

A review on provider and facility financial incentives and cancer screenings in the United States

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Abstract

Breast, cervical, and colorectal cancer screening has been recommended by the U.S. Preventive Services Task Force for decades to reduce cancer mortality and morbidity. Use of cancer screening has been an important indicator for process measure for healthcare quality in the US. There has been an increasing number of health plans adopted pay-for-performance mechanisms to improve quality. In this review, I first summarized previous literature on provider financial incentives and use of cancer screenings in the US. I then identified research gaps and some open research questions on financial incentive and cancer screening. Meanwhile, I proposed approach to address some of the open questions.

Introduction

Cancer is the second leading cause of death in the US. It was estimated that there would be approximately 609,360 cancer deaths in the US in 2022.¹ Many cancer deaths are preventable if diagnosed at early stages. The U.S. Preventive Services Task Force (USPSTF) has recommended for breast, colorectal, and cervical cancer screenings for eligible population.²⁻⁴ In recent years, lung cancer screening was also recommended for high-risk population.⁵ Promoting evidence-based cancer screening has been a focus for the Health People 2030 to reduce cancer mortality and morbidity.

Use of cancer screening has been an important indicator for process measure for healthcare quality in the US. There has been an increasing number of health plans adopted pay-for-performance mechanisms to improve quality.⁶ Understanding the effects of provider financial incentives can inform payment model design. So far, there have been several studies examining how provider financial incentive could change use of cancer screening. In this review, I first summarized previous literature on provider financial incentives and cancer screenings in the US. I then identified research gaps and some open research questions on financial incentive and cancer screening. Meanwhile, I proposed approach to address some of the open questions.

Review of research on provider financial incentives and cancer screenings

Several studies have examined the effects of financial incentives and cancer screenings in the US. One study assessed the quality incentive program (QIP) under the PacifiCare Health Systems in California starting from 2002. Since July 2003, physician groups would receive a quarterly bonus if they meet the performance targets (75th percentile of 2002 performance by the

physician groups).⁷ Physician groups in Pacific Northwest where no QIP had been implemented at this time were included as a comparison group for the California groups. A difference-in-differences (DID) design was applied to compare three process measures of clinical quality, including cervical cancer screening and mammography before and after QIP in treatment and comparison groups. They found that cervical cancer screening rate increased by 5.3 percentage points (ppt) in California and 1.7 ppt in Pacific Northwest group, with a statistically significant DID of 3.6 ppt. Mammography rate increased by 1.9 percentage points (ppt) in California and 0.2 ppt in Pacific Northwest group, with a DID of 1.7 ppt (p-value=0.13). Of note, physician groups with high baseline performance improved the least during the QIP, although they received the financial bonus, which indicated setting a common, fixed performance target for all clinicians may result in little gain in quality for the money spent and will largely reward those with higher initial performance. Surprisingly, physician groups with low baseline performance improved most during the study period, although they were less likely to reach the target and receive the bonus and one hypothesis was that the QIP changed the current competition environment. This study raised the concern that setting fixed goals for financial incentives may result in little improvement among original high-performance groups.

Another study conducted by Lester et al. assessed the effects of attaching and removing facility financial incentives on clinical performance, measured by several indicators, including cervical cancer screening.⁸ The analysis was based on 35 medical facilities of Kaiser Permanente Northern California (1999-2007) and women aged 21-64 years whose primary source of care was one of these 35 facilities. From 1999-2007, financial incentives were offered by the regional operations leadership of Kaiser Permanente Northern California when achieving target goals on selected clinical indicators. For cervical cancer screening, incentives were offered in 1999-2000,

and removed from 2001-2005, and reoffered in 2006 and 2007. They compared the facility level percentage of receiving cervical cancer screening during the study period and found that screening rates increased slightly from 77.4%-78.0% in 1999-2000, when the financial incentives were attached, and continuously decreased to 74.3% from 2001 to 2005. Cervical cancer screening rate increased again in 2006-2007 when financial incentives were reoffered. This study provided evidence that attaching or removing financial incentives would increase or decrease cervical cancer screening, but the conclusion was limited by the lack of a comparison group in the study design.

