental variables with appropriate instruments). In addition, for the study to score in the 'Very Informative' category it must also score well in the other study criteria.

The other criteria attempt to measure the generalizability of the findings to populations outside of the sample population analyzed in the study and the appropriateness of the statistical methods.

## **Peer Review Process**

Several individual experts in the fields of health economics and preventive medicine independently reviewed an earlier draft of this report. They are acknowledged in Appendix A. In addition we asked our TEP members to review the draft report. We revised the report in response to the suggestions of all these individuals.

Figure 2. Economic incentives search result flow chart





## Chapter 3. Results

For the literature review on economic incentives for providers, 26 articles were retained for full text review and 19 articles passed the inclusion criteria. All 19 articles were published after 1990. Fourteen of the articles were published since 1995.

The articles were categorized into three classes based on the nature of the economic incentive and study design. The first class includes those nine articles that directly address the impact of targeted economic incentives on provider behavior and represent the main body of articles for the structured review. These articles were subjected to an analysis of the comparability of the nature of the interventions, operational definitions, populations under study, and patterns of outcomes.

The second class includes relevant observational studies that inform the literature on incentives for prevention. The articles that were not included in the formal structural review are discussed in some detail.

The third class includes Medicare and Medicaid demonstration projects. The demonstration projects generally randomized patients to differing levels of covered preventive care benefits and created comparison groups between providers through differing compensation packages. Creating a separate classification for these studies allows us to avoid redundancy of articles between the provider and consumer economic incentives while recognizing the complexity of the interventions.

For the literature review on consumers, 84 articles were retained for full review, with 47 articles passing the inclusion criteria for use in the structured literature review. The consumer research covers a much longer period of time, including articles published from the early 1980s.

### Simple vs. Complex Prevention

As discussed earlier, definitions for simple or complex preventive concerns rest on the behavior required of the consumer, not the specific preventive health target. Simple preventive concerns are those situations that involve discrete actions where the specific targeted behavior has an endpoint. Complex preventive concerns are those situations where the consumer's actions must be sustained over time. For example, while smoking cessation is generally conceived as requiring complex lifestyle changes, interventions using economic incentives to increase recruitment to, or decrease attrition from, smoking cessation programs are classified as simple preventive concerns for the purposes of this review. In this case, the behavior in question is attending a program of limited duration, rather than smoking cessation itself.

All studies for provider incentives addressed simple preventive care: six articles examined immunizations, two looked at cancer screening, one looked at prenatal care, one looked at well-child visits, and one examined cholesterol screening. (Numbers do not add to nine as two studies used more than one preventive care measure as an outcome.) Evidence Table 1 in Appendix F provides a list of the included provider studies.

A greater range in preventive concerns was addressed in the consumer literature. Twenty-four articles addressed simple preventive care: seven on immunization, two on cancer screening, two on prenatal care, three on attendance to educational sessions for STD/HIV prevention, one on recruitment for a smoking cessation program, and nine on preventive care followup; cholesterol and tuberculosis screening, cancer screening, and postpartum exams. Twenty-three articles addressed complex preventive care concerns: ten on smoking cessation, two on exercise,

seven on obesity and weight loss, and one each on breastfeeding, nutrition, CVD prevention, and cholesterol management. Evidence Tables 2 and 3 in Appendix F provide a list of the included consumer studies.

## **Key Question 1. How have “preventive care” and “economic incentive” been defined in the literature?**

**Provider.** In general, definitions for neither term are specifically addressed in the literature.

All studies approached preventive care from the perspective of the study’s targeted preventive care service. Both Fairbrother, Hanson, Friedman et al. and Fairbrother, Siegal, Friedman et al. explicitly based the operational definition of the immunization outcome on expert panel guidelines.<sup>43, 44</sup> Studies by Hillman, Ripley, Goldfarb et al. and Morrow, Gooding, and Clark referenced expert panel guidelines as justification for the chosen outcomes.<sup>45-47</sup> No study provided a conceptual discussion of prevention or the study’s outcome measures with regard to the simplicity or complexity of the preventive processes under examination.

While intending to examine the effects of incentive interventions on preventive behavior changes, most studies used operational definitions of prevention that relied on measuring change by recorded activity rather than actual observed behavior changes. Recorded activity allowed for preventive services obtained from other sources as well as from the provider subject to the economic incentive. Thus, apparent increases in preventive services may have reflected improvement in chart documentation procedures rather than actual increases in inoculations. Only Fairbrother, Hanson, Friedman et al. and Fairbrother, Siegal, Friedman et al., included a bonus targeted at increasing inoculations given by a provider, or the provider’s staff, as one intervention arm under investigation, and Grady, Lemkau, Lee et al. included a behavioral outcome of mammography referrals.<sup>43, 44, 48</sup>

No study based the outcome measure on evidence from the literature, nor discussed whether any relevant evidence literature was available to benchmark the preventive behavior of the provider participating in the study. Thus, it is not surprising no study reported examining providers’ pre-test performance to verify the level of preventive care provided according to criteria for appropriate levels of preventive care as established by empirical evidence of expert panels. Without this examination, we are unable to assess the potential for ceiling effects.

Only Grady, Lemkau, Lee et al. included a conceptual discussion of economic incentives from the behavioral psychology theoretical perspective.<sup>48</sup> No report provided a definition or discussion of financial incentives as a map to locate the chosen intervention design for the study on such attributes as size, eligibility (threshold levels, individual performance, tournament style), or form (fixed or continuous payments).

**Consumer.** No study provided a conceptual discussion of prevention or health promotion for the study’s outcome measures with regard to the simplicity or complexity of the preventive measures being examined. It appears consumer research is generally motivated by policy considerations such as responding to the federal Healthy People initiatives or achieving recommendations of national expert panels.

As seen in Evidence Table 2 in Appendix F, only seven of the 24 simple preventive care and 14 of the 23 complex studies mentioned a theoretical basis for economic incentives in their reporting, with little explicit connection between the theory and the design of the incentive. It appears the incentives themselves are also generally left unexamined, an issue we will explore in greater detail in the discussion on the nature of the interventions. At this point we simply note the

lack of a clear and commonly shared conceptual map, or set of maps, for what an incentive is, its intended purpose, and how it is hypothesized to impact the consumer.

As was discussed in the Methods chapter, given the lack of consensus and implied, rather than specifically reported, concepts and assumptions underlying the research, we created categorization schemes based on the themes which emerged from the analysis. These categorization schemes were used to assist in answering Key Questions 2-4.

## **Key Question 2. Do incentives work?**

To answer this question, we first discuss observed study design issues, that is, who was being studied, both the intervention target and the patients involved, what was the nature of the interventions applied, and how was effectiveness measured. We then turn to what can and cannot be said, based on the patterns of outcomes.

### **Populations under study.**

#### *Provider.*

**Provider populations:** Among incentives aimed at providers, all incentives were targeted to physicians (Evidence Table 4 in Appendix F), but it was not always clear from the reports whether the financial incentives were paid to the physician or the practice. No published studies targeted incentives to nursing personnel or other physician aides, although physicians could delegate many of the related tasks. The physicians have been located in northeastern section of the United States – Philadelphia,<sup>45-47</sup> New York,<sup>43, 44, 47, 49</sup> Maryland,<sup>50</sup> Connecticut, Delaware, New Hampshire, New Jersey, Pennsylvania,<sup>47</sup> Massachusetts,<sup>47, 48</sup> and Ohio,<sup>48</sup> or the UK<sup>51</sup>

Incented physicians included family practitioners,<sup>43-46, 48</sup> general practitioners,<sup>46, 48, 51</sup> internal medicine,<sup>45, 48</sup> or pediatricians.<sup>43, 44, 46</sup> Fox and Phau examined providers of obstetric services.<sup>50</sup> Morrow, Gooding, Clark and Kouides, Bennett, Lewis et al. cited otherwise unspecified primary care providers.<sup>47, 49</sup>

Further, the practice setting itself was often not clearly reported. With the exception of Fox and Phau, it appeared that all of the studies took place in non-academic solo and group practices.<sup>50</sup> However, “group” was frequently left undefined. Kouides, Bennett, Lewis et al. and Grady, Lemkau, Lee et al. provided statistics for group practice sizes, with the majority of group practices consisting of less than five physicians.<sup>48, 49</sup> Morrow, Gooding, and Clark did not provide evidence but suggested that most participating practices are solo or two-physician practices.<sup>47</sup> Those studies not reporting solo or group practice participation examined physicians providing Medicaid care, who often work in solo and small offices. Thus, we might speculate on the possibility that studies have directed target payments to individual physicians through solo and small group practices.

**Patient populations:** Incented physicians tended to emphasize vulnerable patient populations. Urban, Medicaid-eligible children accounted for three of the four US studies involving childhood immunization.<sup>43, 44, 46</sup> Medicaid-eligible women accounted for two of the nine studies.<sup>45, 50</sup> The remaining two US studies were with a general HMO population<sup>47</sup> and women over age 50 from Dayton, Massachusetts.

*Consumer.* Patient populations are given in Evidence Table 5 in Appendix F. Populations tended to fall into two broad categories that correlated with the simple/complex classification. Vulnerable populations of low SES, the first category, were the most frequent populations studied for simple preventive care, such as immunizations and cancer screening and followup. This constituted 16 of the 24 simple preventive studies but only four of the 23 complex studies. These populations included active drug users,<sup>52-54</sup> teen mothers,<sup>55, 56</sup> low-income children with mothers on WIC or AFDC,<sup>57, 58</sup> and patients of public clinics and safety-net hospitals.<sup>59-63</sup> These populations were also generally considered at high risk for the study's targeted health concern. Worksite employees and general population, generally healthy, middle-class populations for the second category, were most frequently the recruitment base for studies that promoted complex health promotion lifestyle changes.

Very few reports outlined a clear link between the design of the economic incentive and the specific population intended to receive the incentive. The study investigators may have put considerable effort into the design phase of the study, or have been very familiar with the study populations, but this does not come through in the reporting. The information that could be derived from complete reporting of the design process would be beneficial to future researchers.

### **Nature of the intervention.**

*Provider.* In general, studies did not include justification for the specific design of the economic incentive.

***Types of incentives:*** As shown in Evidence Table 6 in Appendix F, most explicit incentives were bonuses potentially payable to all qualifying physicians. The exceptions are the Hillman studies which paid bonuses in a tournament-style manner.<sup>45, 46</sup> That is, only the top performing providers are rewarded with bonus incentives. Providers would need to estimate their ability to win such tournaments.

Only a few studies provided data on the range and mean size of bonus payments. Kouides, Bennett, Lewis et al. reported an average \$242 bonus.<sup>49</sup> This seems to be a very small amount compared to typical physician incomes. In this study physicians created the patient list to target for immunizations. This collaborative involvement in the study may have increased the salience and personal motivation of the provider to reach the immunization goal. Hillman et al. reported bonus averages and ranges that were slightly more significant—up to \$4,682 for one study.<sup>45, 46</sup> The overall amounts are still small, and since bonuses were paid tournament style to only the top performing or improving sites, the marginal benefit of the bonus would need to be tempered by the physician's expectation of receiving the bonus. Grady, Lemkau, Lee et al. provided token amounts of \$50 for achieving the target behavior goal.<sup>48</sup>

No study provided information on the frequency and timing of payments. Reports also did not include the investment costs the physician or provider may have faced to establish the clinical and office procedures necessary to support production and behavioral changes, or whether they had the time, staff, or office system supports available for such changes to be feasible. We cannot assess from the information provided how these factors, plus the anticipated length of time for the bonus program, would have influenced the physician's decision on whether the incentive was considered financially beneficial.

***Incentive conditions:*** In general, incentives were based either on patient outcomes or physician performance of a behavioral goal (Evidence Table 6 in Appendix F). Six studies used performance bonuses that rewarded the physician for achieving a target outcome rate based on patient utilization, in these instances immunizations<sup>43, 44, 46, 49, 51</sup> and cancer screening.<sup>45</sup> Grady, Lemkau, Lee et al. applied a performance bonus that rewarded the physician for achieving a target behavior goal, a 50 percent mammography referral rate.<sup>48</sup> The Fairbrother studies also pitted the target outcome bonus against a per-input bonus, a more direct way of measuring physician behavior, which paid the physician for each additional shot administered and office visits that brought the child up to date in immunization coverage.<sup>43, 44</sup> Morrow, Gooding, Clark et al. examined the effect of adjusted capitation rates partially based on a practice achieving preventive care outcome rates.<sup>47</sup> Fox and Phau examined the effect of raised delivery and prenatal visit fees, an incentive based on physician behavior.<sup>50</sup>

***Salience of the incentive:*** Only the Hillman studies attempted to directly assess awareness of the incentive program within a practice.<sup>45, 46</sup> Only 56 percent and 67 percent of sites, respectively, responding to a survey indicated they were aware of the incentive program. As the incentive apparently was communicated to providers through regular HMO communication practices, this design aspect may be more indicative of “real world” responses to incentive programs than the remainder of the studies that involved more direct communication of the experiment to potential participants. Communications from HMOs may be buried under the busyness of a physician’s normal daily practice.

The total incentive size paid to any one provider would arguably also impact the salience of an incentive program. While several studies did provide some payout information, as noted above, no study provided an assessment of the relative impact of the incentive on the provider’s overall income.

***Expectation of payment:*** Expectation to receive the bonus is also likely to impact a provider’s decision to change preventive care behaviors. Physicians may have higher expectations to earn incentive payments if such payments are based on their own behaviors, not utilization behavior of the patients. Expectations would be affected not only by how the criteria of success are determined, but also whether the incentive is potentially payable to all physicians if they meet the target levels, or if the incentive is distributed in a tournament style.

As was mentioned earlier, because reports did not include information on pre-test assessments of preventive care performance against set criteria, it is uncertain whether physicians would have had low or high expectations of earning the incentive payments, regardless of tournament style or the potential for all to qualify.

In short, estimating the chance of receiving the bonus would likely be very difficult for the provider. The provider may not have been aware of his or her starting position when estimating the likelihood of success. Some of the bonus structures were very complex. The provider would have little to no control over the patient’s choices regarding whether or not to accept the incented service.

***Other factors:*** Timing of payment and the interplay between financial incentives and performance feedback may potentially impact the effectiveness of the incentive and should be taken into consideration. The studies did not generally address the average time lag between the provider activities which influence the potential for receiving a bonus and the actual receipt of



the bonus. If everything else is constant, the longer the delay between the behavior and the reinforcement, the weaker the effect.

Performance incentives include an element of feedback. Feedback may be formal, through the use of reports, or informal, in that receipt of the incentive itself functions as feedback of performance levels. Feedback may also be private or public to all providers participating in the incentive program. As seen in Evidence Table 6 in Appendix F, some studies did include formal feedback reports. However, the studies often did not clarify whether such reports were private or public. Thus, it is difficult to assess the contribution of feedback to the effect of economic incentives. However, it should be noted Grady Lemkau, Lee et al. found a token bonus of \$50, intended as a feedback mechanism, was not significant for changed behavior.<sup>48</sup>

*Consumer.* Few studies provided justification for the specific design of the chosen economic incentive, although Smith, Weinman, Johnson et al.<sup>55</sup> and Kamb, Rhodes, Hoxworth et al.<sup>64</sup> noted using focus groups to establish the form and size of the incentive, while Laken and Ager<sup>65</sup> cited advice from the study population. Interestingly, while a few articles do mention Prochaska's meta-theory as a basis for the design of educational or motivational counseling sessions, no study discussed the impact of the theory on the design of the incentive.

Although several studies did provide some descriptive information on the uptake and desirability of the study incentive, only nine studies could be said to include direct tests of the uptake of an incentive (Evidence Table 2 in Appendix F). Another ten studies set different forms of economic incentives against each other as a direct test of the desirability of incentive form.

***Types of economic incentives:*** The 59 incentives offered in the studies were highly varied in type and size (Table 2). There were ten lotteries, seven gifts, 11 cash incentives, 15 coupons for free or reduced price goods or non-medical services, six free or reduced price medical services, and ten incentives involving negative reinforcement or the opportunity to avoid punishment.

All lotteries and raffles are included in the lottery category. Five of the ten lotteries were for cash prizes, ranging from \$40 to \$100. The remaining prizes included a microwave, dinner for two at a local restaurant, travel packages, and groceries. Few studies provided information regarding the expected value of the lottery per participant, leaving it difficult to compare the value against the incentive categories that did not involve uncertainty in receiving the incentive. In addition, lottery values depend on the cognitive processing of assessing expectations, which may or may not be 'accurate.' Lotteries were generally used as rewards for adhering, participating, and outcome categories.

Gifts were physical goods provided as incentives. Gifts ranged from a nutritional information package valued at \$2 to inexpensive jewelry, baby blankets, and other infant products. Gifts within interventions for the two complex preventive concerns were accompanied by other intervention components such as lotteries, tournaments, and other educational components. Gifts were all given as rewards and evenly split between the adhering and participating categories.

Cash incentives ranged from \$5 to return a tuberculosis skin test reading, to a potential \$500 over ten months for smoking abstinence. Simple preventive incentives were \$5, \$10, or \$15 per event. Complex preventive incentives ranged from \$1 to \$25 per payable event, payable from once per week to several months apart, with potential total payment per person, when the information was provided, of \$50 to \$500. Cash incentives were treated as rewards and were relatively evenly divided between the adhering, participating, and outcome categories.

Coupons included free or reduced-price coupons, vouchers, and gift certificates for non-medical goods and services. The coupon values were generally modest, from \$2 to \$15, when the values were provided. Coupons might be related to an encouraged healthy behavior, such as exercise passes, farmers markets, and condom purchase; to address barriers such as transportation; or were unrelated to the specific aim of the study, such as haircuts and infant formula. Given the flexible nature of this category, it is not surprising that it is well represented in virtually all categories, with coupons not used for only the outcome category, and more likely to be used for simple, rather than complex, preventive concerns.

Free or reduced cost medical services involved free influenza immunizations, reduced fees for clinic visits, and free or reduced price nicotine replacements. The studies providing this form of incentive viewed price as a barrier to care-seeking and healthy behavior. The values of incentives in this category were generally higher on a per event basis than the other incentive categories (assuming the expected value of an uncertain lottery is less than the face value), ranging from \$10 to \$25. All free or reduced medical service incentives were categorized as barrier removal and were evenly divided between the facilitating and adhering categories.

The last type of incentive included those interventions that intentionally incorporated a disincentive to exhibit behaviors counter to the desired behavior, including both punishments and negative reinforcement. Punishments were examined in three simple preventive concern studies, all related to vulnerable populations and the receipt of government subsidies. Birkhead LeBaron, Parsons et al. and Kerpelman, Connell, & Gunn required mothers to return to WIC offices more frequently to receive their benefits if the children were not up to date in immunization coverage.<sup>57, 58</sup> Kerpelman, Connell, & Gunn tested whether the threat of loss of AFDC benefits for non-immunized children would effectively prompt parents to immunize.<sup>58</sup> All three incentives were represented in the adhering category.

The remainder of the studies in this category involved the use of monetary contracts; the participant deposited his/her own money in a contract whereby the money was returned in increments if agreed upon goals were met. The money was forfeited if the goals were not met. Such contracts were often made in the presence of other participants, perhaps working in teams, and the kitty of forfeited money was split among those participants who qualified to participate in the kitty, often by meeting their own health behavior goals. Incentives in this group were evenly split between adhering and outcome categories. No study provided information on incentives per individual when there was potential variability, or in total for the study.

***Incentive condition:*** Seventy-eight percent of incentives required a target behavior of the participant as a condition for the distribution of the incentive. The remainder required the participant to attain a particular outcome. Marcus et al. is unusual in that the free bus-passes were essentially bribes, distributed without any required behavior or outcome from the participant.<sup>60</sup> This may have caused some cognitive problems for some participants in that the gift may have created a sense of obligation. However, only 33 percent of the participants reported actually using the bus pass (see Evidence Table 2 in Appendix F).

***Multiple components:*** Several studies included other intervention components that potentially confounded the impact of the incentive. Of interest is the inclusion of other social pressures. Two studies provided incentives not only for the participant, but also for the significant other who was supporting the participant's efforts to change behaviors.<sup>66, 67</sup> Another three studies introduced team competition into a worksite health promotion program, where cash

prizes were distributed to the teams who best met the health promotion goals.<sup>68-70</sup> The reports of these studies did not address the potential effects of these social pressures, whether the results would be positively or negatively affected by them.

### **Study outcome measures.**

*Provider.* Outcomes were primarily measured as the percent of charts documenting compliance with the target outcome, with data collected from chart audits. A chart was generally defined as being in compliance if the preventive care service, such as immunization or mammography, was documented as having occurred whether or not the physician, or his/her office staff, directly provided the service. Grady, Lemkau, Lee et al. differed in that they also measured documented referral rates.<sup>48</sup> Denominators for the percentage calculations were based on patients who had visited the provider's office within a set period of time. However, providers who participated in the Kouides, Bennett, Louis et al. study created a target list of Medicare patients from their patient base.<sup>49</sup> This list then determined the denominator.

*Consumer.* All of the simple preventive care studies used hard outcome measures. Complex preventive care studies were perhaps necessarily forced to use self-report in some instances. Smoking cessation has fairly well established valid and reliable laboratory tests available to confirm self-reported abstinence, keeping overall costs of the study lower. While body mass index can be measured and attendance at exercise sessions counted, many relevant lifestyle behavior changes related to health promotion, such as exercise and eating patterns, cannot be directly observed by the investigator.

As mentioned before, unfortunately most studies did not include as primary outcome measures direct tests of the salience and uptake of the economic incentives themselves, as well as the hypothesized effect of the incentive on the preventive behavior. Health outcomes are indirect measures of incentives that are aimed at a behavior that is only one component of a complex chain of events that eventually expresses as obesity or high cholesterol. Enabling a behavior, or reducing an attitudinal barrier, may be a helpful but not necessarily sufficient condition for improved preventive health behaviors.

As shown in Evidence Table 2, generally only the structural barrier removal studies demonstrated direct effects aimed at the true preventive health goal. We see this in only simple preventive health behaviors.

### **Consistency of outcomes.**

*Provider.* As shown in Table 3, outcome patterns were mixed. Target outcome performance bonuses showed positive results in three studies,<sup>43,44,49</sup> but no results in three studies.<sup>45,46,51</sup> The three studies showing positive results measured immunization compliance by chart documentation. Provision of the immunization services may have come from sources other than the study provider. Within the Fairbrother studies, outcome measures that directly addressed provider behavior, per-input bonuses, and percent of missed opportunities to provide immunizations, did not show positive results.<sup>43,44</sup> Thus it appears in these cases that the financial incentives were motivating providers to change chart documentation behaviors as opposed to increasing preventive services. In addition, the physicians participating in the Kouides study

were required to create the patient list for targeted immunizations.<sup>49</sup> This up-front involvement may have increased the awareness of the bonus for the physicians.

Morrow, Gooding, & Clark did show significant increases in the percent of charts in compliance with MMR immunization and cholesterol screening indicators.<sup>47</sup> However, the capitation rate adjustments were based on both utilization and improvements in preventive care practices. The analysis did not include controls such as possible rate adjustments due to utilization. The study period also covered a time period when the awareness of prevention and quality of care, in which prevention is included, was increasing in the general physician population. Thus, it is difficult to determine whether the financial incentive itself was the causative factor.

**Practice settings:** Several studies included practice-level variables in the analyses. Group practices appeared to have better results than solo practices. The Hillman and Ritchie studies found evidence that increases in preventive care were greater for group practices.<sup>45, 46, 51</sup> There is uncertainty regarding the effect of remuneration packages for physicians within group practices. Studies did not clearly report who was actually paid the incentives. No data was collected on physicians within group practices who may have been paid salary and whether they participated in the incentives.

**Other factors:** No other provider or patient characteristics included in the studies were found to be significant. Many factors of interest were not addressed in any study. These would include: how the readiness stage of a provider to change behavior may have affected the salience of the incentive program, the effects of non-economic barriers such as attitudes of the physicians regarding the perceived accuracy of the data, the effects of physician work-flow decisions when only a portion of the patient base may be affected by an MCO incentive program, the effect of the providers' level of knowledge and understanding of the preventive care guidelines, and what was necessary to reach incented target levels.

We also cannot speak to the effect practice area variations would have on effectiveness of incentives in other regions of the country or non-physician health care personnel.

Not all studies reported effect sizes or provided enough information to construct relative risk ratios. Attempts to contact lead authors to obtain such information were met with limited success. Based on what was provided in the articles, the effect size is moderate at best. Economic incentives were responsible for a seven percent increase in documentation of immunizations based on regression analysis in the Kouides, Bennett, Lewis et al. study.<sup>49</sup>

Given the mixed outcomes for the provider incentives, it can be informative to look at the explanations offered by the investigators for their findings (Table 4). Both Kouides, Bennett, Lewis et al. and Hillman, Ripley, Goldfarb et al. noted low power for detecting differences in absolute rates.<sup>46, 49</sup> However, Hillman also noted it was unlikely that the small effect size a higher powered study could provide would be unlikely to motivate MCOs to commit significant financial resources to target economic incentives.

Five studies specifically pointed to inadequate size and duration of the bonus. Bonuses were too small in either absolute size or relative to the physician's overall income.<sup>43-46, 48</sup>

Four studies cited national trends increasing preventive care in general.<sup>45-47, 51</sup> Ritchie, Bisset, Russell et al. noted jawboning of national preventive care goals had already begun to raise awareness and practice levels before the target payments were implemented.<sup>51</sup> Likewise, Hillman noted increases in both intervention and control groups mirrored secular national trends.<sup>45, 46</sup>

Several studies cited physician beliefs, attitudes, and inferences through social cognition processes. Morrow, Gooding, & Clark reported the potential factors of: peer pressure from physician committee or normalizing force of knowing how other offices perform; non-financial motivation of pride in job well-done; and fear of retribution for poor performance.<sup>47</sup> Likewise, Fairbrother's studies noted that physicians perceived that the incentive goals were not attainable.<sup>43, 44</sup> In particular, the physicians saw their patients as subject to lack of continuity of care and themselves as "sick doctors," which detracts from their ability to provide the preventive care. Since they were not the primary source for immunizations, they were less likely to take responsibility for patient immunizations. Lastly, Hillman's studies, noted a definite lack of awareness of the bonus on the part of the physician.<sup>45, 46</sup>

### *Consumer.*

**Categories:** (Table 5) The facilitating category, which included removal of structural barriers, showed significant positive findings. This group of studies demonstrated perhaps the tightest links between incentives, desired outcomes, and direct tests of the uptake of the incentives. However, Marcus' studies stand out in that only a minority of patients self-reported using the bus passes or were logged as turning in vouchers.<sup>60, 61</sup> It is possible the population involved had much deeper cognitive and affective barriers, such as denial in a frightening situation where cancer might be detected, and that the structural barrier incentives were not strong enough to overcome the personal barriers.

The studies on disincentives found effective interventions. Caution should be used in interpreting the findings of these studies, however. For the simple preventive concerns, the Birkhead, LeBaron, Parsons et al. study took place immediately following a measles epidemic when public attention and concern was running high.<sup>57</sup> The findings of Kerpelman, Connell, & Gunn may be overestimations as parental permission was needed to review charts and some families may have left the AFDC program due to the policy of linking immunizations to benefits.<sup>58</sup>

As rewards, economic incentives for participating and adhering categories, whether for simple or complex preventive concerns, are, in general, effective in prompting people to change their behavior in order to attain the reward. Most studies matched a short-term incentive with a short-term behavioral change or outcome.

When looking at the outcome and penalty categories for complex preventive concerns, however, one begins to see a change. While many of the studies in the outcome and negative reinforcement categories showed positive effects in the short run, of the four studies that checked for long-term results, all the significantly improved measures had returned to original levels and non-significant findings.<sup>66, 71-73</sup>

In modifying behavior, economic incentives may have unintended consequences which offset the ultimate aim of the incentives. For example, Jeffery and French found cash incentives to participate in group exercise sessions did increase participation.<sup>74</sup> However, overall exercise effort, when compared to the control group, was not different. Barring the possibility of over-reporting of exercise due to social desirability, it would appear the participants exchanged the convenience of walking at their choice of location on their own schedules for the group activity in order to maximize the cash incentives.

There may be evidence of a differential in the outcomes of economic definitions categories, although the evidence is too thin to speak with confidence. A significant finding when the majority

of people do not actually collect or use the incentive suggests the possibility the impact of the incentive was informational rather than economic. Evidence Table 2 in Appendix F shows four studies that fit this case. Perhaps the incentive generated feelings of social support or cohesiveness, that they and their health are important, improving self-esteem or self-worth. Or perhaps the existence of the incentive sharpened the participant's attention to the health behavior in question.

Alternatively, a finding of not significant may have more to do with an incentive that is not large enough or meaningful enough to the target population than it does with the overall idea that economic incentives may or may not be effective.

**Populations:** As there is a definite correlation between vulnerable populations, low SES, and simple preventive care, it is difficult to infer whether the effects of incentives are consistent across populations. It would seem reasonable, as discussed above, to suggest that much more information is needed before any such inference could be made with confidence, as the nature of the intervention, type, duration, and frequency, would be dependent upon the target population.

**Settings:** As seen in Evidence Table 5 in Appendix F, the settings for the studies are quite diverse. It appears that the setting is less a concern than the general question of whether it is appropriate, to some consumers' minds, to offer economic incentives at all within the context of health care. Moran, Nelson, Wofford et al. provided anecdotal evidence from a few participants that questioned providing a lottery to encourage people to get a flu shot.<sup>63</sup>

### **Key Question 3. Is there evidence of a dose/response curve?**

**Provider.** Given the paucity of evidence for the effectiveness of provider incentives, we can not address this question for provider incentives at this time.

**Consumer.** There is minimal evidence of a dose response within the consumer research. (Table 6) Of the few studies that offer a direct comparison between different forms of incentives, cash is king. Malotte, Hollingshead, & Rhodes; Kamb, Rhodes, Hoxworth et al., and Deren, Stephen, Davis et al. show that cash incentives were preferred over coupons.<sup>52, 54, 64</sup> However, generalizability of this group of studies is extremely limited as the participants were from highly vulnerable populations.

Cash incentives have the expected rank ordering. Malotte, Rhodes, Mais showed a \$10 cash incentive was more effective than a \$5 incentive.<sup>53</sup> Stitzer and Bigelow also showed a rank ordering of \$1, \$5, and \$10 per day incentives for reducing daily cigarette smoking.<sup>75</sup> Hughes, Wadland, Fenwick et al. showed price elasticity was higher for \$6 vs. \$20 than \$0 vs. \$6, suggesting larger incentive increases had a stronger impact on the participants to reduce daily cigarette intake.<sup>76</sup> Malotte suggested the street value of a coupon is half-price off face value, perhaps suggesting another interpretation of the finding that cash is preferred to coupons with an equivalent face value.<sup>53</sup>

Although more open to interpretation, we might also suggest that coupons are preferred to gifts. Both studies that pitted a coupon incentive to a gift incentive found the coupon the more effective incentive.<sup>55, 77</sup> In addition, while coupon incentives were in general effective, with 12 of 15 studies showing positive results, only four of seven gift incentives had positive results, and two of the positive results were potentially confounded by other intervention components comprised of a lottery or competition.

## Key Question 4. What is the evidence for cost-effectiveness of economic incentive interventions?

Those limited number of studies that did address cost-effectiveness tended to do so from the perspective of productive efficiency, i.e., examining the cost of achieving the determined preventive goal.

**Provider.** Among the provider studies, only one study addressed cost-effectiveness and calculated a marginal cost of \$3 per additional immunization.<sup>49</sup> The study did not provide any other figures against which to weigh this cost.

**Consumer.** Only seven of the 47 studies included cost-effectiveness calculations for the study itself (Evidence Table 7). In five of the seven cases, a treatment arm that consisted of a similar intervention without the incentive itself was reported to be a more cost-effective approach. In the Freedman and Mitchell study, simply providing a return envelope cost \$1.61 per completed and returned fecal occult blood test kit based on a 57 percent compliance rate.<sup>59</sup> A stamped, return envelope, increased the cost to \$1.71 and improved compliance to 71 percent. Both were more cost-effective than the baseline condition which had a compliance rate of only 37 percent and costs per completed and returned fecal occult blood test of \$2.24. Nexoe, Krogstrup, & Ronne found the cost per prevented influenza related death was \$3,990 for those who received an invitation letter reminding the patient of the upcoming flu season, versus \$17,860 for those who received the letter plus free flu shots.<sup>78</sup> Similarly, Yokley and Glenwick estimated the least cost intervention was also a personalized letter prompting parents to immunize their children, at \$2.27 per target child who received immunizations.<sup>62</sup> Free day care and lottery incentives increased the cost by \$4 to \$5. Moran, Nelson, Wofford et al. found the cost per additional flu immunization was \$3.45 for an educational brochure but \$8.74 for the lottery incentive.<sup>63</sup> Lastly, in the mixed-incentive group, Gomel, Oldenburg, Simpson et al. found the incentive group to be the least cost effective.<sup>69</sup> The cost per “health risk unit” reduced at six months was \$26.50 for risk factor education, \$24.47 for behavioral counseling, and \$49.80 for behavioral counseling and an incentive.

All of the calculations were relatively crude. No study included an attempt to generalize cost-effectiveness over time for the estimated potential population morbidity or mortality that would be affected by a policy decision to implement the economic incentive.

## Other Perspectives

In this section we look at the limited pool of observational studies that have attempted to directly address whether preventive services are affected by economic incentives using econometric methods to analyze cross-sectional databases. We also look at what the Medicare/Medicaid demonstrations have to offer.

### Econometric studies.

*Incentives, prenatal care and birth weight.* Two studies addressed the relationship between physician payment incentives and the use of prenatal care for Medicaid enrollees. Gray examined

the impact of increased Medicaid physician payment generosity and the use of prenatal care and birth outcomes for Medicaid enrollees.<sup>79</sup> Gray used individual birth data from the National Maternal and Infant Health Survey and matches the individual data to the state Medicaid payment rate. Gray identified the impact of the payment rate on outcome using a difference-in-difference approach—comparing expected differential outcomes between Medicaid and non-Medicaid enrollees as a function of the generosity of the Medicaid physician payment. This estimation strategy differences out unobserved, state specific effects that might be correlated with the payment rate. However, the difference-in-difference strategy will not correct for unobserved variables that impact the outcome of only one of the groups that might be correlated with the payment rate.

The increases in the payment rate did not significantly impact the use of prenatal care, but increased payment generosity is correlated with fewer low birth weight infants. These results are somewhat puzzling in that it does not identify a mechanism by which increased payments increase birth weight. That is, if increased physician payments are not increasing the use of prenatal care, then how is it that the payments are increasing birth weight? A possible answer is that increased payments are correlated with a more generous menu of financial support available to Medicaid enrollees. In this scenario, the physician payment effect is just an omitted variable bias associated with the researcher not observing other income transfers to the poor.

Oleske, Branca, Schmidt et al. examined the relationship between FFS and capitation payment to physicians in California's Medicaid program, Medi-Cal.<sup>80</sup> In the Medi-Cal program counties within California have different contract structures with the physicians and the authors use this difference to identify the impact of capitation payments on the use of prenatal care and birth outcomes. Similar to Gray, they found that capitation payments are not related to the use of prenatal care but lowered the likelihood of low birth weight babies.<sup>79</sup> Thus, like Gray, the causal mechanism by which capitation lowers low birth weight outcomes is unclear if it is not through the use of prenatal care. The lack of identifying a causal mechanism increases the likelihood that there might be some omitted variable that is correlated with payment structure and impacts birth outcomes. If the authors had used a difference-in-difference approach similar to Gray, that possibility would have been mitigated to some degree.

*NHS.* Two econometric studies have examined the impact of incentives on preventive care within Britain's National Health Service (NHS). In 1990, the NHS introduced target-linked payments for pre-school/childhood immunization (as well as cervical cytology). GPs can earn up to £1,800 (in 1990) for achieving 90 percent immunization uptake. Lynch analyzed the uptake data in Greater Glasgow, Scotland, in an attempt to estimate the factors that determine physician group immunization uptake.<sup>81</sup> She found that 25 percent of the practices did not achieve the high uptake target. To understand the variance in practice immunization uptake, she regressed (in an OLS framework) the uptake rate on the percentage of the total compensation that the immunizations payments make along with other covariates. The idea is that physicians are more likely to focus on the target payments if they comprise a larger percentage of their income. Consistent with this hypothesis, she found a significant positive relationship between the importance of the immunization payment and the percentage of children immunized. This difference variable explains 28 percent of the variance in immunization rates. However, it is not clear in which direction the causation works here. For example, practices that specialize in pediatrics may have higher immunization rates simply because they focus on that type of care. These are also the same practices that are likely to rely more heavily on the target payments.



Hughes and Yule used aggregate time-series data on payments and care provision rates within the NHS for cervical cytology, maternity care, contraceptive advice, and vaccinations.<sup>82</sup> They found little relationship between the rate of use and the payment rates. This is not surprising, as they identified the parameters of interest of time-series variation. Their approach does not allow for the inclusion of most demand side and supply side variables, control variables that are likely to be important. Thus, it is difficult to put much weight on their results.

*U.S. Survey Data.* Balkrishnan, Hall, Mehrabi et al. examined the relationship between capitation and the number of preventive health counseling visits in the National Ambulatory Medical Care Survey (NAMCS).<sup>83</sup> The NAMCS samples approximately 1,200 physicians and the physicians in its sample return approximately an average of 24 patient encounter record forms. The authors regressed the patient specific payment type (FFS or capitation) on the variable on interest. Patients in capitation plans were more likely to receive health counseling and preventive care. However, the authors made no attempt to control for differential selection into physician contract types.<sup>1</sup> That said, for physicians that received a mix of FFS and capitation (more than 20 percent capitation patients) there was no difference in care between FFS and capitated patients, suggesting to us that physician selection effect may be important.

Wee, Phillips, Burstin et al. surveyed 4,473 patient charts from 169 physicians in the Boston area to examine the relationship between HEDIS measures and the reported compensation structure (salary versus productivity pay).<sup>84</sup> They hypothesized (without much discussion or reference to the economic literature on incentives) that physicians who are paid on a productivity basis are less likely to perform preventive services. They found that physicians with financial productivity incentives in their compensation are less likely to perform certain types of preventive care (Pap smears and cholesterol screening) but there is no difference in the rates of mammography and influenza vaccination (point estimates indicate that productivity compensated physicians are more likely to give influenza vaccines). Like Balkrishnan, Hall, Mehrabi et al. the authors made no attempt to correct for the endogeneity of the contract form.<sup>83</sup> For this reason, it is likely that their parameter estimates do not represent causal relationships.<sup>83</sup>

**Medicare/Medicaid demonstrations.** During the 1980s, the Health Care Financing Administration conducted several Medicare and Medicaid competitive demonstration projects in order to assess the impact of different competitive interventions on the cost and quality of care. Several of these projects studied the impact of the physician payment structure on the delivery of preventive services. Preventive care services such as immunization, cancer screening, or health promotion counseling were made free to the consumers, through the use of capitation rates or vouchers for FFS. The advantage of these demonstrations is that they can provide payment interventions on a large proportion of a physician's caseload thereby providing a change in an incentive structure that potentially has a large bite on the physician's income. A potential disadvantage of these studies is that the intervention may last only one year, thus physicians may be unwilling to reorganize their work practice when facing a change in payment structure with a short window.

---

<sup>1</sup> See Akerberg and Botticini (2002) "Endogenous Matching and the Empirical Determinants of Contract Form," *Journal of Political Economy* 110(3): 564-591, for a description of importance of selection into compensation contracts and potential corrections for the problems.

Carey, Weis, Homer et al. examined the impact of capitation on the delivery of preventive services in California and Missouri.<sup>85</sup> In this demonstration, all Medicaid eligible people in two counties (Santa Barbara and Jackson) were enrolled in a program that paid the physicians a capitation payment for specifically preventive services. The behavior of physicians in caring for Medicaid enrollees in these counties was then compared to their counterpart physicians in adjacent counties. Carey, Weis, and Homer found little significant difference between the performance of physicians in the demonstration project and in the FFS control group.<sup>85</sup>

Lave, Ives, Traven et al. reported in several articles the results of a Medicare demonstration project in rural Pennsylvania.<sup>86-88</sup> In this project, hospital-based physicians were paid a capitated payment for providing a series of preventive services (influenza vaccinations, health counseling, depression evaluation) while the rest of the physicians were paid for each service provided. Patients were then randomly assigned into each group or a control group. Patients in the treatment arms received vouchers for free preventive services. The authors found those in the treatment arms were more likely to receive influenza vaccinations.<sup>86</sup> They also found that while participation rates in the health screenings, nutritional counseling, smoking and alcohol cessation, and depression/dementia services were variable depending on the program and treatment arm, there were no differences in the consumers' use of medical care services or health outcomes between the treatment and control groups. The authors also found little difference in the performance of the physicians across preventive interventions.<sup>87</sup> However, because physicians were not randomized into each group, it is difficult to know if the lack of differences is the result of the correlation of the "type" of physician with the payment structure or that mean physician behavior is insensitive to the form of payment.

Ohmit, Furumoto, Dawson et al. examined the impact of free influenza vaccinations in Michigan as part of a community intervention program that included community promotion and outreach, and educational materials and cost reimbursement to the providers.<sup>89</sup> The behavior of the consumers was then compared with their counterpart consumers from a comparison county which was not involved in the demonstration. They found the community intervention program, including fully reimbursed shots for the providers, significantly increased the likelihood of consumers receiving an immunization.

Morrissey, Harris, Kincade-Norburn et al. examined the effects of financial and office systems on the level of preventive care as part of a demonstration project in North Carolina.<sup>90</sup> Patients were randomized within practices to a treatment or usual-care control group. Patients in the treatment arm were treated by physicians who were fully reimbursed for the preventive care and health promotion packages, and who received office system support for personal reminders of scheduled preventive care, clinic staff to carry out many of the preventive care procedures, and new charting forms for patient records. They found that while screening tests increased significantly, there was evidence of a lack of followup of abnormal findings. Also, there was little difference between the treatment and control groups in health-related quality of life measures at the two year study followup. Again, it was not possible to separate the impact of the financial incentive from the other intervention component of patient prompting and other office system improvement.

**Table 2. Consumer incentive type**

	Incentive Type		Positive Findings to Total Studies					Totals
	Lottery	Gift	Cash	Coupon	Free Medical	Punishment		
Simple	2 of 5 (40%)	2 of 5 (40%)	5 of 5 (100%)	10 of 12 (83%)	3 of 4 (75%)	3 of 3 (100%)	25 of 34 (74%)	
Complex	4 of 5 (80%)	2 of 2 (100%)	3 of 6 (50%)	2 of 3 (67%)	1 of 2 (50%) *	6 of 7 (86%)	18 of 25 (72%)	
Totals	6 of 10 (60%)	4 of 7 (57%)	8 of 11 (73%)	12 of 15 (80%)	4 of 6 (67%)	9 of 10 (90%)	43 of 59 (73%)	

\* One non-significant study mismatched test for effect of incentive. No direct measure of uptake.

**Coupon** = coupons, vouchers, gift certificates, free or reduced non-medical services

**Free** = free or reduced medical services

**Punishment:**

Punishment for simple category was clearly punishment.

Punishment for complex category was monetary return contracts that included a reward element. Those that measured followup periods showed rebound back to non-significant levels.

Non-significant test was for smoking cessation. The rest were weight loss.

**Table 3. Impact of provider incentives**

Study Characteristics	Frequency of Interventions with Positive Effects	Frequency of Interventions with No Effects
Total studies	4	5
Performance bonus - target outcome	3	3
Bonus structure - Tournament	0	2
Bonus structure - All providers have potential to qualify	4	3
Bonus structure - Reward/punishment	0	1
Performance bonus - target behavior	0	3
Adjusted capitation rates	1	0
Raised fees	0	1
Subgroup analysis - Group practice vs. solo	3	0
Source of bonus - Paid by HMO	1	3
Source of bonus - Not paid by HMO	3	2
Prevention target - Immunizations	4	2
Prevention target - Other	1	3

**Table 4. Potential explanations by category**

Category	Number of Studies
Study design – Insufficient power	2
Study design – Inadequate size and duration of bonus	5
Study design – Historical trends	4
Salience - Physician beliefs and attitudes about the bonus	3
Salience - Lack of physician awareness	2

**Table 5. Overall positive findings to total consumer studies**

	Facilitating	Participating	Adhering	Outcome
Simple	6 of 6 (100%)	4 of 6 (67%)	9 of 12 (75%)	0 studies
Complex	1 of 1 (100%)	4 of 5 (80%)	5 of 8 (63%) *	10 of 12 (83%)

\* One non-significant study mismatched test for effect of incentive. No direct measure of uptake.  
 Outcome studies - 8 of the 10 positive studies either did not check for long-term results or showed rebound to original levels and non-significant.

	Structural Barrier Removal	Attitude Barrier Removal	Reward	Punishment
Simple	6 of 6 (100%)	0 studies	10 of 14 (71%)	2 of 2 (100%)
Complex	2 of 3 (67%) *	1 of 2 (50%)	11 of 15 (73%)	5 of 6 (83%)

\* One non-significant study mismatched test for effect of incentive. No direct measure of uptake.  
 Only 1 of the Attitude Barrier studies actually measured change in attitude - negative finding.  
 Four of the five positive findings for punishment showed rebound to original levels.  
 Complex reward changes to 12 of 18 (67%) and 9 of 13 (69%) if remove studies which included punishment

	Purchasing Behavior	Income Behavior
Simple	6 of 7 (86%)	13 of 17 (76%)
Complex	7 of 8 (88%)*	10 of 15 (67%)

\* One non-significant study mismatched test for effect of incentive. No direct measure of uptake.  
 Complex income behavior drops to 8 of 19 (42%) and 6 of 15 (40%) with long term results.

**Table 6. Consumer incentive type by significance**

Non-Significant Findings Studies	Significant Findings Studies
<b>Lotteries:</b>	
\$50/session + \$2,000 travel package. For middle-class people to attend group exercise program. <sup>91</sup> (complex)	\$100/month; a 1 in 10 chance to win over 3 years. For low SES and middle-class people to return monthly nutrition newsletter postcards. <sup>74</sup> (complex)
Microwave. For people who showed for community program cholesterol retest. <sup>73</sup> (simple)	Three travel packages: one week in Hawaii, weekend in San Juan, weekend at local hotel. For self-help smoking members of GHCPs. <sup>72</sup> (complex)*
Dinner for two. For car dealership employees attending off-hour smoking cessation class. <sup>92</sup> (simple)	Five \$100 cash prizes; 5 in 29 chance if all participants make goal. For health fair participants with high cholesterol. <sup>93</sup> (complex) **
\$100 cash. For low SES women returning for post-partum check. <sup>65</sup> (simple)	Two \$40 cash for meeting three-month goal; 1 in 4 chance at \$1,000 competitive lottery. For employees of ambulance services. <sup>69</sup> (complex)*
	\$25, \$50, and \$100 cash prizes. For immunizing parents of children/patients at public clinic. <sup>62</sup> (simple)
	Three \$50 grocery gift certificates. For low SES urban community health center. <sup>63</sup> (simple)
<b>Gifts:</b>	
Nutritional information package. For community women attending mammography. <sup>94</sup> (simple)	Nutritional information package. For community women attending mammography. <sup>95</sup> (simple)
Jewelry. For low SES women attending post-partum check. <sup>55</sup> (simple)	Ceramic coffee mug (also lottery). For smoking members of GHCPs in self-help program. <sup>72</sup> (complex)*
Baby blanket. For low SES women attending prenatal checks. <sup>77</sup> (simple)	Turkey buffet and pooled kitty to winning worksites for competitive smoking cessation program. For employees of state government department. <sup>71</sup> (complex)**
	Gerry Cuddler. For low SES women attending post-partum check. <sup>56</sup> (simple)
<b>Cash:</b>	
\$50 payment. For middle-class worksite employees for cigarette abstinence. <sup>96</sup> (complex)	\$5 cash payment. For active drug users to return for TB skin test reading. <sup>53</sup> (simple)
Potential of up to \$266 over 18 months; \$1 to \$3 per exercise session. For middle-class people to attend group exercise program. <sup>97</sup> (complex)	\$10 cash payment. For active drug users to return for TB skin test reading. <sup>53</sup> (simple)
\$12.50 to \$25 per week for 20 weeks. For middle-class people to lose weight. <sup>98</sup> (complex)	\$10 cash payment. For active drug users to return for TB skin test reading. <sup>54</sup> (simple)
	Two \$15 payments. For low SES people to attend STD prevention education. <sup>64</sup> (simple)
	Three cash payments totaling \$35. For active drug users to attend AIDS prevention education. <sup>52</sup> (simple)
	\$5 to \$15 per participant for competitive team members. For employees of diverse firms for smoking cessation. <sup>70</sup> (complex)*
	\$1 to \$10 per day for six weeks. For mostly hospital workers for decreased smoking. <sup>75</sup> (complex)**
	\$50 for participation, \$15/month for abstinence, \$1,980 competitive kitty. For employees of aerospace firms for smoking cessation. <sup>68</sup> (complex)*
	\$50/month for smoking abstinence, maximum ten months. For low SES pregnant women. <sup>67</sup> (complex)***
<b>Coupons:</b>	
Fitness center passes. For lower SES people for attending motivational counseling for exercise program. <sup>99</sup> (complex)	Free postage. For lower SES people to return completed FOBT. <sup>59</sup> (simple)

Non-Significant Findings Studies	Significant Findings Studies
Bus passes. For lower SES women returning for abnormal pap. <sup>100</sup> (simple)	Bus passes. For lower SES women returning for abnormal pap. <sup>60</sup> (simple)
\$5 department store gift certificate. For lower SES women returning for post-partum check. <sup>65</sup> (simple)	75% off coupons for box of condoms. For young adults for STD prevention. <sup>101</sup> (simple)
	Coupon for infant formula. For low SES women to attend post-partum check. <sup>55</sup> (simple)
	Free taxicab fare. For low SES women to attend prenatal visit. <sup>77</sup> (simple)
	\$10 of free bus passes or fast food coupons. For active drug users to return for TB skin test reading. <sup>54</sup> (simple)
	\$10 grocery gift certificate. For active drug users to return for TB skin test reading. <sup>54</sup> (simple)
	\$20 in coupons for farmer's market fresh produce. For low SES women to improve nutrition. <sup>102</sup> (complex)**
	Two \$15 coupons for goods or services. For low SES people to attend STD prevention education. <sup>64</sup> (simple)
	Free evening day care. For immunizing parents of children/patients at public clinic. <sup>62</sup> (simple)
	Three grocery gift certificates totaling \$35. For active drug users to attend AIDS prevention education. <sup>52</sup> (simple)
	Multiple kinds, of high frequency and moderate to high value. For low SES women to breast feed. <sup>66</sup> (complex)***
<b>Free/Reduced Medical:</b>	
Free nicotine patches - did not test for uptake, only effect on cessation. <sup>103</sup> (complex)	Free or reduced price of \$6 or \$20 (vs. \$24) per pack of nicotine gum. For smoking rural family practice patients. <sup>76</sup> (complex)
Voucher for reduced clinic visit. For low SES women for abnormal pap. <sup>100</sup> (simple)	Voucher for reduced clinic visit. For low SES women for abnormal pap. <sup>61</sup> (simple)
	Free flu shots. New Zealand <sup>104</sup> (simple)
	Free flu shots. Denmark <sup>78</sup> (simple)
<b>Punishment</b>	
Return contracted amount, minimum \$5 per paycheck. For worksite employees for smoking abstinence. <sup>105</sup> (complex)	Return contracted amount, minimum \$5 per paycheck. For worksite employees for meeting weight loss goals. <sup>105</sup> (complex)**
	Return \$20 per session for ten sessions. For overweight people to attend meet weight loss goals. <sup>106</sup> (complex)**
	Return \$20 per session for ten sessions. For overweight people to attend weight loss sessions. <sup>106</sup> (complex)**
	Return \$30 per every five pound reduction, up to \$150. For overweight people to meet weight loss goals. <sup>107</sup> (complex)**
	Return \$1, \$5, or \$10 per session for 30 sessions. For overweight people to meet weight loss goals. <sup>108</sup> (complex)**
	Return \$5 per session, 14 sessions; forfeit money split. For mostly female employees of a hospital to attend weight loss sessions. <sup>109</sup> (complex)
	Return to WIC offices monthly (not bimonthly) for vouchers. For low SES parents of non-immunized children. <sup>57</sup> (simple)
	Return to WIC offices monthly (not quarterly) for vouchers. For low SES parents of non-immunized children. <sup>110</sup> (simple)
	Lose AFDC benefits. For low SES parents of non-immunized children. <sup>58</sup> (simple)

- \* Studies showed rebound of outcomes back to pre-test levels  
\*\* Studies did not follow up participants for long-term effects  
\*\*\* Incentives also paid to participant's chosen Significant Other



## Chapter 4. Discussion

### Key Question 1. Definitions

Definitions for economic incentives are remarkably absent in the literature, not only in terms of locating the incentive intervention within larger environmental contexts, but also with regard to the function of the incentive. That is, is the incentive to function as a goal state, as an external reinforcement of behaviors until such time as the individual's internal motivation is sufficient, as a reinforcement until habituation, or perhaps as reinforcement until some learning task is accomplished, or simply as a means of directing a person's attention to a neglected area. As a whole, the studies lack a clear and commonly shared conceptual map, or set of maps, for what an incentive is, its intended purpose, and how it is hypothesized to impact the consumer.

In general, research on the effects of incentive interventions on preventive care and health promotion appears to be driven by policy considerations. Policy guidelines developed by national organizations, expert panels, and governmental bodies at the national and state levels provide the goals which in turn determine the operational definitions of preventive care. While advancing understanding for specific health conditions and constituencies, this fact also has the potential to result in a fragmented research agenda that inhibits transferring the gains across varied preventive domains.

We note the imbalance of provider research into simple preventive care, leaving complex preventive care situations quite unexplored. We can only speculate at this time whether issues of data collection, i.e., cost and difficulty, or difficulty in defining a unit of health promotion care are the greater barriers to further research.

Our approach did not address broader concepts of economic incentives such as those implied in the shift from fee-for-service payment to capitation.

### Key Question 2. Do Incentives Work?

#### Provider

There is little evidence available to support the idea that explicit provider financial incentives, particularly of the perhaps modest and artificial nature such as were evaluated in the studies, are effective. The literature is scarce. Further, from the studies that have been performed, it appears bonuses don't work as simply and easily as some may have assumed they would. It would seem we have been functioning under core beliefs regarding the appropriateness and efficacy of financial incentives that have only recently begun to be subjected to examination through either experimentation or well-designed quasi-experimental or observational studies.

While there was some evidence that increases for preventive care were greater for group practices than solo practices, there is not enough evidence to sort out the causes. The improvements could signal increased staff and office system resources available to group practices. As the evidence isn't clear regarding whether the incentives were paid directly to the physician or to the group, the question remains open. Note Debrock and Arnould found that financial incentives were more effective if directed at individual physicians.<sup>111</sup>

Even in its sparseness, some lessons can be gleaned from the literature. Perhaps most obviously, incentives need to be easily understood; simple, transparent, and have a clear connection between the incentive and the desired behavior. The complexity of the clinical



practice and differing reimbursement systems should not be minimized. As MCOs are not homogenous, market penetration of MCOs in a local market is a significant factor in provider behavior.<sup>83</sup> Physicians may use a heuristic approach and manage their practices as an amalgam of the various guidelines and procedures required by plans and other reimbursement sources along with their own professional opinion.

Another lesson is that the effects of incentives need to be understood within the larger context of the process of preventive care and health promotion. How far down the stream of preventive care did the effects go? An intervention can change a facilitating preventive care behavior, yet not reach the outcome that is of most importance. Findings of a lack of office procedures to follow up on abnormal findings from preventive screening is an illustration of the importance of this issue.<sup>90</sup> Grumbach, Osmond, Vranizan et al. found that over one-third of physicians who reported facing incentives could not specify the amount of their overall income that was involved in bonus payments.<sup>112</sup> In addition, attention should be given to the role of other reinforcers such as profiling and feedback.

According to the National Health Care Purchasing Institute monographs,<sup>113, 114</sup> the key factors for a successful implementation of explicit target economic incentives, as determined in an interview with a focus group comprised of physicians and plan administrators, included:

- The size of the financial incentive
- Peer and/or consumer knowledge of individual provider performance regarding the incentive target
- Recognition among the physicians of a need for change
- Support for the incentive program among medical leadership
- The practicing physician's knowledge and understanding of the performance incentives/sanctions
- Simplicity and directness of the incentive program
- Perceived and actual accuracy of the data on which the incentives are based. There is a lack of physician trust in data and data sources.

As a warning, it must be recognized that incentive models perceived as penalizing providers for patient behavior may inadvertently create incentives for providers to drop non-adherent patients.

## **Consumer**

We may guardedly say that in the short run, for simple preventive care and distinct behavioral goals that are well defined, economic incentives are effective. There isn't sufficient evidence to say that economic incentives are effective for promoting the long-term lifestyle changes required for health promotion.

Funding bias may be contributing to our lack of information on the long-term effects of economic incentives. Research proposals to examine whether there is extinction of behaviors after the removal of economic incentives are not as exciting as testing a new intervention.

Perhaps most intriguing was the psychological impact of incentives. The Melnikow et al. study showed a positive effect for free taxi rides when only one of 34 vouchers was redeemed.<sup>77</sup> Marcus et al. showed similar findings with the incentive demonstrating a positive effect, yet only 33 percent of the patients used the bus passes provided, and 41.7 percent of those eligible redeemed the reduced clinic fee vouchers.<sup>60, 61</sup> It has been noted that participants tend to underestimate the role of external incentives on their behavior.<sup>115</sup> This may partly underlie reports that only a handful of participants were swayed by the lotteries or gifts.<sup>65, 92, 93</sup>

There are also alternative views to the cognitive behavioral models in the studies which may help explain the effect of explicit economic incentives on consumer behavior. These views focus on expectations of future reinforcements or rewards as motivators and people's attributions about why they engaged in certain behaviors in the past. Deci and Ryan view the study of motivation as an "exploration of the energization and direction of behavior" and consider intrinsic motivation to be at least as important a factor in explaining human behavior as drives and external or environmental controls.<sup>116</sup> They argue extrinsic motivators, such as economic incentives, actually inhibit intrinsic motivation, the spontaneous, internal experiences that accompany behavior. A person who is intrinsically motivated enjoys the rewards that are inherent in the activity and perform the activity for its own sake. This has the unintended consequence of reducing the likelihood of the desired behavior in the long run.

Curry, Wagner, & Grothaus attempted to address this question directly by testing a form of intrinsic motivation, represented by personalized feedback designed to improve self-efficacy and enhance a direct cognitive link between behavior and outcome, against an extrinsic motivation of gifts and lotteries for smoking cessation.<sup>72</sup> While the extrinsic incentive improved participation in the smoking cessation program, abstinence rates post-program were not significantly different from the control group. The intrinsic motivation group, however, showed abstinence rates double those of the control group at followup.