An observational study conducted by Gilmore et al. evaluated a provider financial incentive program, Physician Quality and Service Recognition (PQSR) (1998-2003), under the Hawaii Medical Services Association (HMSA).⁹ Breast, colorectal, and cervical cancer screenings were among the major clinical indicators of performance. Physicians would be financially rewarded based on the percentile ranking among all physicians participating in the PQSR. This study compared the HMSA preferred provider organization (PPO) enrollees who visited providers participating in PQSR with those not participating in the program. They found that in the first program year, providers who participated in the program had higher rate of using breast cancer screening for their patients compared to those not joining the program (57% vs 53%). In subsequent years, joining the program was also linked to higher use of breast, colorectal, and cervical cancer screening rates. This study showed evidence that provider financial incentive had positive effects on use of cancer screenings. One major limitation of this study was that although they control for several patient factors, there could still be some baseline variance that was not addressed by the current study design due to the lack of data before the program.

During 2001-2003, provider incentives were gradually introduced to physician groups in Massachusetts, creating natural experiments where some physician groups were newly exposed to provider incentives and some were not. A study conducted by Pearson et al. based on this setting and examined how provider incentives affect a series of quality measures, with breast and cervical cancer screenings as key measures.¹⁰ They used data from five health plans participating in Massachusetts Health Quality Partners (MHQP), a nonprofit collaborative of consumers, health care providers, health plans, purchasers, state government, and academic researchers. The financial incentive amount was linked to the amount of savings arising from concomitant efforts to reduce health care use in other areas. Breast and cervical cancer screening rate changes from 2001 to 2003 were compared between incentivized group and non- incentivized group. The percentage for breast cancer screening did not change in 2011 (82%) to 2013 (82%) for incentivized group and increased little in comparison group (83% vs 84%). The percentage for cervical cancer screening increased to a similar extent for incentivized group (84% vs 86%) and comparison group (84% vs 86%). This study suggested that provider incentives were not associated with greater improvement in breast and cervical cancer screening.

In 2009, seven provider organizations in Massachusetts entered the Blue Cross Blue Shield Alternative Quality Contract, followed by another four provider organizations in 2010. Similar to Accountable Care Organizations in Medicare, this program was based on a global budget and pay-for-performance for achieving certain quality benchmarks through placing providers at risk for excessive spending and rewarding them for high-quality performance. A study conducted by Song et al. analyzing changes in quality measures, including use of breast, cervical, and colorectal cancer screenings as key measures, under the Blue Cross Blue Shield Alternative Quality Contract in Massachusetts.¹¹ This study was based on a DID approach that

comparing changes in quality measures among plan enrollees whose primary care physicians entered the contract to those whose primary care physicians did not enter the contract before and after the contract enactment (2009 or 2010). They found a significant net increase of 1.2 percentage points for the treatment group for breast cancer screening, while no net increase was observed for cervical and colorectal cancer screening. This study suggested that provider financial incentives could potentially increase breast cancer screening, but no evidence on increases for cervical and colorectal cancer screening.

Another example financial incentive is the Accountable Care Organization (ACO), which is a network of physicians, hospitals, and other health care providers who share medical and financial risks by providing coordinated care to Medicare fee-for-service beneficiaries. One study conducted by Resnick et al. used a cohort of Medicare beneficiaries from 2006 through 2014 and evaluated how was the ACO associated with breast and colorectal cancer screenings.¹² The analysis was based on the DID approach and they compared using of cancer screening between beneficiaries assigned to organizations participating in an ACO to those not in pre-(2007-2011) and post-(2012-2014) contract. They found a 1.8% net decrease in breast cancer screening among women attributed to ACO providers and a 2.4% net decrease for colorectal cancer screening.

There have been several other studies examining how provider financial incentives can change use of cancer screening. For example, one study conducted by Gavagan et al. examined the effect of a physician pay-for-performance program on quality of preventive care in a network of community health centers and found no evidence on the positive effects of financial incentives on use of cancer screenings.¹³ Another study focused on physician financial incentive in Medicaid managed care also found no positive effects of the incentives on use of cancer

screening.¹⁴ Of note, one study conducted by Wee et al. based on physician and patients from 11 academically affiliated primary care practices in Boston found that physician financial incentive might discourage the use of cervical and colorectal cancer screenings for providers.¹⁵ They hypothesized that financial incentives may lead physicians to see more patients and therefore spend less time on some forms of prevention, such as cancer screenings. In summary, previous studies showed mixed effects of provider financial incentives on use of cancer screenings.