Inhibition of intrinsic motivation, if this view is correct, is particularly important to the complex preventive health concerns found in the lifestyle changes for health promotion. Any economic incentive that is a reward must be viewed by the consumer as temporary support toward a personal goal. To do otherwise would not only impose an economic cost on an already strained system, and a cost that would be difficult to justify from a purely cost-effectiveness stance, it also creates a psychic environment which does not promote the personal responsibility and autonomy of the consumer for his own health.

On the other hand, if extrinsic motivations do not dampen intrinsic motivations, we are unable to infer from the given literature the rate of decline of preventive behavior back to baseline levels or the length of the time gap between the extinction of the incented preventive care behavior and the increase of the intrinsic motivation to whatever is the threshold level that would sustain the preventive or health promoting behaviors.

## Special Populations Concerns

**Pediatric population.** The nature of incentives for children's preventive services differs from that for adults.<sup>117</sup> Children's healthcare needs differ from adults. First, children are in a dependent relationship with adults who may not make choices based on the best interest of the

child. Incentives need to “actively encourage such access.” Second, children’s preventive services take place within a very dynamic context. Children are constantly developing and changing, and it is important to provide regular care and avoid pigeonholing into a specific disease category. Third, intertemporal relationships are even more relevant. A provider of children’s preventive care will not reap benefits when a child reaches adulthood. Another provider will.

**Vulnerable populations.** It should be noted that the use of economic incentives, and the research regarding the incentives, is not without controversy. The ethical problem seen in public programs that threatened withholding public benefits as incentive to induce parents to immunize their children is the fact that the financial penalties were threatened only to people already at high risk for economic deprivation.<sup>118</sup> Even simply requiring people to return more frequently to government offices to collect public benefits imposes additional costs. Further, the evaluation research of these programs is often conducted without the oversight of a Human Research Protection Review Board. The ethical imperative in research efforts is to decrease, not potentially increase, the overall risk borne by individuals already at higher risk for deprivation and poor health.<sup>118</sup>

It is also not surprising that studies that directly tested the desirability of different incentive were focused on high-risk and vulnerable populations, where public health policy and ethical considerations of economic incentives are at the fore. In fact, the opportunity for a natural experiment was created out of the policy decision to change from cash to non-cash incentives in AIDS/HIV prevention outreach programs, due to argument over the ethics of cash incentives to active drug users.<sup>52</sup>

There is also concern that incentives may further fracture care for vulnerable populations. LeBaron noted in interview followups that low SES mothers did not wish to take their children to mobile clinics for free immunizations because they preferred to see their regular providers for shots.<sup>119</sup> Ironically, the providers in the Fairbrother studies, who served a similar vulnerable population, didn’t think of themselves as well-care providers, but rather sick-child providers.<sup>43, 44</sup> This is a considerable disconnect between the stated needs of the parent and the perceptions of the providers.

## **Comparison of Provider and Consumer Incentive Research**

Research shows a tendency to favor different rubrics for providers and consumers. Consumer research shows much more attention to psychological and behavioral theories. Provider research approaches research from an economics/business perspective. This is perhaps to be expected, given the roles consumers or providers play, and unfortunate in that both roles are played by humans who share in common many social, psychological, and philosophical qualities.

Both provider and consumer incentives evidenced “gaming the system,” that is, adjusting behavior to maximize income production without necessarily increasing the desired behavior. In physicians there was an adjustment in documentation and reimbursement behaviors.<sup>43, 44</sup> In turn, consumers appeared to have adjusted where, rather than how much, they exercised.<sup>97</sup> Further, Breen, Feuer, Depuy et al. found little increase in reported mammography rates but an increase in reporting using public payment sources for the mammograms after Medicare extended its mammography benefit to reimburse for breast cancer screening mammograms.<sup>120</sup>

It may seem reasonable to speculate that target incentives for preventive care might be generally welcomed by both providers and consumers as a structurally reinforced motivation for appropriate and quality care. There is evidence from the physician perspective that bonuses based on quality of care, including preventive measures, may promote job satisfaction among physicians.<sup>112</sup> Consumers may view bonuses for increasing a service, signaling the health of the consumer comes first, as inherently more trustworthy than financial incentives linked to physician resource use. Incentives of this kind lead to the Supreme Court case regarding the patient's right to sue HMOs for such cost containment efforts.<sup>29, 121</sup>

In summary, the findings that “artificial” explicit economic incentives do work, but modestly and in the short term, fit well with the growing call for multi-component system changes are often needed to for prevention and health promotion.<sup>36, 122</sup>

### **Key Question 3. Dose Response**

The reviewed literature cannot answer whether there is a dose response for provider incentives. There does appear to be the possibility of a dose response for consumer incentives. What is perhaps most interesting for consumer incentives is the effectiveness of relatively modest-sized incentives. The threshold for the question “how much” appears low. However, the literature, at best, provides only a tantalizing prospect.

### **Key Question 4. Cost-Effectiveness**

As noted earlier, only a minority of studies addressed cost-effectiveness at all, and most of those came at the question from the more limited perspective of finding a less expensive way to achieve a determined preventive target. None of the provider studies and only a few of the consumer studies under review in this report undertook to address the larger and ultimately more policy-relevant question of the cost per quality life years (QALYs) gained. For the latter question, the cost-effectiveness of an economic incentive ultimately depends on the cost-effectiveness of the underlying preventive service. To evaluate the value of a given financial incentive mechanism, it ultimately requires assessing the benefits of the additional preventive care (usually expressed in terms of QALYs gained) against the total cost of the implementation of the intervention. The first step in this analysis should be the determination of whether the preventive service is, without the extra cost of the financial incentive, cost-effective. As noted by Tengs, Adams, Pliskin et al.,<sup>123</sup> many preventive services are not cost-effective—in particular, many screening activities fall into this category. Many of the services targeted in this review did not fall within those identified elsewhere as being adequately cost-effective.<sup>124</sup>

The relative cost of achieving a preventive goal must consider whether the goal is equally achieved under different strategies and how large a gain was achieved. In some instances, different approaches may prove more effective with different populations or different preventive goals. For example, lower income populations may be more responsive to economic incentives than are wealthier people. Economic incentives appear to work best for more discrete preventive targets.

From the provider perspective, one potential factor not considered as an incentive in the literature is the benefit of free or reduced cost changes for new office/clinic procedure startup costs. Studies that implemented provider feedback or patient followup procedures often provided

such services prior to the intervention. Reduced startup costs such as this would allow a provider to reduce investment costs in systems that support preventive care.

An area that has received little attention in analyses of cost-effectiveness with regard to almost any shift in medical practice is the law of unforeseen consequences. Presumably, if a physician is incented to change his/her practice to spend more time on preventive activities, s/he will spend less time on other activities. This shift in emphasis could have health consequences, which are rarely explored. Fontanesi, DeGuire, Holcomb et al. provide one illustration of this concern.<sup>125</sup> A question was how physicians were to reasonably “comply with the 136 pediatric preventive quality indicators suggested by the 1997 RAND recommendations, the 25 well-child preventive “interventions” recommended by the US Preventive Services Task Force; the 22 requirements for well-child visits in Early and Periodic Screening, Diagnosis, and Treatment (EPSDT) visits funded by the Health Care Financing Administration (HCFA); the National Committee for Quality Assurance (NCQA) pediatric quality measures; and the AAP’s recommendations for anticipatory guidance in place at the time of the study.” The study addressed this issue of tradeoff between services using a time and motion analysis of pediatric well-child visits that did and did not include immunizations in a patient population with unmet primary care needs. The study found no significant difference in total clinic duration or direct patient-provider duration between visits during which patients were immunized and visits during which patients were not immunized, yet charting and updating patient immunization cards alone required over three minutes in time. The investigators suggested that the “price” of immunization delivery in terms of record gathering, review, writing orders, administering the vaccine, and providing parent information is an opportunity cost that comes at the expense of other health care activities.

The pressing policy question is ultimately whether economic incentives are the most cost-effective strategy to promote the delivery of preventive care. If policy makers or providers have made the commitment to invest in more preventive care, specific studies are needed that directly compare the effectiveness (and cost-effectiveness) of economic incentives against other strategies such as information systems, registries, or better information or advertising. Because the infrastructure costs of these approaches are quite different, the cost-effectiveness is likely to vary substantially. These studies may prove to vary with the nature of clientele and the preventive goal.

Assessing the relative cost-effectiveness of interventions to improve provider and consumer participation would pit economic incentives against infrastructure changes. The outcome of the comparison will depend on the time frame. In the short run, economic incentives are likely to prove less expensive, but there is scant evidence that the behavior will sustain once the incentives are withdrawn. Infrastructure changes, by contrast, are more expensive to implement, but once established they should continue to produce their effect.

It is easy to envision infrastructure changes for providers. They might be variations of information systems, such as tickler files or special tags for persons at risk of needing the service; they could even involve systematic searches of the patient data files to develop alert notices. Infrastructure changes for consumers are harder to consider. Most would seem to revolve around some form of direct to consumer advertising, either broadly targeted through the media or by specific target such as educational materials for persons identified as at risk.

## Other Perspectives

The Medicare/Medicaid demonstrations illustrate the complexity of understanding the effects of price changes on both the providers who supply the service and the consumer who “purchases” the service. The demonstration projects have provided useful information on the impact of increased benefit coverage and other population or clinic-based efforts to improve preventive services. However, a considerable amount remains to be learned.

## General Discussion

Physicians make decisions in an attempt to influence and control patient states. Patients, in turn, make decisions based on their personal values and life context, plus the actions of physicians and other aspects of the health care environment they experience. Patient and provider decisions interact in the management of the patient’s health/disease state over time.

Good decisions typically have high outcome benefits relative to the costs of achieving them. Some decisions are judged to be good because they are capable of achieving positive outcomes. Other decisions are driven by an attempt to avoid negative outcomes. Patient decisions reflect a process of self-regulation in which outcomes are pursued over time in the face of challenges, temptations, and frustrations associated with the experience of their health-related condition and the health care system that is mobilized to address it.<sup>126</sup>

Patients’ capacity to make decisions is enhanced when 1) patients are given specific information regarding their progress in achieving established health outcomes and 2) this information is discussed with their health care providers.<sup>127</sup> Improved patient decision-making impacts patient care by modifying the process physicians use to make decisions. Provider decisions regarding appropriate treatment goals, expectations of patient compliance, as well as actions to ensure progress toward targeted states are altered by informed interaction with knowledgeable patients.

The success of patient decision-making efforts depends on feedback from the consequences of previous actions. Despite having the necessary information, patients frequently fail to act so as to achieve their goals. When individuals fail to act in their own best interests they are often considered to lack the necessary personal agency or self-efficacy.<sup>128</sup> Examples of health behaviors related to self-efficacy recently reviewed include exercise, nutrition, weight control, dental health behavior, sexual risk-taking behavior, and addictive behaviors.<sup>129</sup>

One means of increasing belief in personal agency is to provide information designed to improve the ability to construct, regulate, and evaluate potential courses of action. In the environment of health care, such information can include knowledge of one’s health state plus the nature of the health care system and its associated treatment regimens. Especially important is knowledge that enhances patients’ capacity to participate in the process of setting goals and choosing means of achieving them.<sup>130</sup>

For feedback to be effective in altering behavior, it needs to be tailored to the conditions of the task on which performance is assessed.<sup>131</sup> Simple outcome feedback is often only weakly related to improvements in performance for single judgments as well more complex problem solving and decision-making tasks.<sup>132, 133</sup>

In medicine, feedback has been shown to be most effective in bringing about change in physician behaviors when it is keyed to specific components in diagnostic and patient

management tasks.<sup>134-136</sup> More recent work in a variety of domains has shown that strategies based on customized/personalized information have widespread applicability (and success) in modifying individual decision-making and choice behavior.<sup>137, 138</sup>

Incentives affect behavior within a framework of patient and provider decisions. In one view, incentives may be thought of as forms of feedback that increase (or decrease) the likelihood of some specific behavior. Incentives in this sense are labeled as either positive or negative depending on the direction of change in behavior they produce.

Incentives are also associated with terms such as reward and punishment and are used by researchers to explain how attention is directed to features of the environment that comprise what is to be learned as well as the strength of the change in behavior they produce. Incentives are also treated as goal objects for decision making, in which case they are associated with the idea of motivation and treated as drivers of behavior.

An important aspect of research on incentives is that they are often linked to the variability of behavior. Thus when the events comprising an incentive are perceived as positive, the variability of an agent's behavior typically decreases as it progresses toward some goal state. However, when an event is perceived as punishment, the variability of responses typically increases, making goal attainment more difficult.

It is often unclear why the behavior of interest (the target of intervention) was not originally demonstrated by the individuals in question. Because patients often adapt to the conditions of the health states they experience, the problem confronting the researcher is to move individuals away from conditions and behaviors with which they are comfortable.<sup>139</sup> Without understanding the basis for these adaptations, efforts to accomplish behavioral change (whether on the part of physicians or patients) can be fraught with unanticipated difficulties.<sup>140</sup> Under these conditions it may not be surprising that 1) efforts to bring about change frequently meet with failure and 2) the behavioral changes that do occur, are seldom sustained over time.

## **Practical Implications**

Concerns over the quality of care have prompted increasing attention to how to change providers' behaviors. Educational strategies such as guidelines and protocols alone have not proven particularly successful. Economic incentives seem a more direct approach, but this review raises several cautionary flags. The desired behaviors must be very specific and easy to track. Complex rules for success are less effective. The incentive must be of sufficient size to make it worthwhile for the provider to change practice behaviors. In general, offering a chance to win a large prize may be less attractive than the promise of a modest but substantial prize. Moreover, relying on incentives may prove dangerous because it may foster dependency on them. If the provider behaviors are not ingrained, they may disappear when the incentives end or when a new topic is selected to be incentivized.

Those planning to use incentives should be very clear about their goals. Is this intended as a temporary change in behavior or an inducement to make a permanent change? Practitioners feel under great stress and harried by many competing demands for their time. Incentives may buy a temporary priority from the provider, but sustained change in the operation of the practice will require an investment of energy to address the underlying mechanisms that can reinforce the desired behaviors. One might hope that a brief experience in delivering care in a new way, fostered by financial incentives, might lead to permanent changes in the modus operandi of the practice, but there is little empirical evidence to support this hope. Some incentives may be

permanent, a direct reward to 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 delegation of authority to support staff. In those cases, the resources earmarked for incentives may be put to more efficient use elsewhere.

The enthusiasm for consumer incentives may be driven by some of the same concerns. Pressures to improve preventive performance may motivate some health care organizations to induce their enrollees to become more active in their own care and health promotion activities. In some cases, it may be possible to simultaneously incent both consumers and providers towards synergistic ends. Consumers seem to be more susceptible to incentives, even modest ones. At least some patients may appreciate the attention that incentive programs represent. However, there is always a temptation to pick the low hanging fruit. The recalcitrant consumers may not be as easily swayed by incentives. The energy required to reach and persuade non-adherent patients may still be high.

## **Limitations**

Although our literature search was thorough and rigorous, it cannot be described as wholly systematic. Our searches started with well-defined search strategies. However, the literature is sparse, crossing many areas, not necessarily tagged by the MeSH headings, and key word searches using “incent\$” is not as discriminatory as we would prefer. As noted in Chapter 2, we asked many consultants and colleagues to review the reference list and note if it was missing important studies. No further references were generated through this effort.

As was noted earlier, the heterogeneity of the literature with regard to variety of populations, settings, the nature of the interventions, and outcome measures precluded the more common approaches to aggregating the data such as meta-analysis or even simple comparisons of odds ratios. The research studies were often far more complex or multi-faceted than typical RCTs or observational studies.

## **Future Research**

### **Overall**

As this review highlights, the current evidence is extremely limited in its ability to inform future health care efforts. The limited success of modest and “artificial” incentives to induce long-term change supports the current push for multi-component interventions based on the full environmental or social ecological perspectives such as the McKinley model. There is a need for further studies.

The current work on economic incentives is scattered across topics and approaches. Other work suggests that simple preventive approaches are more cost-effective than complex ones, and economic incentives seem to work best in simple cases. On the other hand, such incentives have not been compared with other strategies, especially in terms of cost-effectiveness. For providers, these alternative approaches usually involve some sort of infrastructure change, such as creating registries or other information systems. Because the goal of such interventions is to create



sustained, rather than simply transient, change, perhaps the most desirable research should employ economic incentives to encourage providers to adopt these new systems; but the research should be continued (if the initial results are promising) long enough to assess whether the innovations persist after the incentives are removed.

Future researchers need to be clear about the causal chain of prevention or health promotion being investigated and the purpose of the incentive intervention being considered. More 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, are all needed. The black box approach, which leaves the economic and behavioral assumptions underlying the research project unexamined, should be replaced with more well-developed conceptual models.

The large literatures in the social and behavioral sciences on incentives should be brought to bear. Most of the studies reviewed here have not evidenced use of this literature. The research reviewed here generally takes an atheoretical approach to studying incentives. However without a theoretical underpinning it is difficult to understand exactly why the incentive worked or didn't work. Perhaps, more importantly, without a theoretical underpinning the right questions do not get asked.

The first question a study should ask is "What problem is the incentive trying to solve and how is the incentive going to solve this problem?" It is not inherently interesting to ask: "Can I change behavior using incentives?" The answer is certainly "yes" if the incentive is great enough. Rather, a better question is, "Given that a preventive service is underprovided, what is the best incentive mechanism to bring the provision of that service up to its optimal level?" A second important question is then "Given this new incentive is in place, are there other, unintended consequences of this incentive?" Of course, anticipating unintended consequences requires a theoretical framework.

On the surface, it would seem wise to approach economic incentive intervention as mimicking a dose-response curve. That is, start with a dose that should be "therapeutic" and test for the possibility of lower doses. However, as the review highlights with the differential effects of modest incentives for providers and consumers, different levels of economic incentives may trigger different modes of decision-making processes. What are the trigger points which determine whether psychological models or economic models of decision-making are used? When does a person view an economic incentive as input into a cost/benefit equation, a reward as goal object, a removal of a barrier? While not mutually exclusive, each model suggests different sets of hypotheses.

Another important question is how economic incentives compare to and complement other strategies to improve preventive care, particularly with regard to long-term effects. There may be joint effects of intervention components, including incentives, within multi-component research. Do explicit incentives improve, impede, or are they unnecessary when a larger ecological effort is made, especially for consumers?

Attention should be given to measuring the direct impact of the incentive itself. Health outcomes may be too high of a measurement standard for incentives that are designed to address only one behavior pattern within a continuum of preventive care. Many other factors, both controllable and uncontrollable, may come to bear on the achievement of a health outcome even when the consumer or provider adjusted behavior in the manner exactly desired for the incentive.

Natural settings for social science research are important. Randomized controlled trials lose the primacy of gold standard with behavioral change research because many factors remain

uncontrollable in the normal busyness of every day life. Adaptation to the environment by the provider or consumer may be either good or bad, but once a person is adapted, it is difficult to get him/her to move. Randomized controlled trials should come only after we can answer why the intervention is needed from this perspective. The difference between controlled trials and “real world” efficacy was demonstrated in the series of studies on the effectiveness of incentives and intensive followup for women with abnormal pap smears. Even though both controlled trials showed positive effects of the economic incentives,<sup>60, 61</sup> a planned evaluation of the same interventions using a quasi-experimental design<sup>100</sup> was unable to replicate the positive effect. The potential cost-effectiveness of incentives would be erased if positive results of an incentive are fragile enough they only survive in controlled settings.

Mixed-method research projects would also seem an appropriate approach for understanding the effects of incentives within a health or health care setting. Qualitative components, particularly conducted retrospectively with a purposive sampling of participants that captures the range of outcome responses, would do much to advance our understanding and improve future research design. We know very little of the meaning and value of the incentives to the populations they are intended for or the attitudes and beliefs they hold. For example, Moran provided anecdotal evidence that some patients found a lottery inappropriate within health care.<sup>63</sup> The bias this belief may create on the findings could be mixed; a feeling of indignation could as easily prompt a person to not receive a flu shot from the clinic in protest as receive the shot while not participating in the lottery.

Personality research and other ways to understand who the people are may provide a step toward understanding what the “problem” is and how to address it. A phenomenological orientation, that it is the world of the perceiver that determines what he will do and not the physical environment, except as the physical environment comes to be represented in the mind of the behaving individual, also requires an understanding of how people differ from one another in how the events come to be represented in the mind. Certainly Prochaska & DiClementi’s stages of change meta-theory provides one ready-made conceptual framework with potential usefulness that has not been fully explored.<sup>140</sup>

Another question that remains unresolved is “What is the right metric for determining if preventive care is truly under-provided?” Possible perspectives are cost-effectiveness, effectiveness, consumer welfare, HMO welfare, or the opportunity cost of other types of care.

**Providers.** Physicians work in organizations and organizations matter. The dynamics of the organization affect the rules under which physicians work and they affect their financial incentives. Economic incentives do not live in a vacuum. They are often coupled with other incentives. Physicians can be paid a salary, which is viewed as a low-powered incentive, but face the prospect of being fired if they under perform. Physicians face many competing demands on their time and are under the influence of many different incentives (economic and otherwise). It may be difficult for outside actors (government, health plans) to affect the direct incentives of the physician.

Measurement also matters. You can base incentives only on things that you can measure. That means if incentives are paid on the basis of measurable performance there is the potential for slackening of effort in other unmeasurable but potentially important domains of care. The unintended consequences of an economic incentive may wipe out what appeared to be a cost-effective practice.

Paying incentives on health outcome measures for providers becomes a default choice when we cannot measure the process. We are often not able to determine with any sense of confidence

what a unit of preventive care services is, such as providing health promotion counseling during both routine checks and provider visits for acute care. Furthermore, 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.

We need to tease out the differential effects of two major components of economic incentives for physicians: motivation and information content. Physicians often claim they are in a permanent state of stress. Given this stress, they can become resistant to change and incentives can shake up the patterns. When something changes, an incentive can redirect the physician's attention to the new "agenda concern," often switching one behavior for another in the process. Using an incentive as an "attentional" device is most helpful when we understand what the initial barrier to change is: no desire to change; not enough knowledge; not enough time; overcoming heuristics that are a hindrance.

Future researchers should keep in mind scalability matters. For an incentive system to be put to use widely, it has to be scaleable. There has to be a clean relationship between the size of the incentives and the behavior that is being encouraged. It must be large enough to make the task seem worthwhile. We know little about how large such incentives need to be.

**Consumers.** Questions such as who the people are and what motivates their actions are of great importance when designing an economic incentive. Personality research, with its focus on individual differences, offers a potentially useful approach to these questions. For example, some participants in a team competition for cash prizes reported disliking the inherent peer pressure.<sup>68</sup> Lotteries engendered feelings of unfairness and created tension among participants in another study.<sup>91</sup> Competition and the openness to experiencing gambling uncertainty have differential effects for different personality types.<sup>116</sup>

Cultural difference is another potential subgroup categorization scheme. Smith et al. found African Americans and Hispanics responded differently to the different economic incentives of infant formula versus a gift of jewelry. They suggested there may be cultural differences in the meaning of gifts.<sup>55</sup>

A major concern with economic incentives is the potential for the coercive effect of incentives on patient autonomy. No study has actually investigated this concern. As we saw, several studies cited interview or anecdotal evidence that the incentives themselves were not a factor in their decision to seek care. This may point to less concern regarding coercive effects for the likely value level of consumer incentives. On the other hand, the finding of positive effects for an incentive intervention, even when the incentive was not redeemed in several studies, could be interpreted as a psychological vulnerability to manipulation of social obligation through the social desirability response. In addition, Malotte et al. suggested paying people for preventive care behaviors may create an expectation for future payments that may result in even lower participation rates should the expectation be thwarted.<sup>54</sup> Smith suggested many of the WIC population may be becoming desensitized to "gifts" from public programs competing for the attention of the beneficiary.<sup>55</sup>

The benefits from competitions, or tournaments, as an aspect of worksite economic incentive programs may be open to debate as well. Deci and Ryan state there are gender differences in responses to competition, and that competition against another person is less effective for women.<sup>116</sup> Of the studies that included tournament-style competitions, 53 percent to 85 percent of the participants were male.

A potentially fruitful area is the possibility for cross-fertilization between health promotion activities and the extensive research conducted around disease management programs. Patient self-care for disease management requires sustained behaviors, also often without apparent immediate “gain” or improvement, and the similarities and differences in patient motivation and patient-provider relationships may be very informative.<sup>141</sup>

**Doctor/Patient Interactions.** The patient-provider relationship itself is also important. There is extensive literature in this area that would inform future research on the effects on incentives and how they might impact preventive services and the consumer’s acceptance of the provider as a collaborator in health promotion activities. In turn, there may be the potential for differences in the provider’s behavior when the provider is aware of lower costs to the patients. Future research should also investigate possible joint effects of coordinated incentives simultaneously applied to both providers and consumers for a particular preventive concern.

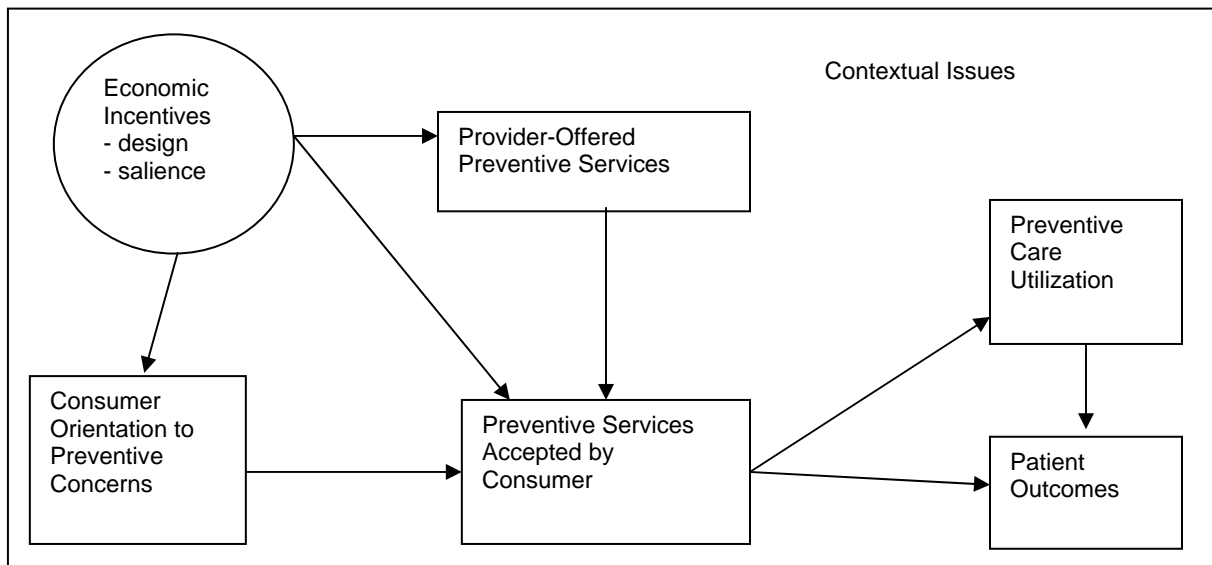
## Conclusion

If we accept the value of preventive efforts, we must recognize the inadequacies of existing systems to encourage such practices. The literature reviewed here suggests that financial incentives have been used, in an uncoordinated fashion, at three levels in an attempt to increase prevention behaviors: 1) as motivators in the larger economic context at the health plan level, where savings associated with prevention is believed to be efficient, or where market interventions have instituted preventive care performance measures as quality indicators; 2) as provider incentives to induce discrete behavioral changes; and 3) as consumer incentives to remove barriers, improve health education, and reward healthy behavior. System-level economic incentives can help to change the larger health care environment, in turn prompting the individual providers and consumers to adapt to a new environment. Financial incentives, if they are big 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. Whereas 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 targeted at a new topic. So questions remain regarding whether investing in office system changes, including information technology, which support long-term changes in practice, is a better choice than relying on incentives. 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.



stated previously, prevention is often used as only one component of quality of care when measuring effectiveness of incentives. For example, Dudley conducted a literature review on the effect of financial incentives on quality of care that relied on IOM's definition of quality (the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge) and included a general category of preventive services utilization as one of eight study outcome measures.<sup>26, 27</sup>

**Figure 1. Conceptual framework**



**Table 1. Conceptual framework: Level of action**

	<b>Participate</b>	<b>Act</b>
<b>Consumer</b>	Attend educational sessions	Accept service Change behavior
<b>Provider</b>	Identify prevention needs	Give service

**Table 2. Consumer incentive type**

	Incentive Type		Positive Findings to Total Studies					Totals
	Lottery	Gift	Cash	Coupon	Free Medical	Punishment		
Simple	2 of 5 (40%)	2 of 5 (40%)	5 of 5 (100%)	10 of 12 (83%)	3 of 4 (75%)	3 of 3 (100%)	25 of 34 (74%)	
Complex	4 of 5 (80%)	2 of 2 (100%)	3 of 6 (50%)	2 of 3 (67%)	1 of 2 (50%) *	6 of 7 (86%)	18 of 25 (72%)	
Totals	6 of 10 (60%)	4 of 7 (57%)	8 of 11 (73%)	12 of 15 (80%)	4 of 6 (67%)	9 of 10 (90%)	43 of 59 (73%)	

\* One non-significant study mismatched test for effect of incentive. No direct measure of uptake.

**Coupon** = coupons, vouchers, gift certificates, free or reduced non-medical services

**Free** = free or reduced medical services

**Punishment:**

Punishment for simple category was clearly punishment.

Punishment for complex category was monetary return contracts that included a reward element. Those that measured followup periods showed rebound back to non-significant levels.

Non-significant test was for smoking cessation. The rest were weight loss.

**Table 3. Impact of provider incentives**

Study Characteristics	Frequency of Interventions with Positive Effects	Frequency of Interventions with No Effects
Total studies	4	5
Performance bonus - target outcome	3	3
Bonus structure - Tournament	0	2
Bonus structure - All providers have potential to qualify	4	3
Bonus structure - Reward/punishment	0	1
Performance bonus - target behavior	0	3
Adjusted capitation rates	1	0
Raised fees	0	1
Subgroup analysis - Group practice vs. solo	3	0
Source of bonus - Paid by HMO	1	3
Source of bonus - Not paid by HMO	3	2
Prevention target - Immunizations	4	2
Prevention target - Other	1	3

**Table 4. Potential explanations by category**

Category	Number of Studies
Study design – Insufficient power	2
Study design – Inadequate size and duration of bonus	5
Study design – Historical trends	4
Salience - Physician beliefs and attitudes about the bonus	3
Salience - Lack of physician awareness	2

**Table 5. Overall positive findings to total consumer studies**

	Facilitating	Participating	Adhering	Outcome
Simple	6 of 6 (100%)	4 of 6 (67%)	9 of 12 (75%)	0 studies
Complex	1 of 1 (100%)	4 of 5 (80%)	5 of 8 (63%) *	10 of 12 (83%)

\* One non-significant study mismatched test for effect of incentive. No direct measure of uptake.  
Outcome studies - 8 of the 10 positive studies either did not check for long-term results or showed rebound to original levels and non-significant.

	Structural Barrier Removal	Attitude Barrier Removal	Reward	Punishment
Simple	6 of 6 (100%)	0 studies	10 of 14 (71%)	2 of 2 (100%)
Complex	2 of 3 (67%) *	1 of 2 (50%)	11 of 15 (73%)	5 of 6 (83%)

\* One non-significant study mismatched test for effect of incentive. No direct measure of uptake.  
Only 1 of the Attitude Barrier studies actually measured change in attitude - negative finding.  
Four of the five positive findings for punishment showed rebound to original levels.  
Complex reward changes to 12 of 18 (67%) and 9 of 13 (69%) if remove studies which included punishment

	Purchasing Behavior	Income Behavior
Simple	6 of 7 (86%)	13 of 17 (76%)
Complex	7 of 8 (88%)*	10 of 15 (67%)

\* One non-significant study mismatched test for effect of incentive. No direct measure of uptake.  
Complex income behavior drops to 8 of 19 (42%) and 6 of 15 (40%) with long term results.



**Table 6. Consumer incentive type by significance**

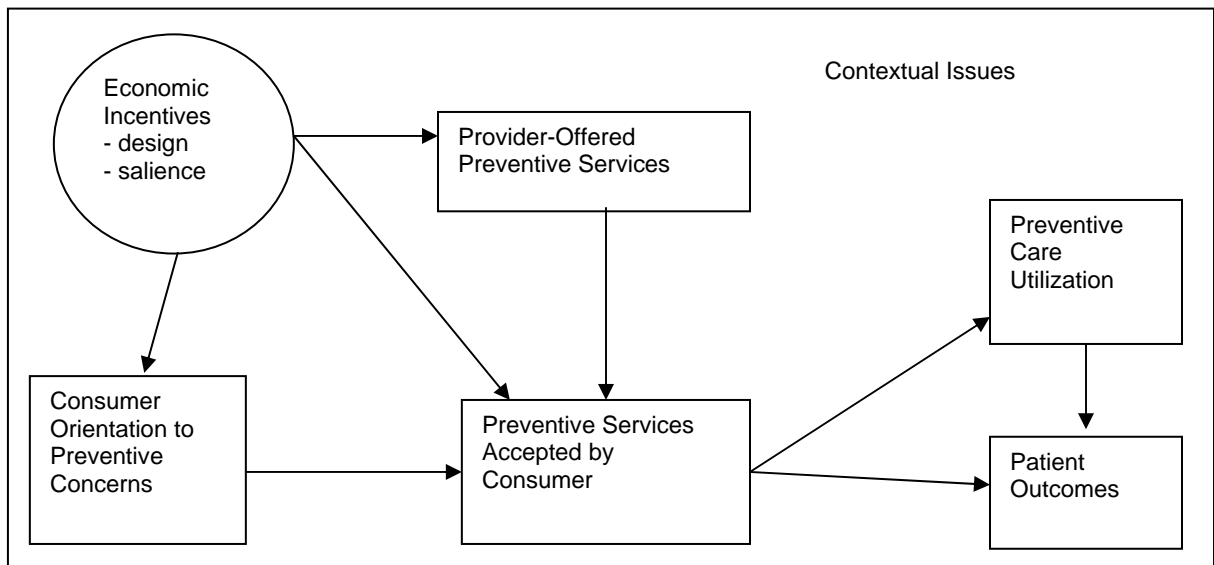
Non-Significant Findings Studies	Significant Findings Studies
<b>Lotteries:</b>	
\$50/session + \$2,000 travel package. For middle-class people to attend group exercise program. <sup>91</sup> (complex)	\$100/month; a 1 in 10 chance to win over 3 years. For low SES and middle-class people to return monthly nutrition newsletter postcards. <sup>74</sup> (complex)
Microwave. For people who showed for community program cholesterol retest. <sup>73</sup> (simple)	Three travel packages: one week in Hawaii, weekend in San Juan, weekend at local hotel. For self-help smoking members of GHCPs. <sup>72</sup> (complex)*
Dinner for two. For car dealership employees attending off-hour smoking cessation class. <sup>92</sup> (simple)	Five \$100 cash prizes; 5 in 29 chance if all participants make goal. For health fair participants with high cholesterol. <sup>93</sup> (complex) **
\$100 cash. For low SES women returning for post-partum check. <sup>65</sup> (simple)	Two \$40 cash for meeting three-month goal; 1 in 4 chance at \$1,000 competitive lottery. For employees of ambulance services. <sup>69</sup> (complex)*
	\$25, \$50, and \$100 cash prizes. For immunizing parents of children/patients at public clinic. <sup>62</sup> (simple)
	Three \$50 grocery gift certificates. For low SES urban community health center. <sup>63</sup> (simple)
<b>Gifts:</b>	
Nutritional information package. For community women attending mammography. <sup>94</sup> (simple)	Nutritional information package. For community women attending mammography. <sup>95</sup> (simple)
Jewelry. For low SES women attending post-partum check. <sup>55</sup> (simple)	Ceramic coffee mug (also lottery). For smoking members of GHCPs in self-help program. <sup>72</sup> (complex)*
Baby blanket. For low SES women attending prenatal checks. <sup>77</sup> (simple)	Turkey buffet and pooled kitty to winning worksites for competitive smoking cessation program. For employees of state government department. <sup>71</sup> (complex)**
	Gerry Cuddler. For low SES women attending post-partum check. <sup>56</sup> (simple)
<b>Cash:</b>	
\$50 payment. For middle-class worksite employees for cigarette abstinence. <sup>96</sup> (complex)	\$5 cash payment. For active drug users to return for TB skin test reading. <sup>53</sup> (simple)
Potential of up to \$266 over 18 months; \$1 to \$3 per exercise session. For middle-class people to attend group exercise program. <sup>97</sup> (complex)	\$10 cash payment. For active drug users to return for TB skin test reading. <sup>53</sup> (simple)
\$12.50 to \$25 per week for 20 weeks. For middle-class people to lose weight. <sup>98</sup> (complex)	\$10 cash payment. For active drug users to return for TB skin test reading. <sup>54</sup> (simple)
	Two \$15 payments. For low SES people to attend STD prevention education. <sup>64</sup> (simple)
	Three cash payments totaling \$35. For active drug users to attend AIDS prevention education. <sup>52</sup> (simple)
	\$5 to \$15 per participant for competitive team members. For employees of diverse firms for smoking cessation. <sup>70</sup> (complex)*
	\$1 to \$10 per day for six weeks. For mostly hospital workers for decreased smoking. <sup>75</sup> (complex)**
	\$50 for participation, \$15/month for abstinence, \$1,980 competitive kitty. For employees of aerospace firms for smoking cessation. <sup>68</sup> (complex)*
	\$50/month for smoking abstinence, maximum ten months. For low SES pregnant women. <sup>67</sup> (complex)***
<b>Coupons:</b>	
Fitness center passes. For lower SES people for attending motivational counseling for exercise program. <sup>99</sup> (complex)	Free postage. For lower SES people to return completed FOBT. <sup>59</sup> (simple)

Non-Significant Findings Studies	Significant Findings Studies
Bus passes. For lower SES women returning for abnormal pap. <sup>100</sup> (simple)	Bus passes. For lower SES women returning for abnormal pap. <sup>60</sup> (simple)
\$5 department store gift certificate. For lower SES women returning for post-partum check. <sup>65</sup> (simple)	75% off coupons for box of condoms. For young adults for STD prevention. <sup>101</sup> (simple)
	Coupon for infant formula. For low SES women to attend post-partum check. <sup>55</sup> (simple)
	Free taxicab fare. For low SES women to attend prenatal visit. <sup>77</sup> (simple)
	\$10 of free bus passes or fast food coupons. For active drug users to return for TB skin test reading. <sup>54</sup> (simple)
	\$10 grocery gift certificate. For active drug users to return for TB skin test reading. <sup>54</sup> (simple)
	\$20 in coupons for farmer's market fresh produce. For low SES women to improve nutrition. <sup>102</sup> (complex)**
	Two \$15 coupons for goods or services. For low SES people to attend STD prevention education. <sup>64</sup> (simple)
	Free evening day care. For immunizing parents of children/patients at public clinic. <sup>62</sup> (simple)
	Three grocery gift certificates totaling \$35. For active drug users to attend AIDS prevention education. <sup>52</sup> (simple)
	Multiple kinds, of high frequency and moderate to high value. For low SES women to breast feed. <sup>66</sup> (complex)***
<b>Free/Reduced Medical:</b>	
Free nicotine patches - did not test for uptake, only effect on cessation. <sup>103</sup> (complex)	Free or reduced price of \$6 or \$20 (vs. \$24) per pack of nicotine gum. For smoking rural family practice patients. <sup>76</sup> (complex)
Voucher for reduced clinic visit. For low SES women for abnormal pap. <sup>100</sup> (simple)	Voucher for reduced clinic visit. For low SES women for abnormal pap. <sup>61</sup> (simple)
	Free flu shots. New Zealand <sup>104</sup> (simple)
	Free flu shots. Denmark <sup>78</sup> (simple)
<b>Punishment</b>	
Return contracted amount, minimum \$5 per paycheck. For worksite employees for smoking abstinence. <sup>105</sup> (complex)	Return contracted amount, minimum \$5 per paycheck. For worksite employees for meeting weight loss goals. <sup>105</sup> (complex)**
	Return \$20 per session for ten sessions. For overweight people to attend meet weight loss goals. <sup>106</sup> (complex)**
	Return \$20 per session for ten sessions. For overweight people to attend weight loss sessions. <sup>106</sup> (complex)**
	Return \$30 per every five pound reduction, up to \$150. For overweight people to meet weight loss goals. <sup>107</sup> (complex)**
	Return \$1, \$5, or \$10 per session for 30 sessions. For overweight people to meet weight loss goals. <sup>108</sup> (complex)**
	Return \$5 per session, 14 sessions; forfeit money split. For mostly female employees of a hospital to attend weight loss sessions. <sup>109</sup> (complex)
	Return to WIC offices monthly (not bimonthly) for vouchers. For low SES parents of non-immunized children. <sup>57</sup> (simple)
	Return to WIC offices monthly (not quarterly) for vouchers. For low SES parents of non-immunized children. <sup>110</sup> (simple)
	Lose AFDC benefits. For low SES parents of non-immunized children. <sup>58</sup> (simple)

- \* Studies showed rebound of outcomes back to pre-test levels
- \*\* Studies did not follow up participants for long-term effects
- \*\*\* Incentives also paid to participant's chosen Significant Other

stated previously, prevention is often used as only one component of quality of care when measuring effectiveness of incentives. For example, Dudley conducted a literature review on the effect of financial incentives on quality of care that relied on IOM's definition of quality (the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge) and included a general category of preventive services utilization as one of eight study outcome measures.<sup>26, 27</sup>

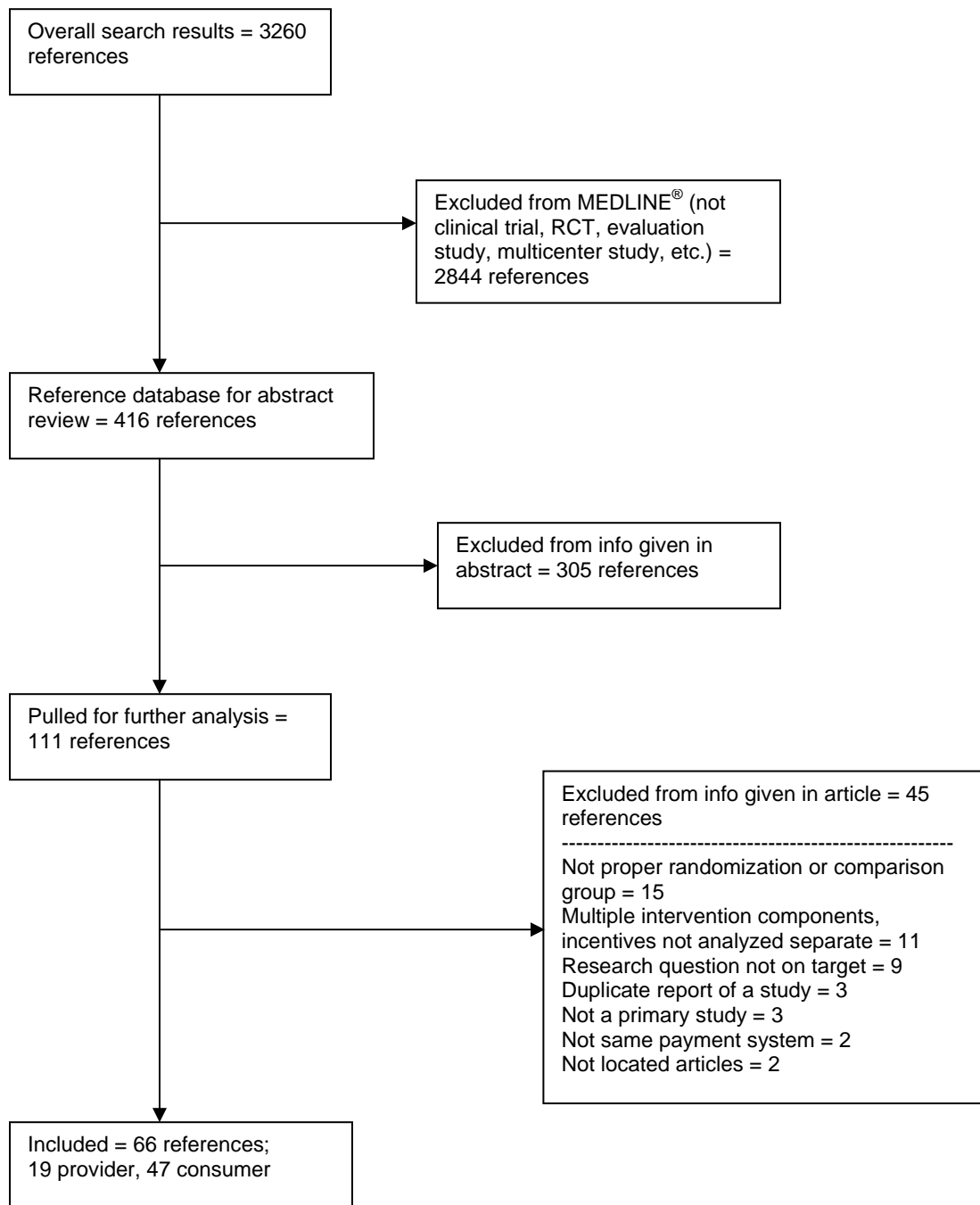
**Figure 1. Conceptual framework**



**Table 1. Conceptual framework: Level of action**

	<b>Participate</b>	<b>Act</b>
<b>Consumer</b>	Attend educational sessions	Accept service Change behavior
<b>Provider</b>	Identify prevention needs	Give service

Figure 2. Economic incentives search result flow chart



## References and Included Studies

1. Institute of Medicine. Crossing the quality chasm: a new health system for the 21st century. Washington, D.C.: National Academy Press; 2001.
2. Casalino L, Gillies RR, Shortell SM, et al. External incentives, information technology, and organized processes to improve health care quality for patients with chronic diseases. *JAMA*. January 22/29 2003;289(4):434-41.
3. McGinnis JM, Foege WH. Actual causes of death in the United States. *JAMA*. Nov 10 1993;270(18):2207-12.
4. Bowman MA, Dignan M, Crandall S, et al. Changes in functional status related to health maintenance visits to family physicians. *Journal of Family Practice*. 2000;49(5):428-33.
5. Philipson T. Economic Epidemiology and Infectious Diseases. In: Newhouse JP, ed. Handbook of health economics. Vol 1B. Handbooks in Economics, vol. 17. Amsterdam; New York and Oxford: Elsevier Science North-Holland; 2000:1761-99.
6. Dowd BE. Financing preventive care in HMOs: a theoretical analysis. *Inquiry*. 1982;19(1):68-78.
7. Kenkel DS. The Demand for Preventative Medical Care. *Applied Economics*. 1994;26(4):313-25.
8. Mullahy J. It'll Only Hurt a Second? Microeconomic Determinants of Who Gets Flu Shots. *Health Economics*. 1999;8(1):9-24.
9. Cherkin DC, Grothaus L, Wagner EH. The effect of office visit copayments on preventive care services in an HMO. *Inquiry*. 1990;27(1):24-38.
10. Lillard L, W. Manning, et al. Preventive Medical Care: Standards, Usage, and Efficacy. Santa Monica, CA: Rand Corporation; 1986.
11. Gruber J, Koszegi B. Is Addiction "Rational"? Theory and Evidence. *Quarterly Journal of Economics*. 2001;116(4):1261-303.
12. Harris RP, Helfand M, Woolf SH, et al. Current methods of the U.S. Preventive Services Task Force. A review of the process. *American Journal of Preventive Medicine*. 2001; 20(3S):21-35.
13. Kahneman D, Tversky A. Prospect Theory: An Analysis of Decision under Risk. *Econometrica*. 1979;47(2):263-91.
14. Kenkel DS. Prevention. Handbook of health economics. In: Culyer AJ & Newhouse JP, eds. Handbooks in Economics. Vol 17. Amsterdam; New York and Oxford: Elsevier Science North-Holland; 2000:1B: 1675-720.
15. Ippolito PM, Mathios AD. Information, Advertising and Health Choices: A Study of the Cereal Market. *Rand Journal of Economics*. 1990;21(3):459-80.
16. Ippolito PM, Mathios AD. Information and Advertising: The Case of Fat Consumption in the United States. *American Economic Review*. 1995;85(2):91-5.
17. Viscusi WK. Do Smokers Underestimate Risks? *Journal of Political Economy*. 1990;98(6):1253-69.
18. Viscusi WK. Age Variations in Risk Perceptions and Smoking Decisions. *Review of Economics and Statistics*. 1991;73(4):577-88.
19. Viscusi WK. Smoking: Making the risky decision. New York; Oxford; Toronto and Melbourne: Oxford University Press: x, 170; 1992.
20. Schoenbaum M. Do smokers understand the mortality effects of smoking? Evidence from the Health and Retirement Survey. *American Journal of Public Health*. 1997;87(5):755-9.
21. Hellinger FJ. The impact of financial incentives on physician behavior in managed care plans: a review of the evidence. *Medical Care Research and Review*. September 1996;53(3):294-314.
22. Russell L. Is Prevention Better than Cure? Washington DC: Brookings Institution; 1986.
23. Tengs T, Graham JD. The opportunity costs of haphazard social investments in life-saving. In: Hahn RW, ed. Risks, Costs, and Lives Saved: Getting Better Results from Regulation. New York: Oxford University Press; 1996:167-82.
24. Hensrud DD. Clinical preventive medicine in primary care: background and practice: 1. Rationale and current preventive practices. *Mayo Clinic Proceedings*. 2000;75(2):165-72.
25. Adams EK. Factors affecting physician provision of preventive care to Medicaid children. *Health Care Financing Review*. 2001;22(4):9-26.
26. Dudley RA, Miller RH, Korenbrot TY, et al. The impact of financial incentives on quality of health care. *Milbank Quarterly*. 1998;76(4):649-86, 511.

27. Lohr KN, Schroeder SA. A strategy for quality assurance in Medicare. *New England Journal of Medicine*. 1990;322(10):707-12.
28. Achat H, McIntyre P, Burgess M. Health care incentives in immunisation. *Australian & New Zealand Journal of Public Health*. 1999;23(3):285-8.
29. Armour BS, Pitts MM, Maclean R, et al. The effect of explicit financial incentives on physician behavior. *Archives of Internal Medicine*. 2001;161(10):1261-6.
30. Bains N, Pickett W, Hoey J. The use and impact of incentives in population-based smoking cessation programs: a review. *American Journal of Health Promotion*. 1998;12(5):307-20.
31. Briss PA, Rodewald LE, Hinman AR, et al. Reviews of evidence regarding interventions to improve vaccination coverage in children, adolescents, and adults. The Task Force on Community Preventive Services. *American Journal of Preventive Medicine*. 2000;18(1 Suppl):97-140.
32. Chaix-Couturier C, Durand-Zaleski I, Jolly D, et al. Effects of financial incentives on medical practice: results from a systematic review of the literature and methodological issues. *International Journal for Quality in Health Care*. 2000;12(2):133-42.
33. Giuffrida A, Gosden T, Forland F, et al. Target payments in primary care: effects on professional practice and health care outcomes. *Cochrane Database of Systematic Reviews*. 2000(3):CD000531.
34. Giuffrida A, Torgerson DJ. Should we pay the patient? Review of financial incentives to enhance patient compliance. *BMJ*. 1997;315 (7110):703-7.
35. Gosden T, Forland F, Kristiansen IS, et al. Capitation, salary, fee-for-service and mixed systems of payment: effects on the behaviour of primary care physicians. *Cochrane Database of Systematic Reviews*. 2000(3):CD002215.
36. Hulscher ME, Wensing M, Grol RP, et al. Interventions to improve the delivery of preventive services in primary care. *American Journal of Public Health*. 1999;89(5):737-46.
37. Stone EG, Morton SC, Hulscher ME, et al. Interventions that increase use of adult immunization and cancer screening services: a meta-analysis. *Annals of Internal Medicine*. 2002;136(9):641-51.
38. Bandura A. *Social learning theory*. Englewood Cliffs, N.J: Prentice-Hall; 1977.
39. Rosenstock I. The health belief model: Explaining health behavior through expectancies. In: Glanz K, Lewis FM, & Rimer BK, eds. *Health Belief and Health Education*. San Francisco: Jossey Bass Publishers; 1990.
40. Frame PS. Health maintenance in clinical practices: strategies and barriers. *American Family Physician*. 1992;45:1192-200.
41. Downs SH, Black N. The feasibility of creating a checklist for the assessment of the methodological quality both of randomised and non-randomised studies of health care interventions. *Journal of Epidemiology & Community Health*. 1998;52(6):377-84.
42. West S, King V, Carey T, et al. *Systems to Rate the Strength of Scientific Evidence*. Rockville, MD: Agency for Healthcare Research and Quality; 2002. 47.
43. Fairbrother G, Hanson KL, Friedman S, et al. The impact of physician bonuses, enhanced fees, and feedback on childhood immunization coverage rates.[comment]. *American Journal of Public Health*. 1999;89(2):171-5.
44. Fairbrother G, Siegel MJ, Friedman S, et al. Impact of financial incentives on documented immunization rates in the inner city: results of a randomized controlled trial. *Ambulatory Pediatrics*. 2001;1(4):206-12.
45. Hillman AL, Ripley K, Goldfarb N, et al. Physician financial incentives and feedback: failure to increase cancer screening in Medicaid managed care. *American Journal of Public Health*. 1998;88(11):1699-701.
46. Hillman AL, Ripley K, Goldfarb N, et al. The use of physician financial incentives and feedback to improve pediatric preventive care in Medicaid managed care. *Pediatrics*. 1999;104(4 Pt 1):931-5.
47. Morrow RW, Gooding AD, Clark C. Improving physicians' preventive health care behavior through peer review and financial incentives. *Archives of Family Medicine*. 1995;4(2):165-9.
48. Grady KE, Lemkau JP, Lee NR, et al. Enhancing mammography referral in primary care. *Preventive Medicine*. 1997;26(6):791-800.
49. Kouides RW, Bennett NM, Lewis B, et al. Performance-based physician reimbursement and influenza immunization rates in the elderly. The Primary-Care Physicians of Monroe County. *American Journal of Preventive Medicine*. 1998;14(2):89-95.

50. Fox MH, Phua KL. Do increases in payments for obstetrical deliveries affect prenatal care? *Public Health Reports*. 1995;110(3):319-26.
51. Ritchie LD, Bisset AF, Russell D, et al. Primary and preschool immunisation in Grampian: progress and the 1990 contract. *BMJ*. 1992;304 (6830):816-9.
52. Deren S, Stephens R, Davis WR, et al. The impact of providing incentives for attendance at AIDS prevention sessions. *Public Health Reports*. 1994;109(4):548-54.
53. Malotte CK, Rhodes F, Mais KE. Tuberculosis screening and compliance with return for skin test reading among active drug users. *American Journal of Public Health*. 1998;88(5):792-6.
54. Malotte CK, Hollingshead JR, Rhodes F. Monetary versus nonmonetary incentives for TB skin test reading among drug users. *American Journal of Preventive Medicine*. 1999;16(3):182-8.
55. Smith PB, Weinman ML, Johnson TC, et al. Incentives and their influence on appointment compliance in a teenage family-planning clinic. *Journal of Adolescent Health Care*. 1990;11(5):445-8.
56. Stevens-Simon C, O'Connor P, Bassford K. Incentives enhance postpartum compliance among adolescent prenatal patients. *Journal of Adolescent Health*. 1994;15(5):396-9.
57. Birkhead GS, LeBaron CW, Parsons P, et al. The immunization of children enrolled in the Special Supplemental Food Program for Women, Infants, and Children (WIC). The impact of different strategies. *JAMA*. 1995;274(4):312-6.
58. Kerpelman LC, Connell DB, Gunn WJ. Effect of a monetary sanction on immunization rates of recipients of aid to families with dependent children. *JAMA*. 2000;284(1):53-9.
59. Freedman JD, Mitchell CK. A simple strategy to improve patient adherence to outpatient fecal occult blood testing. *Journal of General Internal Medicine*. 1994;9(8):462-4.
60. Marcus AC, Crane LA, Kaplan CP, et al. Improving adherence to screening follow-up among women with abnormal Pap smears: results from a large clinic-based trial of three intervention strategies. *Medical Care*. 1992;30(3):216-30.
61. Marcus AC, Kaplan CP, Crane LA, et al. Reducing loss-to-follow-up among women with abnormal Pap smears. Results from a randomized trial testing an intensive follow-up protocol and economic incentives. *Medical Care*. 1998;36(3):397-410.
62. Yokley JM, Glenwick DS. Increasing the immunization of preschool children; an evaluation of applied community interventions. *Journal of Applied Behavior Analysis*. 1984;17(3):313-25.
63. Moran WP, Nelson K, Wofford JL, et al. Increasing influenza immunization among high-risk patients: education or financial incentive? *American Journal of Medicine*. 1996;101(6):612-20.
64. Kamb ML, Rhodes F, Hoxworth T, et al. What about money? Effect of small monetary incentives on enrollment, retention, and motivation to change behaviour in an HIV/STD prevention counselling intervention. The Project RESPECT Study Group. *Sexually Transmitted Infections*. 1998;74(4):253-5.
65. Laken MP, Ager J. Using incentives to increase participation in prenatal care. *Obstetrics & Gynecology*. 1995;85(3):326-9.
66. Sciacca JP, Phipps BL, Dube DA, et al. Influences on breast-feeding by lower-income women: an incentive-based, partner-supported educational program. *Journal of the American Dietetic Association*. 1995;95(3):323-8.
67. Donatelle RJ, Prows SL, Champeau D, et al. Randomised controlled trial using social support and financial incentives for high risk pregnant smokers: significant other supporter (SOS) program. *Tobacco Control*. 2000;9(Suppl 3):III67-9.
68. Koffman DM, Lee JW, Hopp JW, et al. The impact of including incentives and competition in a workplace smoking cessation program on quit rates. *American Journal of Health Promotion*. 1998;13(2):105-11.
69. Gomel M, Oldenburg B, Simpson JM, et al. Work-site cardiovascular risk reduction: a randomized trial of health risk assessment, education, counseling, and incentives. *American Journal of Public Health*. 1993;83(9):1231-8.
70. Klesges RC, Glasgow RE, Klesges LM, et al. Competition and relapse prevention training in worksite smoking modification. *Health Education Research*. 1987;2(1):5-14.
71. Gottlieb NH, Nelson A. A systematic effort to reduce smoking at the worksite. *Health Education Quarterly*. 1990;17(1):99-118.
72. Curry SJ, Wagner EH, Grothaus LC. Evaluation of intrinsic and extrinsic motivation interventions with a self-help smoking cessation program. *Journal of Consulting & Clinical Psychology*. 1991;59(2):318-24.