Future research directions for provider financial incentives and cancer screenings

Several studies have examined the effects of provider financial incentives on use of cancer screenings, as highlighted in the section above. Nevertheless, substantial research gaps remain. In this section, I reviewed some research gaps and proposed approaches to address some of the research questions.

Use of guideline-concordant cancer screenings and stage at cancer diagnosis

So far, research on provider incentives and cancer screenings have only focused use of cancer screenings during a certain time frame in which data were available, and few study examined guideline-concordant cancer screenings. For example, the USPSTF guideline-concordant colorectal cancer screening was defined as having colonoscopy within the past 10 years, at-home fecal occult blood test (FOBT) within the past year, or flexible sigmoidoscopy within the past 5 years with FOBT performed every 3 years for individuals aged 50 to 75 years. Earlier studies only focused on a single service and did not consider the time frame of receiving cancer screening. It is possible that physicians over-screened some patients to receive their financial incentives, which will not likely translate into better health outcomes. Therefore, it is

also important to understand if provider financial incentive for cancer screening will improve female breast, cervical, and colorectal cancer stage at diagnosis.

Examining use of guideline-concordant cervical (up to five years) and colorectal (up to ten years) cancer screenings can be challenging due to the relatively long time frame, and it might be more feasible to start with guideline-concordant breast cancer screening, as the USPSTF recommends biennial screening mammography for women aged 50 to 74 years. Future research can identify use of guideline-concordant breast cancer screening from the claims data and link to their provider contract information to understand if financial incentive can affect guideline-concordant screening. To assess if provider incentives can translate into earlier stage at cancer diagnosis, future data linkage on claims data, cancer registry data, and provider contract data will be needed.

Model design and use of cancer screenings

All the past and ongoing financial incentive models are designed to reward either individual health care providers or health care facilities. There are few contracts to incentive both of them at the same time, and therefore, little has been known about if providing incentives to individuals or facilities will lead to greater use of cancer screening. In addition, there is little evidence on what is the appropriate amount for the financial incentives and the benchmark to receive the incentives. One concern is that setting a fixed benchmark may not provide enough incentives for physicians with high performance as they can receive the bonus without any improvement; and for physicians with lower performance, they may also not be motivated enough as they are not likely to reach the benchmark even with substantial improvement. On the other hand, providing incentives based on the extent of improvement may lead to less motivation for physicians with high baseline performance as it is more difficult for them to improve. Thus, it

is important for future studies to explore the best model design for financial incentives aimed to improve cancer screenings. However, there can be challenges for researchers to study this topic due to the lack of data.

Understanding physician characteristics related to changes in cancer screening under provider financial incentives

Earlier studies have only focused on examining the effects of financial incentives on physician as a whole. There has been no research to evaluate if there is any variation by physician characteristics. It is possible that physicians may react differently to the financial incentives based on some characteristics, such as age, year of services, sex, and physician vertical integrated status. Therefore, future research should assess the variations by physician characteristics.

To explore physician variations, we can use the current data that has been used to examine financial incentives and add physician characteristics to the current models. For some variables like and physician vertical integrated status, which is not likely to be available in the current data, we can get this information through linking the current data to the Medicare Data on Provider Practice and Specialty and focusing on a subsample of physicians with Medicare patients.

Another important physician-level factor is the baseline performance. Only a few studies have examined how financial incentives can change use of cancer screening by baseline performance score. Understanding this difference can also help with the contract design to create better outcomes, as discussed before. The approach should be very straightforward through including baseline performance into the models.

In summary, studies on provider financial incentives and use of cancer screenings showed mixed findings. Future studies are warranted to better understand financial incentives and use of guideline-concordant cancer screenings, different model designs, and how the effects of financial incentives varied by physician characteristics.

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