73. Owen N, James R, Henrikson D, et al. Community cholesterol screenings: The impact of follow-up letters and incentives on retest rates and biometric changes in follow-up screenings. *American Journal of Health Promotion*. 1990;5(1):58-61.
74. Jeffery RW, French SA. Preventing weight gain in adults: the pound of prevention study. *American Journal of Public Health*. 1999;89(5):747-51.
75. Stitzer ML, Bigelow GE. Contingent payment for carbon monoxide reduction: Effects of pay amount. *Behavior Therapy*. 1983;14(5):647-56.
76. Hughes JR, Wadland WC, Fenwick JW, et al. Effect of cost on the self-administration and efficacy of nicotine gum: A preliminary study. *Preventive Medicine*. 1991;20(4):486-96.
77. Melnikow J, Paliescheskey M, Stewart GK. Effect of a transportation incentive on compliance with the first prenatal appointment: a randomized trial. *Obstetrics & Gynecology*. 1997;89(6):1023-7.
78. Nexoe J, Kragstrup J, Ronne T. Impact of postal invitations and user fee on influenza vaccination rates among the elderly. A randomized controlled trial in general practice. *Scandinavian Journal of Primary Health Care*. 1997;15(2):109-12.
79. Gray B. Do Medicaid physician fees for prenatal services affect birth outcomes? *Journal of Health Economics*. 2001;20(4):571-90.
80. Oleske DM, Branca ML, Schmidt JB, et al. A comparison of capitated and fee-for-service Medicaid reimbursement methods on pregnancy outcomes. *Health Services Research*. 1998;33(1):55-73.
81. Lynch ML. The uptake of childhood immunization and financial incentives to general practitioners. *Health Economics*. 1994;3(2):117-25.
82. Hughes D, Yule B. The effect of per-item fees on the behaviour of general practitioners. *Journal of Health Economics*. 1992;11(4):413-37.
83. Balkrishnan R, Hall MA, Mehrabi D, et al. Capitation payment, length of visit, and preventive services: evidence from a national sample of outpatient physicians. *American Journal of Managed Care*. 2002;8(4):332-40.
84. Wee CC, Phillips RS, Burstin HR, et al. Influence of financial productivity incentives on the use of preventive care. *American Journal of Medicine*. 2001;110(3):181-7.
85. Carey T, Weis K, Homer C. Prepaid versus traditional Medicaid plans: effects on preventive health care. *Journal of Clinical Epidemiology*. 1990;43(11):1213-20.
86. Lave JR, Ives DG, Traven ND, et al. Participation in health promotion programs by the rural elderly. *American Journal of Preventive Medicine*. 1995;11(1):46-53.
87. Lave JR, Ives DG, Traven ND, et al. Evaluation of a health promotion demonstration program for the rural elderly. *Health Services Research*. 1996;31(3):261-81.
88. Ives DG, Lave JR, Traven ND, et al. Impact of Medicare reimbursement on influenza vaccination rates in the elderly. *Preventive Medicine*. 1994;23(2):134-41.
89. Ohmit SE, Furumoto-Dawson A, Monto AS, et al. Influenza vaccine use among an elderly population in a community intervention. *American Journal of Preventive Medicine*. 1995;11(4):271-6.
90. Morrissey JP, Harris RP, Kincade-Norburn J, et al. Medicare reimbursement for preventive care. Changes in performance of services, quality of life, and health care costs. *Medical Care*. 1995;33(4):315-31.
91. Wing RR, Jeffery RW, Pronk N, et al. Effects of a personal trainer and financial incentives on exercise adherence in overweight women in a behavioral weight loss program. *Obesity Research*. 1996;4(5):457-62.
92. Emont SL, Cummings KM. Using a low-cost, prize-drawing incentive to improve recruitment rate at a work-site smoking cessation clinic. *Journal of Occupational Medicine*. 1992;34(8):771-4.
93. Francisco VT, Paine AL, Fawcett SB, et al. An experimental evaluation of an incentive program to reduce serum cholesterol levels among health fair participants. *Archives of Family Medicine*. 1994;3(3):246-51.
94. Mayer JA, Clapp EJ, Bartholomew S, et al. Facility-based inreach strategies to promote annual mammograms. *American Journal of Preventive Medicine*. 1994;10(6):353-6.
95. Mayer JA, Kellogg MC. Promoting mammography appointment making. *Journal of Behavioral Medicine*. 1989;12(6):605-11.
96. Windsor RA, Lowe JB, Bartlett EE. The effectiveness of a worksite self-help smoking cessation program: a randomized trial. *Journal of Behavioral Medicine*. 1988;11(4):407-21.
97. Jeffery RW, Wing RR, Thorson C, et al. Use of personal trainers and financial incentives to increase exercise in a behavioral weight-loss program. *Journal of Consulting & Clinical Psychology*. 1998;66(5):777-83.



98. Jeffery RW, Forster JL, Baxter JE, et al. An empirical evaluation of the effectiveness of tangible incentives in increasing participation and behavior change in a worksite health promotion program. *American Journal of Health Promotion*. 1993;8(2):98-100.
99. Harland J, White M, Drinkwater C, et al. The Newcastle exercise project: a randomised controlled trial of methods to promote physical activity in primary care. *BMJ*. 1999;319(7213):828-32.
100. Kaplan CP, Bastani R, Belin TR, et al. Improving follow-up after an abnormal pap smear: results from a quasi-experimental intervention study. *Journal of Womens Health & Gender-Based Medicine*. 2000;9(7):779-90.
101. Dahl DW, Gorn GJ, Weinberg CB. Encouraging use of coupons to stimulate condom purchase. *American Journal of Public Health*. 1999;89(12):1866-9.
102. Anderson JV, Bybee DI, Brown RM, et al. 5 a day fruit and vegetable intervention improves consumption in a low income population. *Journal of the American Dietetic Association*. 2001;101(2):195-202.
103. Dey P, Foy R, Woodman M, et al. Should smoking cessation cost a packet? A pilot randomized controlled trial of the cost-effectiveness of distributing nicotine therapy free of charge. *British Journal of General Practice*. 1999;49(439):127-8.
104. Satterthwaite P. A randomised intervention study to examine the effect on immunisation coverage of making influenza vaccine available at no cost. *New Zealand Medical Journal*. 1997;110(1038):58-60.
105. Jeffery RW, Forster JL, French SA, et al. The Healthy Worker Project: a work-site intervention for weight control and smoking cessation. *American Journal of Public Health*. 1993;83(3):395-401.
106. Jeffery RW, Thompson PD, Wing RR. Effects on weight reduction of strong monetary contracts for calorie restriction or weight loss. *Behaviour Research & Therapy*. 1978;16(5):363-9.
107. Jeffery RW, et al. Effectiveness of monetary contracts with two repayment schedules of weight reduction in men and women from self-referred and population samples. *Behavior Therapy*. 1984;15(3):273-9.
108. Jeffery RW, Gerber WM, Rosenthal BS, et al. Monetary contracts in weight control: effectiveness of group and individual contracts of varying size. *Journal of Consulting & Clinical Psychology*. 1983;51(2):242-8.
109. Follick MJ, Fowler JL, Brown RA. Attrition in worksite weight-loss interventions: the effects of an incentive procedure. *Journal of Consulting & Clinical Psychology*. 1984;52(1):139-40.
110. Hutchins SS, Rosenthal J, Eason P, et al. Effectiveness and cost-effectiveness of linking the special supplemental program for women, infants, and children (WIC) and immunization activities. *Journal of Public Health Policy*. 1999;20(4):408-26.
111. Debrock L, Arnould RJ. Utilization control in HMOs. *Quarterly Review of Economics and Finance*. 1992;32:31-53.
112. Grumbach K, Osmond D, Vranizan K, et al. Primary care physicians' experience of financial incentives in managed-care systems. *New England Journal of Medicine*. 1998;339(21):1516-21.
113. Bailit Health Purchasing. Provider Incentive Models for improving quality of care: National Health Care Purchasing Institute; March 2002.
114. Bailit Health Purchasing, Sixth Man Consulting. The growing case for using physician incentives to improve health care quality: National Health Care Purchasing Institute; December 2001.
115. Stachnik T, Brown B, Hinds W, et al. Goal setting, social support and financial incentives in stress management programs: A pilot study of their impact on adherence. *American Journal of Health Promotion*. 1990;5(1):24-9.
116. Deci E, Ryan R. Intrinsic motivation and self-determination in human behavior. New York: Plenum Press; 1985.
117. Glied S. Getting the incentives right for children. *Health Services Research*. 1998;33(4 Pt 2):1143-60.
118. Davis MM, Lantos JD. Ethical Considerations in the Public Policy Laboratory. *JAMA*. 2000;284(1):85-7.
119. LeBaron CW, Starnes D, Dini EF, et al. The impact of interventions by a community-based organization on inner-city vaccination coverage: Fulton County, Georgia, 1992-1993. *Archives of Pediatrics & Adolescent Medicine*. 1998;152(4):327-32.
120. Breen N, Feuer EJ, Depuy S, et al. The effect of Medicare reimbursement for screening mammography on utilization and payment. National Cancer Institute Breast Cancer Screening Consortium. *Public Health Reports*. 1997;112(5):423-32.
121. Pegram v Heidrick: 530 US 211; 2000.
122. Glasgow RE, Orleans CT, Wagner EH, et al. Does the Chronic Care Model Serve Also as a Template for Improving Prevention? *The Milbank Quarterly*. 2001;79(4):579-612.
123. Tengs TO, Adams ME, Pliskin JS, et al. Five-hundred life-saving interventions and their cost-effectiveness. *Risk Anal*. Jun 1995;15(3):369-90.

124. Coffield AB, Maciosek MV, McGinnis JM, et al. Priorities among recommended clinical preventive services. *American Journal of Preventive Medicine*. 2001;21(1):1-9.
125. Fontanesi J, De Guire M, Holcomb K, et al. The cost to immunize during well-child visits. *American Journal of Medical Quality*. 2001;16(6):196-201.
126. Mischel W, Cantor N, Feldman S. Principles of self-regulation: The nature of willpower and self-control. In: Higgins ET & Kruglanski AW, eds. *Social Psychology: Handbook of Basic Principles*. New York: The Guilford Press; 1996.
127. Gollwitzer PM, Moskowitz GB. Goal effects on action and cognition. In: Higgins ET & Kruglanski AW, eds. *Social Psychology: Handbook of Basic Principles*. New York: The Guilford Press; 1996.
128. Bandura A. Social cognitive theory: An agentic perspective. *Annual Review of Psychology*. 2001;52:1-26.
129. Swarzer R, Fuchs R. Self-efficacy and health behavior. In: Connor M & Norman PO, eds. *Predicting Health Behavior: Research and Practice with Social Cognition Models*. Buckingham: Open University Press; 1995.
130. Olson JM, Roese NJ, Zanna MP. Expectancies. In: Higgins ET & Kruglanski AW, eds. *Social Psychology: Handbook of Basic Principles*. New York: The Guilford Press; 1996.
131. Hammond KR, Summers DA. Cognitive control. *Psychological Review*. 1972;79(1):58-67.
132. Balzer WK, Hammer LB, Sumner KE, et al. Effects of cognitive feedback on components, display format, and elaboration of performance. *Organizational Behavior and Human Decision Processes*. 1994;58:369-85.
133. Te'eni D. Direct manipulation as a source of cognitive feedback: a human-computer experiment with a judgment task. *International Journal of Man-Machine Studies*. 1990;33:453-66.
134. Poses RM, Cebul RD, Wigton RS, et al. Controlled trial using computerized feedback to improve physicians' diagnostic judgments. *Academic Medicine*. 1992;67(5):345-7.
135. Wigton RS, Poses, Roy M., Collins, Marjeanne, and Cebul, Randall D. Teaching old dogs new tricks: Using cognitive feedback to improve physician's diagnostic judgments on simulated cases. *Academic Medicine*. 1990;65(9):S5-S6.
136. Wigton RS. Applications of judgment analysis and cognitive feedback to medicine. In: Brehmer, A & Joyce CRB, eds. *Human Judgment: The SJT View*: Elsevier Science Publishers B.V.; 1988:227-45.
137. Pine II BJ. Mass-customizing products and services. *Mass Customization*. Boston: Harvard Business School Press; 1999:171-212.
138. Schafer JB, Konstan, J., and Reidl, J. Recommended systems in e-commerce. Paper presented at: *Proceedings of the ACM on Electronic Conference*; November, 1999.
139. Johnson PE, Veazie PJ, O'Connor PJ, et al. Understanding Variation in Chronic Disease Outcomes. *Health Care Management Science*. 2002;5(2):175-89.
140. Prochaska JO, DiClemente CC. Toward a Comprehensive Model of Change. *Treating Addictive Behaviors: Processes of Change*. New York: Plenum Press; 1986.
141. Glasgow RE, Orleans CT, Wagner EH, et al. Does the Chronic Care Model Serve Also as a Template for Improving Prevention? *The Milbank Quarterly*. 2001;79(4):579-612.
142. Jeffery RW, Wing RR, Thorson C, et al. Strengthening behavioral interventions for weight loss: a randomized trial of food provision and monetary incentives. *Journal of Consulting & Clinical Psychology*. 1993;61(6):1038-45.
143. Oldenburg B, Owen N, Parle M, et al. An economic evaluation of four work site based cardiovascular risk factor interventions. *Health Education Quarterly*. 1995;22(1):9-19.

## Listing of Excluded Studies *(reason for exclusion is provided in italics following each reference)*

- Baranowski, T., Simons-Morton, B., Hooks, P., Henske, J., Tiernan, K., Dunn, J. K., Burkhalter, H., Harper, J., & Palmer, J. (1990). A center-based program for exercise change among black-American families. *Health Education Quarterly*, 17(2), 179-196.  
*Multi-component intervention*
- Bond, L., Davie, G., Carlin, J. B., Lester, R., & Nolan, T. (2002). Increases in vaccination coverage for children in child care, 1997 to 2000: an evaluation of the impact of government incentives and initiatives. *Australian & New Zealand Journal of Public Health*, 26(1), 58-64.  
*Not randomized, controlled*
- Bowers, T. G., Winett, R. A., & Frederiksen, L. W. (1987). Nicotine fading, behavioral contracting, and extended treatment: effects on smoking cessation. *Addictive Behaviors*, 12(2), 181-184.  
*Multi-component intervention*
- Breen, N., Feuer, E. J., Depuy, S., & Zapka, J. (1997). The effect of Medicare reimbursement for screening mammography on utilization and payment. National Cancer Institute Breast Cancer Screening Consortium. *Public Health Reports*, 112(5), 423-432.  
*Not randomized, controlled*
- Cherkin, D. C., Grothaus, L., & Wagner, E. H. (1990). The effect of office visit copayments on preventive care services in an HMO. *Inquiry*, 27(1), 24-38.  
*System incentives*
- Coleman, T., Wynn, A. T., Barrett, S., Wilson, A., & Adams, S. (2001). Intervention study to evaluate pilot health promotion payment aimed at increasing general practitioners' antismoking advice to smokers. *BMJ*, 323(7310), 435-436.  
*Not randomized, controlled*
- Cox, C. C., Hooper, J., & Telleen, K. (2000). Private sector worksite health promotion programs in Missouri: a comparison with national survey findings and Healthy People recommendations. *American Journal of Health Promotion*, 14(3), 174-178, iii.  
*Not randomized, controlled*
- Fletcher, S. W., Harris, R. P., Gonzalez, J. J., Degnan, D., Lannin, D. R., Strecher, V. J., Pilgrim, C., Quade, D., Earp, J. A., & Clark, R. L. (1993). Increasing mammography utilization: a controlled study. *Journal of the National Cancer Institute*, 85(2), 112-120.  
*Multi-component intervention*
- Fries, J. F., Bloch, D. A., Harrington, H., Richardson, N., & Beck, R. (1993). Two-year results of a randomized controlled trial of a health promotion program in a retiree population: the Bank of America Study.[comment]. *American Journal of Medicine*, 94(5), 455-462.  
*Not on target*
- Glanz, K., Lew, R. A., Song, V., & Murakami-Akatsuka, L. (2000). Skin cancer prevention in outdoor recreation settings: effects of the Hawaii SunSmart Program. *Effective Clinical Practice*, 3(2), 53-61.  
*Multi-component intervention*
- Glasgow, R. E., Hollis, J. F., Pettigrew, L., Foster, L., Givi, M. J., & Morrisette, G. (1991). Implementing a year-long, worksite-based incentive program for smoking cessation. *American Journal of Health Promotion*, 5(3), 192-199.  
*Not randomized, controlled*
- Hahn, D. L. (1999). The delivery of clinical preventive services: acute care intervention. *Journal of Family Practice*, 48(10), 785-789.  
*Not randomized, controlled*  
*System incentive*
- Hickson, G. B., Altemeier, W. A., & Perrin, J. M. (1987). Physician reimbursement by salary or fee-for-service: effect on physician practice behavior in a randomized prospective study. *Pediatrics*, 80(3), 344-350.  
*Not on target*
- Hoekstra, E. J., LeBaron, C. W., & Johnson-Partlow, T. (1999). Does reminder-recall augment the impact of voucher incentives on immunization rates among inner-city infants enrolled in WIC? Special Supplemental Program for Women, Infants, and Children. *Journal of Pediatrics*, 135(2 Pt 1), 261-263.  
*Not on target*
- Hueston, W. J., Mainous, A. G., 3rd, & Farrell, J. B. (1994). Childhood immunization availability in primary care practices. Effects of programs providing free vaccines to physicians.[comment]. *Archives of Family Medicine*, 3(7), 605-609.  
*Not on target*
- Hughart, N., Vivier, P., Ross, A., Strobino, D., Holt, E., Hou, W., & Guyer, B. (1997). Are immunizations an incentive for well-child visits? *Archives of Pediatrics & Adolescent Medicine*, 151(7), 690-695.  
*Not on target*
- Jason, L. A., Jayaraj, S., Blitz, C. C., Michaels, M. H., & Klett, L. E. (1990). Incentives and competition in a worksite smoking cessation intervention. *American Journal of Public Health*, 80(2), 205-206.  
*Multi-component intervention*
- Jason, L. A., Lesowitz, T., Michaels, M., Blitz, C., Vectors, L., Dean, L., Yeager, E., & Kimball, P. (1989). A worksite smoking cessation intervention involving the media and incentives. *American Journal of Community Psychology*, 17(6), 785-799.  
*Multi-component intervention*

Jeffery, R. W., & French, S. A. (1997). Preventing weight gain in adults: design, methods and one year results from the Pound of Prevention study. *International Journal of Obesity & Related Metabolic Disorders: Journal of the International Association for the Study of Obesity.*, 21(6), 457-464.

*Duplicate*

Jeffery, R. W., Pheley, A. M., Forster, J. L., Kramer, F. M., & Snell, M. K. (1988). Payroll contracting for smoking cessation: a worksite pilot study. *American Journal of Preventive Medicine.*, 4(2), 83-86.

*Multi-component intervention*

Jeffrey, R. W., Forster, J. L., Baxter, J. E., French, S. A., & Kelder, S. H. (1993). An empirical evaluation of the effectiveness of tangible incentives in increasing participation and behavior change in a worksite health promotion program. *American Journal of Health Promotion.*, 8(2), 98-100.

*Duplicate*

Katz, K. S., El-Mohandes, P. A., Johnson, D. M., Jarrett, P. M., Rose, A., & Cober, M. (2001). Retention of low income mothers in a parenting intervention study. *Journal of Community Health.*, 26(3), 203-218.

*Not on target*

Keeler, E. B., Sloss, E. M., Brook, R. H., Operskalski, B. H., Goldberg, G. A., & Newhouse, J. P. (1987). Effects of cost sharing on physiological health, health practices, and worry. *Health Services Research.*, 22(3), 279-306.

*System incentives*

Kouides, R. W., Lewis, B., Bennett, N. M., Bell, K. M., Barker, W. H., Black, E. R., Cappuccio, J. D., Raubertas, R. F., & LaForce, F. M. (1993). A performance-based incentive program for influenza immunization in the elderly. *American Journal of Preventive Medicine.*, 9(4), 250-255.

*Not randomized, controlled*

Krieger, J. W., Connell, F. A., & LoGerfo, J. P. (1992). Medicaid prenatal care: a comparison of use and outcomes in fee-for-service and managed care. *American Journal of Public Health.*, 82(2), 185-190.

*System incentive*

LeBaron, C. W., Starnes, D., Dini, E. F., Chambliss, J. W., & Chaney, M. (1998). The impact of interventions by a community-based organization on inner-city vaccination coverage: Fulton County, Georgia, 1992-1993.[comment]. *Archives of Pediatrics & Adolescent Medicine.*, 152(4), 327-332.

*Multicomponent intervention*

Leibowitz, A., Manning, W. G., Jr., Keeler, E. B., Duan, N., Lohr, K. N., & Newhouse, J. P. (1985). Effect of cost-sharing on the use of medical services by children: interim results from a randomized controlled trial. *Pediatrics.*, 75(5), 942-951.

*System incentive*

Ludwig-Beymer, P., & Hefferan, C. (2001). Evaluation of Baby Advocate, a childhood immunization reminder system. *Journal of Nursing Care Quality.*, 16(1), 15-23.

*Not randomized, controlled*

Lurie, N., Manning, W. G., Peterson, C., Goldberg, G. A., Phelps, C. A., & Lillard, L. (1987). Preventive care: do we practice what we preach? *American Journal of Public Health.*, 77(7), 801-804.

*System incentive*

Maheu, M. M., Gevirtz, R. N., Sallis, J. F., & Schneider, N. G. (1989). Competition/cooperation in worksite smoking cessation using nicotine gum. *Preventive Medicine.*, 18(6), 867-876.

*Multi-component intervention*

Manning, W. G., Leibowitz, A., Goldberg, G. A., Rogers, W. H., & Newhouse, J. P. (1984). A controlled trial of the effect of a prepaid group practice on use of services. *New England Journal of Medicine.*, 310(23), 1505-1510.

*System incentive*

Merkel, P. A., & Caputo, G. C. (1994). Evaluation of a simple office-based strategy for increasing influenza vaccine administration and the effect of differing reimbursement plans on the patient acceptance rate. *Journal of General Internal Medicine.*, 9(12), 679-683.

*Not randomized, controlled*

Oldenburg, B., Owen, N., Parle, M., & Gomel, M. (1995). An economic evaluation of four work site based cardiovascular risk factor interventions. *Health Education Quarterly.*, 22(1), 9-19.

*Duplicate*

Pescatello, L. S., Murphy, D., Vollono, J., Lynch, E., Bernene, J., & Costanzo, D. (2001). The cardiovascular health impact of an incentive worksite health promotion program. *American Journal of Health Promotion.*, 16(1), 16-20.

*Multi-component intervention*

Poole, K., Kumpfer, K., & Pett, M. (2001). The impact of an incentive-based worksite health promotion program on modifiable health risk factors. *American Journal of Health Promotion.*, 16(1), 21-26.

*Multi-component intervention*

Reid, G. S., Robertson, A. J., Bissett, C., Smith, J., Waugh, N., & Halkerston, R. (1991). Cervical screening in Perth and Kinross since introduction of the new contract.[comment]. *BMJ.*, 303(6800), 447-450.

*Not randomized, controlled*

Schwab, R. A., Radakovich, R., & Tate, K. (2002). Does payment improve follow-up of pelvic inflammatory disease? *Missouri Medicine.*, 99(7), 286-288.

*Not on target*

Solanki, G., Schauffler, H. H., & Miller, L. S. (2000). The direct and indirect effects of cost-sharing on the use of preventive services. *Health Services Research.*, 34(6), 1331-1350.

*Not randomized, controlled*

Stachnik, T., Brown, B., Hinds, W., Mavis, B., & et al. (1990). Goal setting, social support, and financial incentives in stress management programs: A pilot study of their impact on adherence. *American Journal of Health Promotion*, 5(1), 24-29.

*Not randomized, controlled*

Stein, A. D., Karel, T., & Zuidema, R. (1999). Carrots and sticks: Impact of an incentive/disincentive employee flexible credit benefit plan on health status and medical costs. *American Journal of Health Promotion*, 13(5), 260-267.

*System incentive*

Stevens, M. M., Paine-Andrews, A., & Francisco, V. T. (1996). Improving employee health and wellness: A pilot study of the employee-driven Perfect Health Program. *American Journal of Health Promotion*, 11(1), 12-14.

*Not randomized, controlled*

Strecher, V. J., Becker, M. H., Kirscht, J. P., Eraker, S. A., & Graham-Tomasi, R. P. (1985). Evaluation of a minimal-contact smoking cessation program in a health care setting. *Patient Education & Counseling.*, 7(4), 395-407.

*Multi-component intervention*

Taylor, V., Thompson, B., Lessler, D., Yasui, Y., Montano, D., Johnson, K. M., Mahloch, J., Mullen, M., Li, S., Bassett, G., & Goldberg, H. I. (1999). A clinic-based mammography intervention targeting inner-city women. *Journal of General Internal Medicine.*, 14(2), 104-111.

*Multi-component intervention*

Unti, L. M., Coyle, K. K., Woodruff, B. A., & Boyer-Chuanroong, L. (1997). Incentives and motivators in school-based hepatitis B vaccination programs. *Journal of School Health.*, 67(7), 265-268.

*Not on target*









# **Evidence Report**

Contract No. 290-02-0009, Task Order #1  
Prepared by Minnesota Evidence-based Practice Center, Minneapolis, Minnesota

## **Economic Incentives for Preventive Care**

### **Appendixes**

## Appendix A. Technical Expert Panel Members and Reviewers

### Technical Expert Panel Members

We are indebted to the Technical Expert Panel Members for providing both consultation during the development of this project and feedback on the initial draft.

Douglas Conrad, PhD, MBA, MHA  
Director, Center for Health Management Research  
University of Washington  
Seattle, WA

James Fries, MD  
Professor of Medicine  
Stanford University School of Medicine  
Palo Alto, CA

Nicole Lurie, MD, MSPH  
Senior Natural Scientist and Alcoa Professor of Policy Analysis  
RAND  
Arlington, VA

Dave Meltzer, MD, PhD  
Section of General Internal Medicine  
Harris Graduate School of Public Policy Studies  
University of Chicago, Department of Economics  
Chicago, IL

Paul Shekelle, MD, PhD, MPH  
Southern California Evidence Based Practice Center  
RAND  
Santa Monica, CA

## **Reviewers**

We are grateful for the constructive feedback provided by the following individuals who reviewed the initial draft of this report. Acknowledgements are made with the explicit statement that this does not constitute endorsement of the report.

David Atkins, MD  
Agency for Healthcare Research and Quality  
Rockville, MD

Brian S. Armour, PhD  
Centers for Disease Control and Prevention  
Atlanta, GA

James Bare  
American Academy of Family Physicians  
Leawood, KS

Charles M. Cutler, MD, MS  
American Association of Health Plans  
Washington, DC

Peter Franks, MD  
Family and Community Medicine  
University of California – Davis  
Davis, CA

Jonathan D. Klein, MD, MPH  
Pediatric Adolescent Medicine  
University of Rochester  
Rochester, NY

Thomas G. McGuire, PhD  
Department of Health Care Policy  
Harvard Medical School  
Boston, MA

C. Tracy Orleans, PhD  
Robert Wood Johnson Foundation  
Princeton, NJ

## Appendix B. Exact Search Strings

### Literature Search Strategy—MEDLINE®

Number	Search History	Results
1	Reimbursement, Incentive	687
2	Capitation Fee	3628
3	Physician Incentive Plans	1096
4	Physician's Practice Patterns	12718
5	incent\$	6243
6	Income	30787
7	Reimbursement Mechanisms	18969
8	Fees, Medical	4601
9	Cost Sharing	1684
10	Choice Behavior	14434
11	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10	86379
12	Preventive Health Services	149047
13	Preventive Medicine	12582
14	Primary Prevention	68204
15	Health Promotion	20460
16	Health Behavior	41883
17	Patient Compliance	23515
18	Prenatal Care	11371
19	12 or 13 or 14 or 15 or 16 or 17 or 18	323248
20	11 and 19	4649
21	Limit to English language	4400
22	Limit to year 1966-2002, human, non-dentistry	3804

## Appendix C. Screening Form

Author _____	Study ID _____	
Journal _____		
Year Published _____	Reviewer _____	
Article source: MEDLINE®	PsychINFO	EconLit
Review reference list	Article reference list	
Cochrane Library	Personal files	
Funding source: Government	Corporate	Foundation
Non-funded	Unknown	

### Verification/Selection of Study Eligibility (for structured reviews):

Preventive care	Y	N
Economic incentive	Y	N
Single payment system	Y	N
Randomization	Y	N
Control group	Y	N

### Type of Study:

Randomized controlled experiment	Y	N
Quasi-experimental		
Retrospective	Y	N
Prospective	Y	N
Observational		
Cross-sectional	Y	N
Evaluation	Y	N

## Economic Incentives Article Abstraction Form (Provider version 1)

### Economic Incentives for Prevention University of Minnesota EPC

**Preventive Behavior Target:** (circle all that apply)

Simple	Complex (sustained effort over time)
Immunization	Disease prevention (type)_____
Cancer Screening	Screening - other_____
Pre-natal/well-child care	Health promotion/lifestyle_____

**Intervention Target:** (circle all that apply)

Consumer:	physician	solo	group	staff	in-training	unclear
	nurse			staff		
	primary care practitioner			not primary care practitioner		
Consumer:	<18		working age			65+
Organization						
Other	_____					

**Patient Population:**

Mean Age:\_\_\_\_\_ Age Range:\_\_\_\_\_

Gender: % Male \_\_\_\_\_ % Female \_\_\_\_\_

Race/Ethnic Group:  
Caucasian\_\_\_\_ Black\_\_\_\_ Asian\_\_\_\_ Hispanic\_\_\_\_ Other\_\_\_\_

Patient Source:  
Medicare Medicaid WIC eligible Plan enrollees  
Clinic/System Patients: hospital community clinic provider lists  
Community Other\_\_\_\_\_

Country: US \_\_\_\_\_ Non-US \_\_\_\_\_

**Setting:** (circle all that apply)

Hospital	Office/Clinic	Academic	Mixed
Extended Care Facility	Rural	Urban	Suburban
Solo practice	Group practice	Staff clinic	Free clinic
Community center	Unclear/not stated		
Other (ex: school)	_____		

**Reimbursement system:**

FFS	Medicare	Medicaid	HMO
MCO, not HMO	Mixed reimbursement system		Other
Not reported			

**Appendix D. Abstraction Forms, Continued**

**Participants and Baseline Characteristics:**

(describe) \_\_\_\_\_

Number Eligible \_\_\_\_\_

Number Invited \_\_\_\_\_

Number Enrolled \_\_\_\_\_

Response Rate \_\_\_\_\_

Number subjects completed trial \_\_\_\_\_

Mean Age: \_\_\_\_\_ Age Range: \_\_\_\_\_

Gender: \_\_\_\_\_ % Male \_\_\_\_\_ % Female \_\_\_\_\_

Race/Ethnic Group:  
 Caucasian \_\_\_\_\_ Black \_\_\_\_\_ Asian \_\_\_\_\_ Hispanic \_\_\_\_\_ Other \_\_\_\_\_

Inclusion criteria:  
 \_\_\_\_\_  
 \_\_\_\_\_

Exclusion criteria:  
 \_\_\_\_\_  
 \_\_\_\_\_

**Intervention(s):**

Consumer:

	Economic incentive only	Multi-faceted intervention
Gift:	\$ value _____	frequency _____ type _____
Lottery:	\$ value _____	frequency _____ type _____
Cash Incentive:	\$ value _____	frequency _____ total _____
Coupons/In kind:	\$ value _____	frequency _____ type _____
Other:	_____	
Required behavior	_____	
Required outcome	_____	

Provider:

	Economic incentive only	Multi-faceted intervention
Performance bonus – target outcome:	_____	\$value _____
Performance bonus – target behavior:	_____	\$value _____
Per-input bonus	_____	\$ value _____ total _____
FFS vs. salary/capitation	_____	Other: _____

Unit of randomization: \_\_\_\_\_

Treatment/control groups (enrolled):

Group 1	_____	N= _____	N= _____
Group 2	_____	N= _____	N= _____
Group 3	_____	N= _____	N= _____
Group 4	_____	N= _____	N= _____
Control	Y	N	
Comparison Group	Y	N	

**Appendix D. Abstraction Forms, Continued**

Use of Comparison Group:

- Before/after study group serves as its own comparison
- Control and treatment group from same population
  - Unmatched
  - Matched
- Control and treatment group from different populations
  - Unmatched
  - Matched
- Descriptive study, no comparison group
- Other

Follow-up period: \_\_\_\_\_

**Specification of Research Question(s):**

Statement of research question:

Primary: \_\_\_\_\_

Secondary: \_\_\_\_\_

Defn: Preventive Care: \_\_\_\_\_

Defn: Economic Incentive: \_\_\_\_\_

Outcome Measures: \_\_\_\_\_

Duration between intervention and measurement of outcomes \_\_\_\_\_

Key Factors (affecting outcome measures): \_\_\_\_\_

Stages of Change \_\_\_\_\_

**Statistical methodology:** (describe) \_\_\_\_\_

Unit of Allocation:

Unit of Analysis:

Analysis Denominator:

If not same units, any statistical corrections

made for clustering? Y   N

Sample-size justification or power calculation? Y   N

Costs/benefit analysis? Y   N

(describe) \_\_\_\_\_

Sub-group analysis? Y   N

(describe) \_\_\_\_\_

Reported Drop-outs? Y   N

Intention to treat? Y   N



**Appendix D. Abstraction Forms, Continued**

**Findings:** (note which group serves as comparison)

(record sd or se, range, p-value, odds ratios, if provided)	Group 1	Group 2	Group 3	Group 4
Outcome 1 Before: After: Significance: Precision:				
Outcome 2 Before: After: Significance: Precision:				
Outcome 3 Before: After: Significance: Precision:				
Outcome 4 Before: After: Significance: Precision:				

Dose Response: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Appendix D. Abstraction Forms, Continued

**Economic Incentives Article Abstraction Form** (Consumer version 1)

**Economic Incentives for Prevention  
University of Minnesota EPC**

**Preventive Behavior Target:** (circle all that apply)

Simple \_\_\_\_\_ Complex (sustained effort over time) \_\_\_\_\_  
 Immunization \_\_\_\_\_ Cancer Screening \_\_\_\_\_ Pre-natal/well-child care \_\_\_\_\_  
 Screening – other \_\_\_\_\_  
 Health promotion/lifestyle \_\_\_\_\_ Other \_\_\_\_\_

**Intervention Target:**

Consumer: child adolescent parent working age 65+  
 Other \_\_\_\_\_

**Participant Characteristics:**

(describe) \_\_\_\_\_

Mean Age: _____	Age Range: _____	Used in analysis?	
		Y	N
Gender: % Male _____	% Female _____	Y	N
Race/Ethnic Group:		Y	N
Caucasian _____	Black _____ Asian _____		
Hispanic _____	Other _____		
SES: Income _____	Occupation _____	Y	N
Vulnerable population: _____		Y	N
Geographic: Rural _____	Urban _____ Suburban _____	Y	N
Country: US _____	Non-US _____		

Defn of patient (ex: seen last 6 months) \_\_\_\_\_

Source:  
 Eligible: Medicare Medicaid WIC  
 Clinic/System Patients: hospital community clinic  
 provider lists  
 Other: \_\_\_\_\_

Number Eligible \_\_\_\_\_  
 Number Invited \_\_\_\_\_  
 Number Enrolled \_\_\_\_\_  
 Response Rate \_\_\_\_\_  
 Number subjects completed trial \_\_\_\_\_  
 Evidence of attrition bias concerns? \_\_\_\_\_

**Setting:** (circle all that apply)

Hospital	Office/Clinic	Academic	Mixed
Extended Care Facility	Rural	Urban	Suburban
Solo practice	Group practice	Staff clinic	Free clinic
Community center	Unclear/not stated		
Other (ex: school) _____			

## Appendix D. Abstraction Forms, Continued

### Randomization:

Unit of randomization: \_\_\_\_\_

Treatment/control groups:	enrolled	completed		
Group 1	_____	N=_____	N=_____	
Group 2	_____	N=_____	N=_____	
Group 3	_____	N=_____	N=_____	
Group 4	_____	N=_____	N=_____	

Follow-up period: \_\_\_\_\_

### Intervention(s):

#### Consumer:

	Economic incentive only	Multi-faceted intervention		
Gift:	\$ value _____	frequency _____	type _____	
Lottery:	\$ value _____	frequency _____	type _____	
Cash Incentive:	\$ value _____	frequency _____	total _____	
Coupons/In kind:	\$ value _____	frequency _____	type _____	

Other: \_\_\_\_\_

Required behavior \_\_\_\_\_

Required outcome \_\_\_\_\_

Incentive focus:      reward                      barrier removal                      unclear

Incentive timed to correspond with documented habit formation period?      Y      N

Incentive appropriate and coordinated with identified stage of change?      Y      N

### Specification of Research Question(s):

Defn: Preventive Care: \_\_\_\_\_

Defn: Economic Incentive: \_\_\_\_\_

Theoretical basis (eg, self-efficacy theory, health behavior model, Prochaska, etc.)

Outcome Measures:	Pre	Post
-------------------	-----	------

1) \_\_\_\_\_

2) \_\_\_\_\_

3) \_\_\_\_\_

4) \_\_\_\_\_

Duration between intervention and measurement of outcomes \_\_\_\_\_

Key Factors (affecting outcome measures): \_\_\_\_\_

**Appendix D. Abstraction Forms, Continued**

**Statistical methodology:** (describe) \_\_\_\_\_

Unit of Allocation:			
Unit of Analysis:			
Analysis Denominator:			
If not same units, any statistical corrections made for clustering?	Y	N	
Sample-size justification or power calculation?	Y	N	Unclear
Costs/benefit analysis? (describe) _____	Y	N	
Sub-group analysis? (describe) _____	Y	N	
Reported Drop-outs?	Y	N	Unclear
Intention to treat?	Y	N	Unclear

**Findings:** (note which group serves as comparison)

(record sd or se, range, p-value, odds ratios, if provided)	Group 1	Group 2	Group 3	Group 4
Outcome 1 Before: After: Significance: Precision:				
Outcome 2 Before: After: Significance: Precision:				
Outcome 3 Before: After: Significance: Precision:				
Outcome 4 Before: After: Significance: Precision:				

Dose Response: \_\_\_\_\_

## **Appendix D. Abstraction Forms, Continued**

Notes on findings, conclusions, limitations:

Reference Articles to pull:

## Appendix E. Algorithm

Domain Elements	Score (1-5 (poor -appropriate))	Importance Category
Study Data Structure:      ___ Cross-Section      ___ Cross Section/Time Series		
1. Is there an appropriate control group in the data?		1
2. Can the treatment be viewed as independent of factors unobserved to the researcher or did the researcher employ appropriate methods to correct for selection/attrition/omitted variable bias in the treatment?		1
3. Does the study's conclusions follow from the statistical estimates?		1
4. Is the set of control variables appropriate?		2
5. How closely does the study's objective(s) match the research issue of interest?		2
6. How representative of the relevant population is the sample population?		2
7. Are the outcome variables reliable measures of the outcome of interest?		2
8. Are the treatment variables reliable measures of the intervention of interest?		2
9. Are the statistical methods for estimating the effect of the treatment appropriate given the nature of the data?		2
10. How precise are the coefficient estimates?		2
11. Are the standard errors appropriately calculated given the estimation methodology and the structure of the data?		2
<b>Study Category</b>		

Study Category:

1. Very Informative (a score of at least 4 in all importance category 1 segments and a mean of 4 across the remaining segments)
2. Informative but questions remain on generalizability of findings (mean score of 3.5 across all categories and at least a 3 in all categories)
3. Not Informative (all other)

## Appendix F. Evidence Tables, Continued

Evidence Table 1. Included provider studies

Article ID First Author Country	Research Design and Quality	Prevention Category	Prevention Target	Intervention	Follow-up Period	Ns Practices Providers Patients	Group Assignment	Outcomes
ID# 001 Morrow et al., 1995 <sup>47</sup> US	Three year evaluation, before-after study  Score = 2	Simple	MMR immunization, cholesterol screening	Adjusted capitation rates	Three years 1987-1990	Practices: 418 for MMR, 271 for cholesterol	Group 1) Capitation rates adjusted by quality of care performance measures; audit determines following year cap rate	Significant finding for adjusted capitation: 1) Increase in percent of charts in office in compliance p<.05 2) Increase in percent of offices with <90% compliance p<.05
ID#003 Hillman et al., 1998 <sup>45</sup> US	RCT  Score = 3	Simple	Cancer screening	Performance bonus - target outcome	18 months	Practices: 52 (<100 MDs, 1200 charts)	Group 1) Control n=26 Group 2) Performance bonus - target outcome. 20% of capitation for three highest aggregate compliance scores; 10% for next three highest and three offices most improved n=26	No significant differences between groups for: * Percent of charts in compliance with breast exam indicators * Percent of charts in compliance with mammography indicators * Percent of charts in compliance with pap smear indicators * Percent of charts in compliance with colorectal exam indicators * All groups showed improvement over time p<.001. * Sub-group analysis: Group practices had greater # of charts in compliance with indicators p=.048
ID#004 Kouides et al., 1998 <sup>49</sup> US	RCT  Score = 3	Simple	Flu immunization	Performance bonus - target outcome	One flu season	Practices: 54	Group 1) Control n=27 Group 2) Performance bonus - target outcome. 10% additional reimbursement per shot provided if ≤ 70% immunization rate. 20% if ≤85% - n=27	Significant findings for performance bonus - target outcome: 1) change in percent immunized, p=.03 2) by regression, 7.1% of increase in documented immunization due to intervention, p=.05

## Appendix F. Evidence Tables, Continued

Article ID First Author Country	Research Design and Quality	Prevention Category	Prevention Target	Intervention	Follow-up Period	Ns Practices Providers Patients	Group Assignment	Outcomes
ID#005 Fairbrother et al., 1999 <sup>43</sup> US	RCT  Score = 3	Simple	Child immunizations – up to date (UTD) coverage of scheduled shots	Group 2) performance bonus - target outcome. Group 3) per-input bonus	8 months	MDs: 60 (patients from 2948 to 3019)	Group 1) Control n=15 Group 2) Performance bonus - target outcome and feedback \$1000 for 20% increase in UTD, \$2500 for 40%, \$5000 for reaching 80% coverage. n=15 Group 3) Per-input bonus and feedback. \$5 per administered shot and \$15 per office visit with completed coverage n=15 Group 4) Feedback only n=15	Significant findings for performance bonus - target outcome: 1) Percent of children documented UTD. p<.01 2) Percent vaccines administered outside the practice p<.05 * No significant differences for percent missed opportunity to immunize
ID#006 Fairbrother et al., 2001 <sup>44</sup> US	RCT  Score = 3	Simple	Child immunizations – up to date (UTD) coverage of scheduled shots	Group 2) performance bonus - target outcome. Group 3) per-input bonus	16 months	MDs: 57 (patients from 2792 to 2866)	Group 1) Control n=24 enrolled, n=21 completed Group 2) Performance bonus - target outcome and feedback \$1000 for 35% increase in UTD, \$2500 for 45%, \$5000 for reaching 80% coverage, \$7500 reaching 90%. n=26 enrolled, n=24 completed Group 3) Per-input bonus and feedback. \$5 per administered shot and \$15 per office visit with completed coverage n=14 enrolled, n=12 completed	Significant findings for performance bonus - target outcome: 1) Percent of children documented UTD. p<.05 2) Percent vaccines administered outside the practice p<.01 Significant findings for performance bonus - per input: 1) Percent of children documented UTD. p<.01 * No significant difference for percent missed opportunity to immunize



## Appendix F. Evidence Tables, Continued

Article ID First Author Country	Research Design and Quality	Prevention Category	Prevention Target	Intervention	Follow-up Period	Ns Practices Providers Patients	Group Assignment	Outcomes
ID#007 Hillman et al., 1999 <sup>46</sup> US	RCT  Score = 3	Simple	Well child, including immunizations	Performance bonus - target outcome	18 months	Practices: 49	Group 1) Control n=17 enrolled, n=15 completed Group 2) Performance bonus - target outcome plus feedback; 20% of capitation for three highest aggregate compliance scores; 10% for next three highest and three offices most improved. n=19 enrolled and completed Group 3) Feedback only n=17 enrolled, n=15 completed	No significant differences between groups for: * Total compliance score * Immunization compliance score * Other preventive care indicators compliance * Sub-group analysis 1) Group practices had higher immunization rates than solo p<.05 2) Pediatricians had higher overall compliance scores than other MDs p<.05
ID#008 Ritchie et al., 1992 <sup>51</sup> UK	Time series  Score = 2	Simple	Child immunizations	Performance bonus/ sanction - target payment	1986-1992	Practices: 95 General Practitioners: 313	Target payment - lump sum payment at 70% and 90% coverage levels; implemented 1990	* No change in trend from new contract for immunization rates for two and five year olds. Trend stabilized in 1991 * Removed seasonal pattern for five year olds (school-based) * Both two and five year olds – General practitioners and practices performing below 70% improved after 1990 * Only practice size showed relationship - solo more likely to not reach target levels * Target payments may have helped achieve an accelerated immunization schedule

## Appendix F. Evidence Tables, Continued

Article ID First Author Country	Research Design and Quality	Prevention Category	Prevention Target	Intervention	Follow-up Period	Ns Practices Providers Patients	Group Assignment	Outcomes
ID#011 Grady et al., <sup>48</sup> US	RCT  Score = 2	Simple	Cancer screening	Performance bonus - target behavior	First of three year study	Practices: 61 (Providers: 95, Patients 11,4426)	Group 1) Control – education only n=23 enrolled and completed Group 2) Education and chart sticker cues n=21 enrolled, n=18 completed Group 3) Education, chart sticker cues, feedback, token bonus of \$50 for 50% mammography referral rate, n=21 enrolled, n=20 completed	No significant difference for performance bonus - target behavior: * Mammography referral rate * Mammography completion * Mammography compliance
ID#018 Fox & Phua <sup>50</sup> US	Three-year evaluation, before- after study  Score = 2	Simple	Prenatal care	Fee increase	1985-1987	Patients: 1985 - 1332, 1986 - 1396, 1987 - 1532	Group 1) Raised fees for delivery from \$265 to \$795 and prenatal visits from \$17 to \$21	No significant change for raised fees for: * Number of prenatal visits * Average number of prenatal visits dropped. Baltimore City dropped from 6.82 to 4.71 * Large increase in prenatal care out-state areas

## Appendix F. Evidence Tables, Continued

Evidence Table 2. Included consumer studies data

Article ID Author Country	Prevention Definition	Theoretical Incentive Definition	Functional Incentive Definition	Economic Definition	Theory/ Justification	Prevention Target	Intervention	Incentive Condition	Confounders	Direct Test of Incentive Uptake or Desirability
#074 Sciacca et al., 1995 <sup>66</sup> US	Complex	Reward	Adhering	Income behavior	None	Breast- feeding	Coupon	Required behavior: complete educational program and self-reported breast feeding levels.	Unknown contribution from education, incentive, social support, and incentive to social support.	No
#032 Dey et al., 1999 <sup>102</sup> UK	Complex	Barrier removal - structural	Adhering	Purchasing behavior	None	Smoking cessation	Free/reduced medical	Required behavior - pick up patches from pharmacy		No
#071 Jeffery & French, 1999 <sup>74</sup> US	Complex	Barrier removal - attitudinal	Adhering	Income behavior	Behavioralist	Obesity prevention	Lottery	Required behavior - return postcard that was attached to the newsletter		No
#072 Jeffery et al., 1998 <sup>97</sup> US	Complex	Reward	Adhering	Income behavior	Behavioralist	Weight loss	Cash	Required behavior - attend supervised exercised sessions		No

## Appendix F. Evidence Tables, Continued

Article ID Author Country	Prevention Definition	Theoretica l Incentive Definition	Functional Incentive Definition	Economic Definition	Theory/ Justification	Prevention Target	Intervention	Incentive Condition	Confounders	Direct Test of Incentive Uptake or Desirability
#078 Wing et al., 1996 <sup>91</sup> US	Complex	Reward	Adhering	Income behavior	Behavioralist	Exercise	Lottery	Required behavior - attend exercise sessions. Travel lottery chances based on how many sessions attended		No
#091 Hughes et al., 1991 <sup>76</sup> US	Complex	Barrier removal - structural	Adhering	Purchasing behavior	None	Smoking cessation	Free/reduced medical	Required behavior – purchase gum		Yes - uptake
#107 Follick et al., 1984 <sup>109</sup> US	Complex	Reward/ negative reinforce- ment/ punishment	Adhering	Purchasing behavior	Behavioralist	Weight loss	Monetary contract (forfeit money to be successful)	Required behavior - attend weight loss educational sessions		Yes – uptake *No reporting of contract payments
#104 Jeffery et al., 1978 <sup>106</sup> US	Complex	Negative reinforce- ment/ punishment	Adhering/ outcome	Purchasing behavior	Behavioralist	Weight loss	Monetary contract	Required behavior – attendance. Required Outcome – calorie restriction and weight loss goals		No. **Subjects weren't unhappy with it." *Weight loss goal subjects most likely to forfeit money
#089 Anderson et al., 2001 <sup>102</sup> US	Complex	Barrier removal - structural	Facilitating	Purchasing behavior	None	Nutrition	Coupon	Required behavior - purchase food		Yes – uptake *87% redeemed at least some coupons, 58% redeemed all

## Appendix F. Evidence Tables, Continued

Article ID Author Country	Prevention Definition	Theoretica l Incentive Definition	Functional Incentive Definition	Economic Definition	Theory/ Justification	Prevention Target	Intervention	Incentive Condition	Confounders	Direct Test of Incentive Uptake or Desirability
#061 Francisco et al., 1994 <sup>93</sup> US	Complex	Reward	Outcome	Income behavior	None	Cholesterol level	Lottery	Required out-come - to participate in lottery, lower serum cholesterol by 20%, or be under 200, within 6 months		No *only 6 of 29 lottery eligible agreed in survey the lottery was important to their behavior
#069 Jeffery, Forster, French et al., 1993 <sup>105</sup> US	Complex	Reward	Outcome	Income behavior	Behavioralist	Weight loss	Cash	Required outcome - lose weight and maintain loss		No
#102 Jeffery et al., 1984 <sup>107</sup> US	Complex	Negative reinforce- ment/ punishment	Outcome	Purchasing behavior	Behavioralist	Weight Loss	Monetary contracts	Required outcome - weight loss		Yes – desirability
#103 Jeffery et al., 1983 <sup>108</sup> US	Complex	Reward/ punishment	Outcome	Purchasing behavior	Behavioralist	Weight loss	Monetary contract (forfeit money to be successful)	Required outcome - weight loss		Yes - desirability
#108 Windsor et al., 1988 <sup>96</sup> US	Complex	Reward	Outcome	Income behavior	None	Smoking cessation	Cash	Required outcome - abstinence		No

## Appendix F. Evidence Tables, Continued

Article ID Author Country	Prevention Definition	Theoretical Incentive Definition	Functional Incentive Definition	Economic Definition	Theory/ Justification	Prevention Target	Intervention	Incentive Condition	Confounders	Direct Test of Incentive Uptake or Desirability
#062 Gomel et al., 1993 <sup>69</sup> New Zealand	Complex	Reward	Outcome	Income behavior	Prochaska - no justification of chosen rewards	CVD prevention	Lottery + competition	Required behavior: self-reported progress toward or meeting lifestyle change goals	Unknown contribution from incentive, positive or negative team peer pressure, positive or negative effect of results reported publicly within the worksite	No
#065 Koffman et al., 1998 <sup>68</sup> US	Complex	Reward	Outcome	Income behavior	Prochaska, Bandura - no justification of chosen rewards	Smoking cessation	Cash + competition	Required outcome: lab-verified abstinence	Unknown contribution from incentive, positive or negative team peer pressure, positive or negative effect of results reported publicly within the worksite	No
#066 Jeffery, Forster, Baxter et al., 1993 <sup>98</sup> US	Complex	Negative reinforce- ment/ punishment	Outcome	Purchasing behavior	Behavioralist	Smoking cessation/ obesity	Monetary contract:	Required outcome: lab-verified smoking reduction goals or weight loss goals		No

## Appendix F. Evidence Tables, Continued

Article ID Author Country	Prevention Definition	Theoretical Incentive Definition	Functional Incentive Definition	Economic Definition	Theory/ Justification	Prevention Target	Intervention	Incentive Condition	Confounders	Direct Test of Incentive Uptake or Desirability
#079 Donatelle et al., 2000 <sup>67</sup> US	Complex	Reward	Outcome	Income behavior	Behavioral change - no justification of chosen rewards	Smoking cessation	Cash	Required outcome: lab-verified abstinence	Unknown contribution from incentive, social support, and incentive to social support	No
#082 Harland et al., 1999 <sup>99</sup> UK	Complex	Barrier removal - attitudinal	Participating	Income behavior	None	Exercise	Coupon	Required behavior - attend 40 minute motivational interviews		No *44% of group offered up to six vouchers used vouchers vs. 27% of group offered only one voucher
#105 Stitzer & Bigelow, 1983 <sup>75</sup> US	Complex	Reward	Participating	Income behavior	Behavioralist	Smoking cessation	Cash	Required out-come - reduce CO levels to 50% of baseline		Yes - uptake and desirability *No reporting on payments made
#084 Gottlieb & Nelson, 1990 <sup>71</sup> US	Complex	Reward	Participating	Income behavior	None	Smoking cessation	Gift + competition	Required behavior: Turkey buffet to work-sites with highest recruitment rate; pooled kitty to split among quitters at work-site with the highest proportion of quitters	Unknown contribution from competition, positive or negative team peer pressure. Recruitment procedures differed at each site	No

## Appendix F. Evidence Tables, Continued

Article ID Author Country	Prevention Definition	Theoretica l Incentive Definition	Functional Incentive Definition	Economic Definition	Theory/ Justification	Prevention Target	Intervention	Incentive Condition	Confounders	Direct Test of Incentive Uptake or Desirability
#109 Curry et al., 1991 <sup>72</sup> US	Complex	Reward	Participating	Income behavior	Deci & Ryan Intrinsic/ Extrinsic motivation; Bandura's self-efficacy	Smoking cessation	Gift + lottery	Required behavior: return unit progress reports of self-help program		No
#110 Klesges et al., 1987 <sup>70</sup> US	Complex	Reward	Participating/ outcome	Income behavior	None	Smoking cessation	Cash + competition	Required behavior: team with greatest percent of initial participants completing program; highest quit rate at 6 months; highest abstinence rate at 6 months	Unknown contribution from incentive, positive or negative team peer pressure, positive or negative effect of results reported publicly within the worksite	No
#096 Owen et al., 1990 <sup>73</sup> Australia	Simple	Reward	Participating	Income behavior	Social learning theory	Cholesterol level	Lottery	Required behavior - show up for retest		No. *Only 156 of the 1001 who showed for retest turned in lottery coupon
#075 Deren et al., 1994 <sup>52</sup> US	Simple	Reward	Participating	Income behavior	None	AIDS prevention	1) Cash 2) Coupon	Required behavior - attend educational sessions		Yes - desirability



## Appendix F. Evidence Tables, Continued

Article ID Author Country	Prevention Definition	Theoretical Incentive Definition	Functional Incentive Definition	Economic Definition	Theory/ Justification	Prevention Target	Intervention	Incentive Condition	Confounders	Direct Test of Incentive Uptake or Desirability
#076 Dahl et al., 1999 <sup>101</sup> US	Simple	Reward	Participating	Purchasing behavior	None/test if money- savings will overcome barriers such as embar- rassment	STD prevention	Coupon	Required behavior – purchase package of 12 condoms		No
#077 Kamb et al., 1998 <sup>64</sup> US	Simple	Reward	Participating	Income behavior	Extrinsic/ Intrinsic motivation; focus group determined size of meaningful rewards	HIV/STD prevention	1) Cash 2) Coupon	Required behavior - attend one 90 minute group education session and one 60 minute individual session		Yes - desirability
#092 Emont & Cummings, 1992 <sup>92</sup> US	Simple	Reward	Participating	Income behavior	None	Smoking cessation	Lottery	Required behavior - attend non- smoking clinic		Yes – uptake *only one participant reported the prize was a significant factor
#043 Birkhead et al., 1995 <sup>57</sup> US	Simple	Punishment	Adhering	Income behavior	None	Immunization	Must come to WIC offices monthly to pick up allotment of vouchers (normal every 2 months)	Required behavior - immunize child		No *Only 8 of 178 children dropped out during the disincentive
#049 Kerpelman et al., 2000 <sup>58</sup> US	Simple	Punishment	Adhering	Income behavior	None	Immunization	Lose AFDC benefits provided to non- immunized child	Required Behavior - provide proof of immunization		No *17 sanctions warnings, 11 actual sanctions affecting 8 of 1500 families

## Appendix F. Evidence Tables, Continued

Article ID Author Country	Prevention Definition	Theoretical Incentive Definition	Functional Incentive Definition	Economic Definition	Theory/ Justification	Prevention Target	Intervention	Incentive Condition	Confounders	Direct Test of Incentive Uptake or Desirability
#053 Kaplan et al., 2000 <sup>100</sup> US	Simple	Barrier removal	Adhering	Purchasing behavior	Health belief model, Anderson's framework of utilization	Followup of abnormal pap	1) Coupon 2) Free/ reduced medical	Required behavior: for voucher, attend at least one followup visit. No requirement for free bus passes	Unknown contributions of incentive vs. intensive contact. Non- equivalent sites	No
#034 Yokley & Glenwick, 1984 <sup>62</sup> US	Simple	Reward	Adhering	Income behavior	None	Immunization	1) Coupon 2) Lottery	Required Behaviors – 1) Leave child at clinic for shots and day care period, 2) Bring child in for shots		Yes - desirability
#038 Malotte et al., 1999 <sup>54</sup> US	Simple	Reward	Adhering	Income behavior	Reasoned action and behavioral	Tuberculosis screening	1) Cash 2) Coupon 1 3) Coupon 2	Required behavior - return for a reading of the Mantoux test		Yes - desirability
#048 Moran et al., 1996 <sup>63</sup> US	Simple	Reward	Adhering	Income behavior	Carter et al. decision model for factors considered important by elderly	Immunization	Lottery	Required behavior - receive shot at clinic		No
#054 Stevens- Simon et al., 1994 <sup>56</sup> US	Simple	Reward	Adhering	Income Behavior	None	Followup: post-partum exam	Gift	Required behavior - attend post- partum appointment		No

## Appendix F. Evidence Tables, Continued

Article ID Author Country	Prevention Definition	Theoretical Incentive Definition	Functional Incentive Definition	Economic Definition	Theory/ Justification	Prevention Target	Intervention	Incentive Condition	Confounders	Direct Test of Incentive Uptake or Desirability
#055 Smith et al., 1990 <sup>55</sup> US	Simple	Reward	Adhering	Income behavior	None/ jewelry chosen by focus group	Followup: post-partum exam	1) Coupon 2) Gift	Required behavior - attend post- partum appointment on assigned day		No *Child-based formula incentive was more effective
#094 Laken & Ager, 1995 <sup>65</sup> US	Simple	Reward	Adhering	Income behavior	None	Prenatal care	1) Coupon 2) Coupon + lottery	Required behavior - attend prenatal and postpartum check		Yes - uptake and desirability
#106 Malotte et al., 1998 <sup>53</sup> US	Simple	Reward	Adhering	Income behavior	Theory of reasoned action	Tuberculosis screening	1) Cash 1 2) Cash 2	Required behavior - return for skin test reading		Yes - desirability
#044 Hutchins et al., 1999 <sup>10</sup> US	Simple	Punishment	Adhering	Income behavior	None	Immunization	Must come to WIC offices monthly to pick up allotment of vouchers (normal every 3 months)	Required behavior - immunize child		No
#029 Freedman & Mitchell, 1994 <sup>59</sup> US	Simple	Barrier removal - structural	Facilitating	Purchasing behavior	None	Followup: cancer screening	Coupon	Required behavior - return completed fecal occult blood test within 3 months		Yes - uptake

## Appendix F. Evidence Tables, Continued

Article ID Author Country	Prevention Definition	Theoretical Incentive Definition	Functional Incentive Definition	Economic Definition	Theory/ Justification	Prevention Target	Intervention	Incentive Condition	Confounders	Direct Test of Incentive Uptake or Desirability
#037 Satterthwaite, 1997 <sup>104</sup> New Zealand	Simple	Barrier removal - structural	Facilitating	Purchasing behavior	None	Immunization	Free/reduced medical	Required behavior - receive flu shot		Yes - uptake
#047 Nexoe et al., 1997 <sup>78</sup> Denmark	Simple	Barrier removal - structural	Facilitating	Purchasing behavior	None	Immunization	Free/reduced medical	Required behavior - receive flu shot		Yes - uptake
#051 Marcus et al., 1992 <sup>60</sup> US	Simple	Barrier removal - structural	Facilitating	Income behavior - cognitive problem if didn't earn income	Health belief model, reasoned action	Followup: cancer screening	Coupon	Nothing required - mailed with followup reminder; may be used for other purposes		No *Self-report 33% used bus passes
#052 Marcus et al., 1998 <sup>61</sup> US	Simple	Barrier removal - structural	Facilitating	Purchasing behavior	None	Followup: cancer screening	Free/reduced medical	Required behavior - attend at least one followup visit		No *Vouchers used by 41.7% of those eligible
#095 Melnikow et al., 1997 <sup>77</sup> US	Simple	Barrier removal - structural	Facilitating	Purchasing behavior	None	Prenatal care	1) Coupon 2) Gift	Required behavior - attend first prenatal clinic visit		No *Only 1 of 24 taxi vouchers re- deemed. Log regression for confounders showed no significance
#042 Mayer et al., 1994 <sup>94</sup> US	Simple	Reward	Participating	Income behavior	None	Cancer screening – mammog- raphy	Gift	Required behavior - complete mammog- raphy		No *Only 10% redeemed coupon for the kit
#050 Mayer & Kellogg, 1989 <sup>95</sup> US	Simple	Reward	Participating	Income behavior	None	Cancer screening – mammog- raphy	Gift	Required behavior - complete mammog- raphy		No *Only 75% eligible collected the kit

## Appendix F. Evidence Tables, Continued

Evidence Table 3. Included consumer studies outcomes

Article ID Author Country	Prevention Definition	Prevention Target	Intervention	Incentive Condition	Group Assignment	Outcomes
#074 Sciacca et al., 1995 <sup>66</sup> US	Complex	Breast feeding	Gifts and raffles of high frequency and considerable value - from \$15 hair cuts to raffle for trip for two on Grand Canyon Railway. SO Partner also received incentives for attending.	Required behavior: complete educational program and self-reported breastfeeding levels	Group 1) Control - usual education n=29 completed Group 2) Education with a significant other (partner, parent, etc) plus incentives, n=26 completed	Significant Findings: * Differences between groups in exclusive breast feeding and exclusive formula feeding behaviors at discharge, two week, six week, and three month post-partum from p=.000 to p=.023
#032 Dey et al., 1999 <sup>103</sup> UK	Complex	Smoking cessation	Free nicotine patches for 12 weeks	Required behavior - pick up patches from pharmacy	Group 1) counseling and prescription, n=39 Group 2) Counseling and free patch, n=58	No significant difference between groups * Rate of self-reported abstinence * Lab-confirmed abstinence
#071 Jeffery & French, 1999 <sup>74</sup> US	Complex	Obesity prevention	Lottery: \$100, one per month for a 1/10 chance over three years	Required behavior - return postcard that was attached to the newsletter	Group 1) Control, standard behavioral therapy (SBT), n=414 Group 2) SBT + monthly educational newsletter, n=197 Group 3) SBT + newsletter + lottery, n=198	Significant Findings: * Response rate of returned postcards (direct measure of incentive) Group 2 - 65%, Group 3 - 71%, p<.05 * No significant differences for weight gain or behavior changes, though change was in the right direction
#072 Jeffery et al., 1998 <sup>97</sup> US	Complex	Weight loss	Cash Incentive: Graduated payments of \$1 to \$3 per exercise session, paid monthly, 222 total possible walks, \$266 potential total per person	Required behavior - attend supervised exercised sessions	Group 1) Control. Standard behavioral therapy (SBT), n=40 Group 2) SBT + Supervised exercise, n=41 Group 3) SBT + personal trainer, n=42 Group 4) SBT + incentive, n=37 Group 5) SBT + trainer + incentive, n=36	No significant findings for incentives * Self-reported exercise behavior * Body weight * Exercise session attendance

## Appendix F. Evidence Tables, Continued

Article ID Author Country	Prevention Definition	Prevention Target	Intervention	Incentive Condition	Group Assignment	Outcomes
#078 Wing et al., 1996 <sup>91</sup> US	Complex	Exercise	Lottery: one \$50 gift certificate (unknown type) at each exercise session and one \$2,000 travel certificate	Required behavior - attend exercise sessions. Travel lottery chances based on how many sessions attended	Group 1) 24 week programs with group meetings and three supervised exercise sessions per week, n=16 Group 2) Plus Incentive, n=21	No significant difference between groups * Weight loss * Attendance at exercise sessions
#091 Hughes et al., 1991 <sup>76</sup> US	Complex	Smoking cessation	Free or reduced price for nicotine gum; \$0, \$6 or \$20 vs full price of \$24	Required behavior – purchase gum	Group 1) Free gum, n=32 Group 2) \$6/box gum, n=36 Group 3) \$20/box gum, n=38	Significant Findings: * Decreased cost increased several measures of incidence of obtaining gum and long term use, p<.05 to p<.006 * Price elasticity higher for \$6 vs \$20 (.45) than free vs \$6 (.21) * Decreased cost had non-significant trend to increase cessation
#107 Follick et al., 1984 <sup>109</sup> US	Complex	Weight loss	Contract: Return \$5 per session, 14 session Cash: Forfeit money split between subjects who hadn't forfeited	Required behavior - attend weight loss educational sessions	Group 1) Weight loss program, n=24 Group 2) Program + monetary contract, n=24	Significant Findings: * Number of sessions attended per participant, Group 1 - 6.04, Group 2 - 9.42, p<.01 * No difference in weight loss between groups
#104 Jeffery et al., 1978 <sup>106</sup> US	Complex	Weight loss	Contract: return \$200, \$20 per week for 10 weeks, deposited if 1) attended meetings, 2) met calorie restriction goal, or 3) met weight loss goal	Required behavior – attendance Required outcome – calorie restriction and weight loss goals	Group 1) Control - no contract, n=3 Group 2) Weight contract, n=7 Group 3) Calorie contract, n=10 Group 4) Attendance contract, n=7	Significant Findings: * Weight and calorie contracts groups lost more weight than the attendance group, p<.05 * Attendance did not differ between groups * Calorie group more likely to keep detailed diary, p<.025

## Appendix F. Evidence Tables, Continued

Article ID Author Country	Prevention Definition	Prevention Target	Intervention	Incentive Condition	Group Assignment	Outcomes
#089 Anderson et al., 2001 <sup>102</sup> US	Complex	Nutrition	Coupons: fresh produce from farmers' markets, \$20 total	Required behavior - purchase food	Group 1) Control - no intervention, n=97 completed Group 2) Education, n=123 completed Group 3) Coupons, n=114 completed Group 4) Education + coupons, n=121 completed	Significant Findings: * Groups 3 and 4 more likely to have visited the farmer's market, p<.001 * Coupons increased fruit and vegetable consumption, p<.01 * Education "improved" attitudes and beliefs regarding fruit and vegetable consumption p<.01
#061 Francisco et al., 1994 <sup>93</sup> US	Complex	Cholesterol level	Lottery: Five \$100 cash prizes. 5 in 29 chance if all participants make goal	Required outcome - to participate in lottery, lower serum cholesterol by 20%, or be under 200, within six months	Group 1) Control - health fair and follow-up test, n=34 completed Group 2) health fair, test, and chance for lottery entry, n=29	Significant Findings: * Change in cholesterol level: Group 1 - 11.3% decrease, Group 2 - 13.2% decrease, p=.035
#069 Jeffery, Forster, French et al., 1993 <sup>105</sup> US	Complex	Weight loss	Cash Incentive: minimum of \$12.50 to maximum of \$25 per week depending on percent of goal attained, 20 weeks total	Required outcome - lose weight and maintain loss	Group 1) Control - no treatment Group 2) Standard behavioral therapy (SBT), n=40 Group 3) SBT + food provision, n=40 Group 4) SBT + incentive, n=40 Group 5) SBT + food provision + incentive, n=41	No significant findings for incentives. * Change in BMI, completion of food records, quality of diet, nutrition knowledge
#102 Jeffery et al., 1984 <sup>107</sup> US	Complex	Weight loss	Contract 1: return \$30 for every 5 pound reduction, total of \$150 Contract 2: return \$5, \$10, \$20, \$40, \$75 for successive five pound reductions	Required outcome - weight loss	Group assignment stratified by population source, 2X3 factorial design: 3 contract types and 2 long-term maintenance enhancements	Significant Findings: * Percent weight change higher for constant contract (10.8%) vs control (8.5%), p<.03, and increasing contract (12.8%) vs control (8.5%), p<.001

## Appendix F. Evidence Tables, Continued

Article ID Author Country	Prevention Definition	Prevention Target	Intervention	Incentive Condition	Group Assignment	Outcomes
#103 Jeffery et al., 1983 <sup>108</sup> US	Complex	Weight loss	Contracts: refunds of \$1, \$5, or \$10 per pound (\$30, \$150, or \$300 total). Forfeit money split between participants who made goal	Required outcome - weight loss	2X3 factorial design. Contract levels of \$30, \$150, and \$300, and group or individual contracts.	No significant difference between contract sizes: * Weight loss * Group contracts lost more weight than individual, p<.05
#108 Windsor et al., 1988 <sup>96</sup> US	Complex	Smoking cessation	Cash Incentive of \$25 at six weeks and \$25 at six months	Required outcome - abstinence	Group 1) Control - self help program, n= 95  Group 2) Self-help+skills training/social support, n=94  Group 3) Self-help + incentive, n=95  Group 4) Self-help+skills training/ social support + incentive, n=94	No difference in cessation rates between groups for incentives
#062 Gomel et al., 1993 <sup>99</sup> New Zealand	Complex	CVD prevention	Lottery + Competition: Two lottery draws for \$40, \$40 for meeting 3threemonth goal, 1/4 chance at \$1,000 prize for station with highest percent meeting goals	Required behavior: self- reported progress toward or meeting lifestyle change goals	Group 1) Control - health risk assessment n=115 completed  Group 2) hra+risk factor education n=70 completed  Group 3) hra+behavioral counseling n=102 completed  Group 4) hra+counseling+incentive n=77	Significant Findings * BMI, body fat percent, mean blood pressure, aerobic capacity, quit rates - Group 4 usually had strong response within six months but relapsed to initial levels by 12 months
#065 Koffman et al., 1998 <sup>68</sup> US	Complex	Smoking cessation	Prize + competition: workers paid \$50 to participate, rewarded \$15/month of abstinence for up to five months, plus first place team wins up to \$1,980 (split five ways), 1/13 chance to win	Required outcome: lab- verified abstinence	Group 1) Control - traditional non-smoking program. Worksite n=29  Group 2) Multifaceted program. Worksite n=80  Group 3) Multifaceted program + incentive. Worksite n=68	Significant Findings: * Group 3 quit rates significantly higher than Group 2 at end of 6 month program, p=.02 * Biochem confirmed quit rates were not significantly different between Groups 2 and 3 at six months past program



## Appendix F. Evidence Tables, Continued

Article ID Author Country	Prevention Definition	Prevention Target	Intervention	Incentive Condition	Group Assignment	Outcomes
#066 Jeffery, Forster, Baxter et al., 1993 <sup>98</sup> US	Complex	Smoking cessation/ obesity	Monetary contract: money withheld from paycheck, minimum of \$5 per check. If goal met, money returned to employee	Required outcome: lab- verified smoking reduction goals or weight loss goals	Group 1) Control - no treatment, n=16, 645 employees  Group 2) 11 bi-weekly behavior modification sessions + incentive, n=16, 597 employees	Significant Findings: Group 2 significantly greater smoking abstinence at end of program, p=.03.
#079 Donatelle et al., 2000 <sup>67</sup> US	Complex	Smoking cessation	Cash: \$50 per month for each abstinent month, max of ten months, pre-term + two months post-partum	Required outcome: lab- verified abstinence	Group 1) Control - education, n=108  Group 2) education + incentives + social support from significant other	Significant Findings: * Biochem confirmed quit rates p<.0001 at eight months, p<.0009 at two months post- partum
#082 Harland et al., 1999 <sup>99</sup> UK	Complex	Exercise	Coupons: One free use of fitness center, up to six possible	Required behavior - attend 40 minute motivational interviews	Group 1) Control - baseline health risk assessment, n=91 completed  Group 2) baseline hra + 1 interview, n=96 completed  Group 3) baseline hra + 1 interview and voucher, n=88 completed  Group 4) baseline hra + 6 interviews, n=88 completed  Group 5) baseline hra + 6 interviews and vouchers	No significant difference attributable to vouchers. * Increased self-report physical activity * Increased self-report moderate activity * increased self-report vigorous activity * Regression analysis showed interaction effect between vouchers and interview, p=.01 * No lasting effects at 12 month followup
#105 Stitzer & Bigelow, 1983 <sup>75</sup> US	Complex	Smoking cessation	Cash Incentive of \$0, \$1, \$5, or \$10 per day, ten payment periods	Required out- come - reduce CO levels to 50% of baseline	Group 1) \$0 payment group  Group 2) \$1 payment group  Group 3) \$5 payment group  Group 4) \$10 payment group	Significant Findings: * CO levels decreased in orderly fashion as pay increased, p<.001 * Number of daytime cigarettes also decreased in orderly fashion, p<.001 * Percent of targets met increased in orderly fashion, p<.01

## Appendix F. Evidence Tables, Continued

Article ID Author Country	Prevention Definition	Prevention Target	Intervention	Incentive Condition	Group Assignment	Outcomes
#084 Gottlieb & Nelson, 1990 <sup>71</sup> US	Complex	Smoking cessation	Prize + Competition: Cold turkey buffet; participants (smokers and non-smoking supporters) were charged a \$5 incentive fee which was pooled and refunded to winning worksites	Required behavior: Turkey buffet to work-sites with highest recruitment rate; pooled kitty to split among quitters at work-site with the highest proportion of quitters	Group 1) Control/ Comparison - non-competition sites, n=6 Group 2) Competition sites, n=6	Significant Findings: * 70% of employees in Group 2 participated in program vs 17% of employees in Group 1, p<.001 * 28% of smokers in Group 2 participated vs 6% of smokers in Group 1, p<.001
#109 Curry et al., 1991 <sup>72</sup> US	Complex	Smoking cessation	Gift: ceramic coffee mug at the end of first two program units. Lottery: All-expense-paid one-week trip for two to Hawaii, expense-paid weekend at San Juan Island resort, weekend at a deluxe hotel in downtown Seattle. Bonus entries for returning second two program units.	Required behavior: return unit progress reports of self-help program	Group 1) Control - self-help program, n=305 Group 2) Intrinsic motivation - personalized feedback + program, n=304 Group 3) Extrinsic motivation - financial incentives + program, n=304 Group 4) Intrinsic + extrinsic + program, n=304	Significant Findings: * Extrinsic more likely to complete first unit, p=.0001, and complete at least one activity in more than one of the last six units, p=.039 * Intrinsic more likely to show continuous abstinence, p=.004 Compared to extrinsic groups, intrinsic OR was 2.67
#110 Klesges et al., 1987 <sup>70</sup> US	Complex	Smoking cessation	Prize + Competition: within site competition between teams, prizes of \$5 to \$15 per participant	Required behavior: team with greatest percent of initial participants completing program; highest quit rate at six months; highest abstinence rate at six months	Group 1) Control/ Comparison - non-competition sites, n= not reported Group 2) Competition sites, n=not reported	Significant Findings: * Higher cessation rates for Group 2, 39% vs 16%, p<.01, at end of program * Six-month followup, no significant difference between groups

## Appendix F. Evidence Tables, Continued

Article ID Author Country	Prevention Definition	Prevention Target	Intervention	Incentive Condition	Group Assignment	Outcomes
#096 Owen et al., 1990 <sup>73</sup> Australia	Simple	Cholesterol level	Lottery: microwave oven	Required behavior - show up for retest	Group 1) Control - no reminder of retest, n=1659 Group 2) Reminder letter for retest, n=1648 Group 3) Reminder letter + lottery ticket, n=1629	No significant differences between groups: * Percent returning for retest * Cholesterol levels * BMI * Weight
#075 Deren et al., 1994 <sup>52</sup> US	Simple	AIDS prevention	1) Cash incentive, three possible (\$35 total) versus 2) Grocery gift certificates, three possible (\$35 total)	Required behavior - attend educational sessions	Group 1) Money orders, n=1455 Group 2) Grocery gift certificates, n=551	Significant Findings: * Difference in percent returning to initial session: Group 1 - 83%, Group 2 - 66%, p<.001 * Difference in percent attending at least one session: Group 1 - 50%, Group 2 - 36%, p<.01
#076 Dahl et al., 1999 <sup>101</sup> US	Simple	STD prevention	"High value" coupons - 75% off purchase price	Required behavior – purchase package of 12 condoms	Group 1) Control - 10% off coupons Group 2) High value coupons, 75% off	Significant Findings: * Widespread disbursement redemption rate: 0 control coupons vs 13 high value coupons, p<.01 * No difference between in-store coupon redemption rates
#077 Kamb et al., 1998 <sup>64</sup> US	Simple	HIV/STD prevention	1) Cash incentive, two possible (\$15 each) versus 2) Coupons for goods and services, two possible (\$15 each)	Required behavior - attend one 90 minute group education session and one 60 minute individual session	Group 1) coupon incentives, n=160 Group 2) cash incentives, n=198	Significant Findings: * Difference in education participation rate, Group session: Group 1 - 46%, Group 2 - 67%, p<.0001 Both sessions: Group 1 - 37%, Group 2 - 55%, p<.0001 * More enrolled in Group 2 - 31%, than Group 1 - 23%, p=.002

## Appendix F. Evidence Tables, Continued

Article ID Author Country	Prevention Definition	Prevention Target	Intervention	Incentive Condition	Group Assignment	Outcomes
#092 Emont & Cummings, 1992 <sup>92</sup> US	Simple	Smoking cessation	Lottery: dinner for two at a local restaurant	Required behavior - attend non- smoking clinic	Group 1) Control - received registration material for off-site cessation program, n=34 sites Group 2) Lottery ticket plus registration package, n=33 sites	No significant difference between groups in participation rates
#043 Birkhead et al., 1995 <sup>57</sup> US	Simple	Immunization	Must come to WIC offices monthly to pick up allotment of vouchers (normal every two months)	Required behavior - immunize child	Group 1) education and "referral", n=281 Group 2) education and escort to immunization, n=377 3) education and voucher disincentive, n=178	Significant Findings: * Increased immunization rate, Group 2 - RR 1.58, Group 3 - RR 1.44 * Shorter time to vaccination, Group 1- 45 days, Group 2 - 14 days, p<.001, Group 3 - 26 days, p<.001
#049 Kerpelman et al., 2000 <sup>58</sup> US	Simple	Immunization	Lose AFDC benefits provided to nonimmunized child	Required Behavior - provide proof of immunization	Group 1) Control - usual care, n=1000 Group 2) Subject to sanction, n=1500	Significant Findings: * Group 2 had statistically significant (p<.05) and clinically meaningful higher coverage (6-7% points) for all five vaccines for all five years
#053 Kaplan et al., 2000 <sup>100</sup> US	Simple	Followup of abnormal pap	1) Fee bus passes mailed out with reminders 2) Voucher for \$15 off a \$40 clinic fee, redeemable by those at higher risk	Required behavior: for voucher, attend at least one followup visit. No requirement for free bus passes	Group 1) Control - usual follow-up Group 2) Incentives and intensive contact	No significant differences between groups

## Appendix F. Evidence Tables, Continued

Article ID Author Country	Prevention Definition	Prevention Target	Intervention	Incentive Condition	Group Assignment	Outcomes
#034 Yokley & Glenwick, 1984 <sup>62</sup> US	Simple	Immunization	1) Free day care 2) Lottery of \$25, \$50, and \$100 cash prizes	Required Behaviors – 1) Leave child at clinic for shots and day care period 2) Bring child in for shots	Group 1) Control (combined pure control n=119 completed, and attention control, n=108 completed) Group 2) general prompt, n=124 Group 3) personalized prompt, n=119 Group 4) personal prompt + increased access (day care) n=125 Group 5) personal prompt + lottery incentive n=120	Significant Findings (at two week followup): * Increased number of children receiving shots - Group 1 - 11 children, Group 4 - 20 children, Group 5 - 27 children, p<.05 * Increased number of children attending clinic - Group 1 - 13 children, Group 4 - 22 children, Group 5 - 32 children, p<.05 * Increased total number of shots - Group 1 - 22, Group 4 - 38, p<.05, Group 5 - 46, p<.05
#038 Malotte et al., 1999 <sup>54</sup> US	Simple	Tuberculosis screening	1) Cash Incentive of \$10 2) Grocery gift certificate \$10 3) Free bus passes or fast food coupons for total of \$10.	Required behavior - return for a reading of the Mantoux test	Group 1) Control, n=215 Group 2) Cash incentive, n=217 Group 3) Grocery incentive, n=217 Group 4) Choice of bus pass or fast food chain coupons, n=218 Group 5) 5-10 minute motivational education session, n=214	Significant Findings: * Percent returned on time for reading: Group 1 - 49%, Group 2 - 95%, OR 19.2, CI 9.9-37.3, p<.001, Group 3 - 86%, OR 6.2, CI 3.9-9.8, p<.001, Group 4 - 83%, OR 4.9, CI 3.1-7.6, p<.001. Group 5 - 47% * Group 2 vs Group 3, p=.002. Group 2 vs Group 4, p<.001
#048 Moran et al., 1996 <sup>63</sup> US	Simple	Immunization	Lottery: Three \$50 grocery gift certificates	Required behavior - receive shot at clinic	Group 1) Control, n=202 Group 2) Educational brochure, n=198 Group 3) Lottery incentive, n=198 Group 4) Brochure + lottery, n=199	Significant Findings: * Percent receiving shot, Group 1 - 20%, Group 2 - 36%, OR 2.29, CI 1.45-3.61, p=.0004, Group 3 - 29%, OR 1.68, CI 1.05 - 2.68, p=.0308, Group 4 - 26%, OR 1.41, non-significant * For patients with no prior immunization history, only brochure was effective, p=.0002

## Appendix F. Evidence Tables, Continued

Article ID Author Country	Prevention Definition	Prevention Target	Intervention	Incentive Condition	Group Assignment	Outcomes
#054 Stevens- Simon et al., 1994 <sup>56</sup> US	Simple	Followup: post-partum exam	Gift: Gerry Cuddler (unknown value)	Required behavior - attend post- partum appointment	Group 1) Control - appointment recommendation, n=132 Group 2) Recommendation and coupon for gift, n=108	Significant Findings: * Compliance at eight weeks; Group 1 - 52%, Group 2 - 71%, p=.002 * Compliance at 12 weeks: Group 1 - 65%, Group 2 - 82%, p=.003
#055 Smith et al., 1990 <sup>55</sup> US	Simple	Followup: post-partum exam	1) Coupon for infant formula (unknown value) 2) gift of jewelry (unknown value)	Required behavior - attend post- partum appointment on assigned day	Group 1) Control, n=192 Group 2) Infant formula coupon, n=149 Group 3) Jewelry gift, n=193	Significant Findings: * Adherence rate: Group 1 - 22%, Group 2 - 37%, p<.003, Group 3 - 23% * Controlling for ethnicity, Group B significance dropped to p=.07 for blacks
#094 Laken & Ager, 1995 <sup>65</sup> US	Simple	Prenatal care	1) \$5 department store gift certificate 2) \$5 gift certificate + \$100 raffle	Required behavior - attend prenatal and postpartum check	Group 1) Control - usual care, n=101 Group 2) Gift certificates for each prenatal appointment, n=51 Group 3) Gift certificates for each visit + raffle, n=53	No significant differences between groups for: * Percent missed prenatal appointments * Percent attending post-partum appointment * Length of gestation * Birth weight
#106 Malotte et al., 1998 <sup>53</sup> US	Simple	Tuberculosis screening	Cash Incentive 1) \$5 Cash Incentive 2) \$10	Require d behavior - return for skin test reading	2X3 factorial design. Education or no education by \$0, \$5, and \$10 cash incentive	Significant Findings: * Odds ratio for \$5 incentive = 11.2, \$10 incentive = 24.5 * Education was not significant

## Appendix F. Evidence Tables, Continued

Article ID Author Country	Prevention Definition	Prevention Target	Intervention	Incentive Condition	Group Assignment	Outcomes
#044 Hutchins et al., 1999 <sup>110</sup> US	Simple	Immunization	Must come to WIC offices monthly to pick up allotment of vouchers (normal every three months)	Required behavior - immunize child	Group 1) Control - no immunization referral, n=2 sites Group 2) On-site nurse referral and incentive, n= 2 sites Group 3) On-site clinic referral and incentive, n= 1 site Group 4) Off-site referral and incentive, n= 2 sites	Significant findings: * For enrolled children, coverage increased 10% at first birthday and 23% at second birthday for intervention groups. Control groups decreased 4% and 9% respectively, p<.05 * For active WIC participants, increases for intervention groups was 52% by second year vs 2% for the control group
#029 Freedman & Mitchell, 1994 <sup>59</sup> US	Simple	Followup: cancer screening	Free postage	Required behavior - return completed fecal occult blood test within three months	Group 1) Control - return at next visit, n=49 Group 2) Return envelope provided, n=46 Group 3) Stamped return envelope provided, n= 51	Significant Findings: * Increase in adherence rate, p=.003 Adherence rate: Group 1 - 37%, Group 2 - 57%, Group 3 - 71%
#037 Satterthwaite, 1997 <sup>104</sup> New Zealand	Simple	Immunization	Free flu shots (unknown value)	Required behavior - receive flu shot	Group 1) Control - usual care, n=930 Group 2) Invitation letter, n=931 Group 3) Invitation letter and free shot, n=930	Significant Findings: * Increase in vaccination rate, p<0.001 Vaccination rate: Group 1 - 17%, Group 2 - 27%, Group 3 - 45%
#047 Nexoe et al., 1997 <sup>78</sup> Denmark	Simple	Immunization	Free flu shots (\$40-\$60 value)	Required behavior - receive flu shot	Group 1) Control - usual care, n=195 Group 2) Invitation letter, n=195 Group 3) Invitation letter and free shot, n=195	Significant Findings: * Increase in vaccination rate, p<0.01 Vaccination rate: Group 1 - 25%, Group 2 - 49%, Group 3 - 72%

## Appendix F. Evidence Tables, Continued

Article ID Author Country	Prevention Definition	Prevention Target	Intervention	Incentive Condition	Group Assignment	Outcomes
#051 Marcus et al., 1992 <sup>60</sup> US	Simple	Followup: cancer screening	Free bus transportation (\$2.00 to \$2.90 value)	Nothing required - mailed with followup reminder; may be used for other purposes	2X2X2 factorial table assignment totaling 8 groups.  Three intervention factors: 1) personalized followup 2) educational video 3) transportation incentives	Significant Findings: * Improved loss-to-followup - transportation incentive p<.05, OR 1.48, CI 1.06 - 2.06 * Sub-group - more likely for county (vs non-county) patients, p<.05, more severe pap score, p<.01, and non- insured, p<.01
#052 Marcus et al., 1998 <sup>61</sup> US	Simple	Followup: cancer screening	Voucher: \$20 to \$25 off clinic visit fee, about 2/3 price reduction, redeemable by non- insured patients, about 70% of pop	Required behavior - attend at least one followup visit	Group 1) Control, n=377 Group 2) Intensive contact follow-up, n=335 Group 3) Voucher incentive, n=396 Group 4) Intensive + incentive, n=345	Significant Findings: * Improved loss-to-followup - Group 2 - OR 1.56, CI 1.12 - 2.17, p<.01, Group 3 - OR 1.50, CI 1.09 - 2.05, p<.01 * Regression analysis showed no interaction effect between two intervention factors
#095 Melnikow et al., 1997 <sup>77</sup> US	Simple	Prenatal care	1) Taxicab voucher 2) Gift: baby blanket	Required behavior - attend first prenatal clinic visit	Group 1) Control - usual care, n=35 Group 2) Blanket incentive, n=35 Group 3) Taxi voucher, n=34	Significant Findings: * Compliance with first appointment, Group 1 - 66%, Group 2 - 54%, Group 3 - 82%, Unadjusted OR 0.32 (CI 0.12 - 0.88) * No significance difference for Group 2, blanket incentive
#042 Mayer et al., 1994 <sup>94</sup> US	Simple	Cancer screening – mammog- raphy	Gift: Stay-fit Nutrition Kit (brochures and educational material valued at \$2)	Required behavior - complete mammography	Group 1) Control - reminder postcard, n=91 Group 2) Postcard and gift coupon, n=96	No significant difference, and change in wrong direction * Percent difference in appointment keeping rate
#050 Mayer & Kellogg, 1989 <sup>95</sup> US	Simple	Cancer screening – mammog- raphy	Gift: Stay-fit Nutrition Kit (brochures and educational material valued at \$2)	Required behavior - complete mammography	Group 1) Control - information, n=49 Group 2) Information and coupon for gift package, n=47	Significant Findings: * Increase in appointment keeping rate, p<0.05 Appointment rate: Group 1 - 59%, Group 2 - 81%



## Appendix F. Evidence Tables, Continued

Evidence Table 4. Provider populations

Article ID First Author Country	Research Design	Prevention Category	Prevention Target	Provider Population	Group Size	Patient Population
#001 Morrow et al., 1995 <sup>47</sup> US	3 year evaluation, before/after Study	Simple	MMR immunization, cholesterol screening	Primary care providers of a commercial IPA-HMO in northeastern US	Offices suggested to be majority solo practice (1-2 MDs)	HMO general population with office visits in northeastern US
#003 Hillman et al., 1998 <sup>45</sup> US	RCT	Simple	Cancer screening	Primary care providers of a Philadelphia Medicaid IPA-HMO	Of practices, 31 solo, 21 group.	Medicaid covered women with office visits in Philadelphia
#004 Kouides et al., 1998 <sup>49</sup> US	RCT	Simple	Flu immunization	Solo and group practices accepting Medicare in Monroe County, New York	Of practices, 28 solo, 28 group Group sizes: 2 MD = 11 3 MD = 6 4 MD = 5 above 4 MD = 6	Medicare patients with office visits - target lists by provider in Monroe County, NY
#005 Fairbrother et al., 1999 <sup>43</sup> US	RCT	Simple	Child immunizations - up to date (UTD) coverage of scheduled shots	New York urban primary care practices servicing primarily Medicaid		Medicaid covered children with office visits in urban NY
#006 Fairbrother et al., 2001 <sup>44</sup> US	RCT	Simple	Child immunizations - up to date coverage of scheduled shots	New York urban primary care practices servicing primarily Medicaid		Medicaid covered children with office visits in urban NY
#007 Hillman et al., 1999 <sup>46</sup> US	RCT	Simple	Well child, including immunizations	Primary care providers of a Philadelphia Medicaid IPA-HMO	Of practices, 21 solo, 28 group	Medicaid covered children with office visits in Philadelphia
#008 Ritchie et al., 1992 <sup>51</sup> UK	Time series	Simple	Child immunizations	General practice providers in Grampian, Scotland	Of practices, 23 solo, 71 group	Primary and preschool children in Grampian, Scotland
#011 Grady et al., 1997 <sup>48</sup> US	RCT	Simple	Cancer screening	GPs, family practice, internal medicine - small urban community practices in Dayton, Ohio, and Springfield, Massachusetts	Of practices, 39 solo, 56 group. Group sizes: 2 MD = 21; 3 MD = 5; 4 MD = 25; 5 MD = 5	Women 50+; consecutive appointments
#018 Fox & Phua, 1995 <sup>50</sup> US	3 year evaluation, before/after study	Simple	Prenatal care	Maryland providers of obstetric services		Women continuously enrolled in Medicaid for one year and who delivered in final four months of the fiscal year

## Appendix F. Evidence Tables, Continued

Evidence Table 5. Consumer populations

Article ID Author Country	Research Design and Quality	Definition of Prevention	Prevention Target	Participants	Setting	Intervention	Follow-up Period
#029 Freedman & Mitchell, 1994 <sup>59</sup> US	RCT Score = 4	Simple	Cancer screening - fecal occult blood test	Consecutive patients at an internal medicine teaching clinic	Internal medicine teaching clinic	Free postage	15 months
#047 Nexoë et al., 1997 <sup>78</sup> Denmark	RCT Score = 4	Simple	Immunization	GP patients with medical indication for immunization	Solo practices	Free flu shots (\$40-\$60 value)	1995 flu season
#037 Satterthwaite, 1997 <sup>104</sup> New Zealand	RCT Score = 3	Simple	Immunization	GP patients over 65	16 Auckland GP clinics	Free flu shots (unknown value)	One flu season
#043 Birkhead et al., 1995 <sup>57</sup> US	RCT Score = 3	Simple	Immunization	Not immunized children, 12-59 months, of mothers enrolled in WIC	6 New York city WIC offices with clinics	Must come to WIC offices monthly to pick up allotment of vouchers (normal every two months)	8 months
#050 Mayer & Kellogg, 1989 <sup>95</sup> US	RCT Score = 2	Simple	Cancer screening – mammog- raphy	San Diego general population, TV recruitment for low-cost community program - 35+ years old, no previous mammogram	Mammography facilities in San Diego	Gift: stay-fit nutrition kit (brochures and educational material valued at \$2)	1 month
#042 Mayer et al., 1994 <sup>94</sup> US	RCT Score = 2	Simple	Cancer screening – mammog- raphy	Women 50+ who were due for an annual mammography	Mammography facility in San Diego	Gift: stay-fit nutrition kit (brochures and educational material valued at \$2)	2 months
#055 Smith et al., 1990 <sup>55</sup> US	RCT Score = 2	Simple	Post-partum exam	Teen mothers who delivered at a Houston City-county hospital, low SES	Teen health clinic of a Houston-city county hospital	1) Coupon for infant formula (unknown value) 2) Gift of jewelry (unknown value)	1 year
#054 Stevens-Simon et al., 1994 <sup>56</sup> US	RCT Score = 4	Simple	Post-partum exam	Consecutively enrolled pregnant teens participating in the Colorado Adolescent Maternity Program, low SES	Unclear type of clinic setting	Gift: Gerry Cuddler (unknown value)	12 weeks; unclear study period
#032 Dey et al., 1999 <sup>103</sup> UK	RCT Score = 2	Complex	Smoking cessation	Patients, aged 25-64, smoke more than 15 cigarettes per day and expressed interest to quit	East Lancashire GP clinics	Free nicotine patches for 12 weeks	12 weeks NRT + 2 weeks followup

## Appendix F. Evidence Tables, Continued

Article ID Author Country	Research Design and Quality	Definition of Prevention	Prevention Target	Participants	Setting	Intervention	Follow-up Period
#076 Dahl et al., 1999 <sup>101</sup> US	Quasi- experimental  Score = 2	Simple	STD prevention	Sexually active young adults, age 18-30; convenience populations from public gathering places and drug stores	Distributed at 1) public gathering places, "widespread disbursement" and 2) drug stores "in- store disbursement"	"High value" coupons - 75% off purchase price	4 months
#077 Kamb et al., 1998 <sup>64</sup> US	Quasi- experimental  Score = 2	Simple	HIV/STD prevention	Patients attending five inner-city STD clinics	Atlanta, Georgia, STD clinics	1) Cash incentive, 2 possible (\$15 each) versus 2) Coupons for goods and services, 2 possible (\$15 each)	3 weeks; 2 years
#082 Harland et al., 1999 <sup>99</sup> UK	RCT  Score = 2	Complex	Exercise	Patient list of GP located in SES disadvantaged area, 40-64 year olds not previously engaged in an exercise program	Fitness facilities and community centers	Coupons: 1 free use of fitness center, up to 6 possible	18 months
#061 Francisco et al., 1994 <sup>93</sup> US	RCT  Score = 2	Complex	Cholesterol level	Voluntary participants with Cholesterol >200 at a health fair for a Kansas School District Union	Worksite fitness program	Lottery: 5 \$100 cash prizes. 5 in 29 chance if all participants make goal	6 months
#049 Kerpelman et al., 2000 <sup>58</sup> US	RCT  Score = 2	Simple	Immunization	Families with preschool children receiving AFDC, in Muscogee, Georgia	General community; government offices	Lose AFDC benefits provided to non-immunized child	4 years
#075 Deren et al., 1994 <sup>52</sup> US	Quasi- experimental  Score = 2	Simple	AIDS Prevention	Intravenous drug users (IDU) and sexual partners of IDUs recruited in Harlem and Cleveland outreach programs	Neighborhood AIDS outreach sites	1) Cash incentive, 3 possible (\$35 total) versus 2) Grocery gift certificates, 3 possible (\$35 total)	Harlem: May - Dec 1989  Cleveland: Apr 1989 to Nov 1990
#051 Marcus et al., 1992 <sup>60</sup> US	RCT  Score = 3	Simple	Followup of abnormal pap	Female patients of Los Angeles county primary health care clinics. Low SES, 69% non-white, majority Hispanic	Mixed settings, county hospital outpatient clinics, community clinics, University clinics, 12 in all	Free bus transportation (\$2.00 to \$2.90 value)	2 years

## Appendix F. Evidence Tables, Continued

Article ID Author Country	Research Design and Quality	Definition of Prevention	Prevention Target	Participants	Setting	Intervention	Follow-up Period
#052 Marcus et al., 1998 <sup>61</sup> US	RCT  Score = 3	Simple	Followup of abnormal pap	Female patients of Los Angeles county primary health care clinics. Low SES, 84% Hispanic	Two county hospitals with two outpatient clinics each	Voucher: \$20 to \$25 off clinic visit fee, about 2/3 price reduction, redeemable by non- insured patients, about 70% of population	44 months
#034 Yokley & Glenwick, 1984 <sup>62</sup> US	RCT  Score = 1	Simple	Immunization	Immunization deficient pre- school children of a public health clinic in a medium- sized Midwest city	Urban public health clinic	1) Free day care 2) 1 Lottery of \$25, \$50, and \$100 cash prizes	3 months
#038 Malotte et al., 1999 <sup>54</sup> US	RCT  Score = 3	Simple	Tuberculosis screening	Active drug users from Long Beach, California, with no previous TB history	Urban store-front research facility in downtown	1) Cash Incentive of \$10 2) Grocery gift certificate \$10 3) Free bus passes or fast food coupons for total of \$10	2 years
#048 Moran et al., 1996 <sup>63</sup> US	RCT  Score = 2	Simple	Immunization	Patients, seen within last 18 months, high -risk for flu, of an urban community health center, generally lower SES	Urban community health center	Lottery : 3 \$50 grocery gift certificates	1991-92 flu season
#078 Wing et al., 1996 <sup>91</sup> US	RCT  Score = 2	Complex	Exercise	Overweight women, age 25-55, recruited from Minneapolis general population through newspaper ads	Community center and park grounds	Lottery: one \$50 gift certificate (unknown type) at each exercise session and one \$2,000 travel certificate	24 weeks
#071 Jeffery & French, 1999 <sup>74</sup> US	RCT  Score = 3	Complex	Obesity prevention	Men and women of Twin City metro area, recruited through newspaper and flyers. Also targeted women on WIC	Health department sites and community settings	Lottery: \$100, one per month for a 1 in 10 chance over three years	3 years
#072 Jeffery et al., 1998 <sup>97</sup> US	RCT  Score = 3	Complex	Weight loss	General population at two sites, Minneapolis/St. Paul, Minnesota, and Pittsburgh, Pennsylvania, recruited through media advertising	Community centers	Cash Incentive: Graduated payments of \$1 to \$3 per exercise session, paid monthly, 222 total possible walks, \$266 potential total per person	18 months
#069 Jeffery, Wing et al., 1993 <sup>142</sup> US	RCT  Score = 3	Complex	Weight loss	General population at two sites, Minneapolis/St. Paul, Minnesota, and Pittsburgh, Pennsylvania, recruited through media advertising	Unclear	Cash incentive: minimum of \$12.50 to maximum of \$25 per week depending on percent of goal attained, 20 weeks total	18 months

## Appendix F. Evidence Tables, Continued

Article ID Author Country	Research Design and Quality	Definition of Prevention	Prevention Target	Participants	Setting	Intervention	Follow-up Period
#044 Hutchins et al., 1999 <sup>110</sup> US	RCT  Score = 2	Simple	Immunization	Chicago WIC population, majority black, Hispanic, and receiving other federal assistance	Chicago WIC sites, four run by Chicago department of health, three by community agencies	Must come to WIC offices monthly to pick up allotment of vouchers (normal every three months)	2 years
#062 Gomel et al., 1993 <sup>69</sup> New Zealand	RCT  Score = 2	Complex	CVD prevention	Employees of 28 ambulance services. 85% male, average of 32 years old, 25% with greater than high school education	Worksite	Lottery + competition: two lottery draws for \$40, \$40 for meeting three month goal, 1 in 4 chance at \$1,000 prize for station with highest percent meeting goals	18 months
#065 Koffman et al., 1998 <sup>68</sup> US	Quasi-experimental  Score = 2	Complex	Smoking cessation	Aerospace industry workers in California, regular tobacco users. 57% male, average of 38 years old, 75% white, 65% with greater than high school education	Worksite	Cash + competition: workers paid \$50 to participate, rewarded \$15/month of abstinence for up to five months, plus first place team wins up to \$1,980 (split five ways), 1 in 13 chance to win	12 months
#066 Jeffery, Forster, French et al., 1993 <sup>105</sup> US	RCT  Score = 2	Complex	Smoking cessation/ obesity	Employees of 32 diverse worksites from the Minneapolis/St. Paul, Minnesota, area - from manufacturing to public sector to insurance industry	Worksite	Monetary contract: money withheld from paycheck, minimum of \$5 per check; if goal is met, money returned to employee	3 years
#074 Sciacca et al., 1995 <sup>66</sup> US	RCT  Score = 2	Complex	Breast-feeding	Pregnant women without other children, Flagstaff, Arizona WIC clinic patients	WIC clinics	Gifts and raffles of high frequency and considerable value - from \$15 hair cuts to raffle for trip for two on Grand Canyon Railway	3 months post partum
#084 Gottlieb & Nelson, 1990 <sup>71</sup> US	Quasi-experimental  Score = 2	Complex	Smoking cessation	Employees of Texas Department of Human Services located in Austin, Houston, and San Antonio	Worksite	Prize + competition: Cold turkey buffet; participants (smokers and non-smoking supporters) were charged a \$5 incentive fee which was pooled and refunded to winning worksites	Unclear
#079 Donatelle et al., 2000 <sup>67</sup> US	RCT  Score = 3	Complex	Smoking cessation	Pregnant smokers ("even a puff") over age 15, WIC eligible	WIC program offices	Cash: \$50 per month for each abstinent month, maximum of 10 months, pre-term + 2 months post-partum	

## Appendix F. Evidence Tables, Continued

Article ID Author Country	Research Design and Quality	Definition of Prevention	Prevention Target	Participants	Setting	Intervention	Follow-up Period
#053 Kaplan et al., 2000 <sup>100</sup> US	Quasi- experimental  Score = 1	Simple	Followup of abnormal pap	Low SES, majority Hispanic, female patients of Los Angeles County Department of Health Services (LACDHS)	LACDHS clinics	1) Free bus passes mailed out with reminders 2) Voucher for \$15 off a \$40 clinic fee, redeemable by those at higher risk	
#109 Curry et al., 1991 <sup>72</sup> US	RCT  Score = 3	Complex	Smoking cessation	Smoking members of GHCPS, 65% women, recruited through GHCPS's bi-monthly health magazine	Homes of members of Group Health Cooperative of Puget Sound	Gift: Ceramic coffee mug at the end of first two program units. Lottery: All-expense-paid one- week trip for two to Hawaii, expense-paid weekend at San Juan Island resort, weekend at a deluxe hotel in downtown Seattle  Bonus entries for returning second two program units	12 months
#110 Klesges et al., 1987 <sup>70</sup> US	Quasi- experimental  Score = 2	Complex	Smoking cessation	Employees of firms of diverse industries, ranging from 50 to 380 employees, 53% male	Worksite	Prize + competition: within site competition between teams, prizes of \$5 to \$15 per participant	6 months
#089 Anderson et al., 2001 <sup>102</sup> US	RCT  Score = 2	Complex	Nutrition	Pregnant, lactating, or mothers of young children, WIC and population from a local Genesee County, Michigan food program agency	WIC and CSFP offices, local farmer's market	Coupons: fresh produce from farmers' markets, \$20 total	5 months
#091 Hughes et al., 1991 <sup>76</sup> US	RCT  Score = 2	Complex	Smoking cessation	Patients, presenting for appointments, from rural family practices, 18 years or older, daily smokers not identified as ready to quit	Rural family practices, teaching facilities, University of Vermont	Free or reduced price for nicotine gum; \$0, \$6 or \$20 vs. full price of \$24	6 months
#092 Emont & Cummings, 1992 <sup>92</sup> US	Quasi- experimental  Score = 2	Simple	Smoking cessation	Employees of 68 auto dealerships in western New York state, 3/4 male, mean age 35	Worksite	Lottery: dinner for two at a local restaurant	Unclear
#094 Laken & Ager, 1995 <sup>65</sup> US	RCT  Score = 3	Simple	Prenatal care	Low SES prenatal care patients of a local clinic, Detroit, Michigan	Urban clinic	1) \$5 department store gift certificate 2) \$5 gift certificate + \$100 raffle	Unclear

## Appendix F. Evidence Tables, Continued

Article ID Author Country	Research Design and Quality	Definition of Prevention	Prevention Target	Participants	Setting	Intervention	Follow-up Period
#095 Melnikow et al., 1997 <sup>77</sup> US	RCT  Score = 3	Simple	Prenatal care	Newly confirmed pregnant women who intended to use a system of clinics in northern California, low SES, 45% non-white	Family planning clinics	1) Taxicab voucher 2) Gift: baby blanket	2 years
#096 Owen et al., 1990 <sup>73</sup> Australia	RCT  Score = 2	Simple	Cholesterol level	Respondents to a community-based screening program with elevated cholesterol	12 regional government health education service sites, one worksite	Lottery: microwave oven	4 months
#102 Jeffery et al., 1984 <sup>107</sup> US	RCT  Score = 2	Complex	Weight loss	Overweight men and women recruited from self-referred (through media) and community sources	Unclear	Contract 1: Return \$30 for every 5 pound reduction, total of \$150. Contract 2: Return \$5, \$10, \$20, \$40, \$75 for successive 5 pound reductions	16 week program plus 1 year maintenance
#103 Jeffery et al., 1983 <sup>108</sup> US	RCT  Score = 3	Complex	Weight loss	Overweight middle-class men, aged 35 - 57, ineligible for MRFIT, a community population sample, recruited by letter	Unclear	Contracts: Refunds of \$1, \$5, or \$10 per pound (\$30, \$150, or \$300 total). Forfeit money split between participants who made goal	15 week education program plus 1year followup
#104 Jeffery et al., 1978 <sup>106</sup> US	RCT  Score = 2	Complex	Weight loss	Overweight men and women recruited by media from the general population	Unclear	Contract: Return \$200, \$20 per week for 10 weeks, deposited if 1) attended meetings, 2) met calorie restriction goal, or 3) met weight loss goal	10 weeks
#105 Stitzer & Bigelow, 1983 <sup>75</sup> US	RCT  Score = 3	Complex	Smoking cessation	Smokers, 83% female, recruited from bulletins posted in a large metropolitan hospital	Urban hospital	Cash Incentive of \$0, \$1, \$5, or \$10 per day	6 weeks
#106 Malotte et al., 1998 <sup>53</sup> US	RCT  Score = 3	Simple	Tuberculosis screening	Active drug users from Long Beach, California, with no previous TB history	Urban store-front research facility in downtown	Cash Incentive 1) \$5 Cash Incentive 2) \$10	17 months
#107 Follick et al., 1984 <sup>109</sup> US	RCT  Score = 3	Complex	Weight loss	Employees of a general hospital, 85% female, from 10% to 113% overweight	Worksite	Contract: Return \$5 per session, 14 sessions Cash: Forfeit money split between subjects who hadn't forfeited	18 weeks

**Appendix F. Evidence Tables, Continued**

<b>Article ID Author Country</b>	<b>Research Design and Quality</b>	<b>Definition of Prevention</b>	<b>Prevention Target</b>	<b>Participants</b>	<b>Setting</b>	<b>Intervention</b>	<b>Follow-up Period</b>
#108 Windsor et al., 1988 <sup>96</sup> US	RCT  Score = 2	Complex	Smoking cessation	Employees of University of Alabama, regular smokers	Worksite	Cash Incentive of \$25 at 6 weeks and \$25 at 6 months	3 years



## Appendix F. Evidence Tables, Continued

Evidence Table 6. Description of provider incentives

Article ID Author Country	Intervention	Tournament vs. All Qualify	Bonused for Outcome or Behavior	Penalty	Individual Performance Known to Group?	Adequacy	Pay out
#001 Morrow et al., 1995 <sup>47</sup> US	Capitation rates adjusted by quality of care performance measures; audit determines following year cap rate	All qualify	Outcome	No	Yes	Unknown	Unknown
#003 Hillman et al., 1998 <sup>45</sup> US	Performance bonus – target outcome. 20% of capitation for three highest aggregate compliance scores; 10% for next three highest and three offices most improved	Tournament	Indirect	No	Yes	1) \$570 - \$1,260 per site; \$775 average 2) 17 sites received at least one bonus 3) 6-9 of 26 sites	\$13,175
#004 Kouides et al., 1998 <sup>49</sup> US	Performance bonus - target outcome. 10% additional reimbursement per shot provided if ≤ 70% immunization rate. 20% if ≤ 85%	All qualify	Outcome	No	No	\$242 average bonus	\$4,362
#005 Fairbrother et al., 1999 <sup>43</sup> US	Group 2) performance bonus - target outcome \$1,000 for 20% increase in UTD, \$2,500 for 40%, \$5,000 for reaching 80% coverage. Group 3) Per-input bonus \$5 per administered shot and \$15 per office visit with completed coverage	All qualify	Outcome	No	Unknown	Unknown	Unknown
#006 Fairbrother et al., 2001 <sup>44</sup> US	Group 2) performance bonus - target outcome \$1,000 for 20% increase in UTD, \$2,500 for 40%, \$5,000 for reaching 80% coverage. Group 3) Per-input bonus \$5 per administered shot and \$15 per office visit with completed coverage	All qualify	Outcome	No	Unknown	Unknown. Hypothetical calculation showed MDs wouldn't qualify with 80% level even if no missed opportunities to provide shots	Unknown
#007 Hillman et al., 1999 <sup>46</sup> US	Performance bonus - target outcome. 20% of capitation for three highest aggregate compliance scores; 10% for next three highest and three offices most improved; \$500 minimum	Tournament	Indirect	No	Yes	\$772 - \$4,682 per site; average bonus \$2,000. 13 of 19 sites received at least one bonus; 16 sites received two	Unknown
#008 Ritchie et al., 1992 <sup>51</sup> UK	Target payment - lump sum payment at 70% and 90% coverage levels; implemented 1990	All qualify	Outcome	Yes	Yes	Unknown	Unknown

## Appendix F. Evidence Tables, Continued

Article ID Author Country	Intervention	Tournament vs. All Qualify	Bonused for Outcome or Behavior	Penalty	Individual Performance Known to Group?	Adequacy	Pay out
#011 Grady et al., 1997 <sup>48</sup> US	Performance bonus - target behavior; token bonus of \$50 for 50% mammography referral rate	All qualify	Outcome	No	Yes	Very small token	Unknown
#018 Fox & Phua, 1995 <sup>50</sup> US	Raised fees for delivery from \$265 to \$795 and prenatal visits from \$17 to \$21	All qualify	Behavior	No	Not applicable	Unknown	Unknown

## Appendix F. Evidence Tables, Continued

Evidence Table 7. Reported cost of interventions

Article ID Author Country	Definition of Prevention	Prevention Target	Intervention	Incentive Condition	Group Assignment	Outcomes	Cost- Effectiveness
#029 Freedman & Mitchell, 1994 <sup>59</sup> US	Simple	Cancer screening - fecal occult blood test	Free postage	Required behavior: return completed fecal occult blood test within three months	Group 1) Control - return at next visit, n=49 Group 2) Return envelope provided, n=46 Group 3) Stamped return envelope provided, n= 51	Significant findings: * Increase in adherence rate, p=.003 Adherence rate: Group 1 - 37% Group 2 - 57% Group 3 - 71%	Cost per completed kit: Group 1 - \$2.24 Group 2 - \$1.61 Group 3 - \$1.71
#047 Nexoe et al., 1997 <sup>78</sup> Denmark	Simple	Immunization	Free flu shots (\$40-\$60 value)	Required behavior: receive flu shot	Group 1) Control - usual care, n=195 Group 2) Invitation letter, n=195 Group 3) Invitation letter and free shot, n=195	Significant findings: * Increase in vaccination rate, p<0.01 Vaccination rate: Group 1 - 25% Group 2 - 49% Group 3 - 72%	Cost per prevented death: Group 2 - \$3,990 Group 3 - \$17,860
#034 Yokley & Glenwick, 1984 <sup>62</sup> US	Simple	Immunization	1) Free day care 2) Lottery of \$25, \$50, and \$100 cash prizes	Required behaviors: 1) Leave child at clinic for shots and day care period, 2) Bring child in for shots	Group 1) Control (combined pure control n=119 completed, and attention control, n=108 completed) Group 2) general prompt, n=124 Group 3) personalized prompt, n=119 Group 4) personal prompt + increased access (day care) n=125, Group 5) personal prompt + lottery incentive n=120	Significant findings (at 2 week followup): * Increased number of children receiving shots: Group 1 - 11 children Group 4 - 20 children Group 5 - 27 children, p<.05. * Increased number of children attending clinic: Group 1 - 13 children Group 4 - 22 children Group 5 - 32 children p<.05. * Increased total number of shots: Group 1 – 22 Group 4 - 38, p<.05 Group 5 - 46, p<.05	Cost per target child receiving shot after 3 months: Group 2 \$3.64, Group 3 \$2.27, Group 4 \$6.28 Group 5 \$6.91

Appendix F. Evidence Tables, Continued

Article ID Author Country	Definition of Prevention	Prevention Target	Intervention	Incentive Condition	Group Assignment	Outcomes	Cost- Effectiveness
#048 Moran et al., 1996 <sup>63</sup> US	Simple	Immunization	Lottery: Three \$50 grocery gift certificates	Required behavior: receive shot at clinic	Group 1) Control, n=202 Group 2) Educational brochure, n=198 Group 3) Lottery incentive, n=198 Group 4) brochure + lottery, n=199	Significant findings: * % receiving shot: Group 1 - 20% Group 2 - 36%, OR 2.29, CI 1.45-3.61, p=.0004, Group 3 - 29%, OR 1.68, CI 1.05 - 2.68, p=.0308, Group 4 - 26%, OR 1.41, non-significant * For patients with no prior immunization history, only brochure was effective, p=.0002	Cost per additional immunization: \$3.45 for brochure, \$8.74 for incentive
#044 Hutchins et al., 1999 <sup>110</sup> US	Simple	Immunization	Must come to WIC offices monthly to pick up allotment of vouchers (normal every three months)	Required behavior: immunize child	Group 1) Control - no immunization referral, n=2 sites Group 2) On-site nurse referral and incentive, n= 2 sites Group 3) On-site clinic referral and incentive, n= 1 site Group 4) Off-site referral and incentive, n= 2 sites	Significant findings: * For enrolled children, coverage increased 10% at first birthday and 23% at second birthday for intervention groups. Control groups decreased 4% and 9% respectively, p<.05. * For active WIC participants, increase for intervention groups was 52% by second year vs. 2% for the control group	Cost per additional up-to-date child: Year 1: off-site = \$51 on-site = \$111 nurse = \$164 Year 2: off-site = \$13 on-site = \$7 nurse = \$21
#062 Gomel et al., 1993 <sup>69</sup> New Zealand	Complex	CVD prevention	Prize + competition: Two lottery draws for \$40, \$40 for meeting three month goal, 1 in 4 chance at \$1,000 prize for station with highest percent meeting goals	Required behavior: self-reported progress toward or meeting lifestyle change goals	Group 1) Control - health risk assessment (hra) n=115 completed Group 2) hra + risk factor education n=70 completed Group 3) hra + behavioral counseling n=102 completed Group 4) hra + counseling + incentive n=77	Significant Findings: * BMI, body fat %, mean blood pressure, aerobic capacity, quit rates - Group 4 usually had strong response within 6 months but relapsed to initial levels by 12 months	In active phase Group 4 least cost-effective. Not effective by 12 month maintenance stage.  Reported under separate study. <sup>143</sup>

**Appendix F. Evidence Tables, Continued**

<b>Article ID Author Country</b>	<b>Definition of Prevention</b>	<b>Prevention Target</b>	<b>Intervention</b>	<b>Incentive Condition</b>	<b>Group Assignment</b>	<b>Outcomes</b>	<b>Cost- Effectiveness</b>
#091 Hughes et al., 1991 <sup>76</sup> US	Complex	Smoking cessation	Free or reduced price for nicotine gum; \$0, \$6, or \$20 vs. full price of \$24	Required behavior: purchase gum	Group 1) Free gum, n=32 Group 2) \$6/box gum, n=36 Group 3) \$20/box gum, n=38	Significant findings: * Decreased cost increased several measures of incidence of obtaining gum and long-term use, p<.05 to p<.006 * Price elasticity higher for \$6 vs. \$20 (.45) than free vs. \$6 (.21) * Decreased cost had non- significant trend to increase cessation	Financial gain to insurance company per subject enrolled: Free - \$1,120 \$6/box - \$280 \$20/box - \$413