Original Contribution

Changing Physician Incentives for Affordable, Quality Cancer Care: Results of an Episode Payment Model

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Abstract

Purpose: This study tested the combination of an episode payment coupled with actionable use and quality data as an incentive to improve quality and reduce costs.

Methods: Medical oncologists were paid a single fee, in lieu of any drug margin, to treat their patients. Chemotherapy medications were reimbursed at the average sales price, a proxy for actual cost.

Results: Five volunteer medical groups were compared with a large national payer registry of fee-for-service patients with cancer to examine the difference in cost before and after the initiation of the payment change. Between October 2009 and December 2012, the five groups treated 810 patients with breast, colon, and lung cancer using the episode payments. The registry-predicted fee-for-service cost of the episodes cohort was $98,121,388, but the actual cost was $64,760,116. The predicted cost of chemotherapy drugs was $7,519,504, but the actual cost was $20,979,417. There was no difference between the groups on multiple quality measures.

Conclusion: Modifying the current fee-for-service payment system for cancer therapy with feedback data and financial incentives that reward outcomes and cost efficiency resulted in a significant total cost reduction. Eliminating existing financial chemotherapy drug incentives paradoxically increased the use of chemotherapy.

Introduction

The cost of health care in the United States is on an unsustainable trajectory. Using current trends, economists predict that in less than 3 years, it will require 50% of the average U.S. household income to pay the costs of out-of-pocket expenses and the health insurance premium for a family.[1] Cancer therapy is a contributor to these rising costs; it accounts for 11% of UnitedHealthcare's commercial health plan budget, and the proportionate share is rising. The existing fee-for-service payment provides theoretical incentives for overuse and the selection of expensive branded drugs rather than lower cost generic medications. New payment models that reward cost-effective and high-quality treatment are needed.

One approach for cost reduction is to reduce the payment amount for each service. After Medicare decreased the reimbursement levels for drugs in 2005, an analysis of patients with lung cancer revealed that oncologists treated more patients with chemotherapy and increased the usage of expensive drugs.[2] The effect on quality was not measured. Medicare continues to experience increases in cancer costs, probably caused by factors like the introduction of new expensive drugs and increased numbers of beneficiaries.

Another potential solution to rising costs is paying for care by the episode. Medicare has used this approach for hospital care for more than a decade with the Diagnosis Related Groupers, but the method has not been tested for chronic illness care in an ambulatory setting. Proponents argue that a fixed payment for a defined time period provides the incentive to become more efficient while limiting the provider risk to a manageable sum of money. Bach et al[3] proposed a payment model for cancer therapy that uses the monthly national average chemotherapy cost for each cancer type as the basis for the episode payment. This proposed system would require physicians to use lower cost regimens to remain profitable. Further, it would provide an incentive for pharmaceutical firms to reduce the prices of any medications that exceed the episode payment budget amount.

The Bach proposal attacks drug costs, but it has no effect on other cost categories for cancer care. UnitedHealthcare data suggest that these other categories are significant. For commercially insured patients, chemotherapy drugs represent 24% of total care costs, inpatient and outpatient facility services account for 54%, and physician services constitute the remaining 22%. In a previous article, Newcomer proposed a payment method that removes any adverse incentive to use expensive pharmaceuticals while simultaneously creating an incentive to reduce the total costs of care and improve outcomes.[4] The program included a quality improvement approach that mandated an annual review and discussion of use and quality data. This article reports the results of a 3-year trial of this program.

Methods

UnitedHealthcare collaborated with five volunteer medical oncology groups for the pilot. The program changed four elements of the previous fee-for-service contract relationship. First, the medical groups proactively registered all patients with breast, colon, and lung cancer and provided clinical data to the payer. Second, a single episode payment was made at the initial visit. The method for calculating this payment is described below. Third, all drugs were paid using the average sales price rate

as a proxy for the acquisition cost of the drug. All other physician services continued to be reimbursed using the existing fee-for-service contract with the payer. Fourth, the medical groups met annually to review data on cost and quality outcomes.

The program began in October 2009, and it is described in detail in another article.[4] One group dropped out of the program after it was acquired by an academic medical center in June 2011; it was replaced by a new medical group from another city. Nineteen clinical episodes were created for patients with breast, colon, and lung cancer (Table 1). Each medical group selected a single chemotherapy regimen for each adjuvant therapy episode on the basis of their interpretation of the medical literature. Predefined chemotherapy regimens were not selected for episodes treating metastatic disease.

Using the existing fee schedule for each group, UnitedHealthcare calculated the drug margin for each adjuvant regimen, including supportive care medications, by subtracting the average sales price from the contracted rate for the drugs. Average sales price was used as a proxy for acquisition cost in this study. UnitedHealthcare also added a small case management fee that included physician hospital care to each episode. The payer had previously created a registry of more than 65,000 patients with breast, colon, and lung cancer with sufficient clinical and claims data to assign them to the same episode categories. The national average drug margin for each episode in this registry was calculated by subtracting the aggregate average sales price from the aggregate amount paid for chemotherapy drugs and dividing by the total number of patients in each episode. If any episode payments were less than the national average, the larger amount was substituted. A specific treatment regimen was not selected for patients with metastatic cancers, so the registry national average was used as the episode payment amount for episodes 10, 11, 14, 18, and 19 (Table 1). An arbitrary reimbursement was negotiated for the two episode categories that did not use any cancer chemotherapy (episodes 1 and 12). The time period for an adjuvant episode was the time to complete the therapy plus 2 months. A recurring 4-month time period was selected for metastatic episodes.

The medical groups submitted clinical information at the time of initial patient presentation to determine the correct episode. These data included the histology, clinical stage, relevant genetic information, and intent of treatment (curative or palliative). The episode fee was paid immediately. All services were billed to UnitedHealthcare using standard fee-for-service format. Table 2 summarizes the payment methods for the services provided.

The medical groups were free to change their preferred drug regimen at any time; new studies and new drug releases did change the preferred regimens during this study. Patients could also be enrolled onto clinical trials. The new drug substitutes were paid at average sales price, but there were no changes in the episode fee. By contractual agreement, episode fees would be changed only if the groups lowered the total cost of care or improved the survival for the episode.

The oncology groups collaborated with UnitedHealthcare to develop more than 60 measures of quality and cost for these episodes (Table 3). The measures were intended to compare the performance across the groups, to generate hypotheses for quality improvement and cost reduction, and to measure improved outcomes or reductions in the total cost of care.

All analytic work was completed by UnitedHealthcare. The study design used a retrospective observational method that compared the operational and control cohort during the prepilot and pilot time periods. Controls were obtained from the registry.

Table 1. Episode Payment Categories and Duration

Cancer Type	Episode No. and Description	Duration (months)
Breast	1. Stages 0, I; no chemotherapy	6
	2. Stages I, II; HER2 overexpression, ER/PR negative	12
	3. Stages I, II; HER2 overexpression, ER/PR positive	12
	4. Stages I, II; HER2 underexpression, ER/PR negative	6
	5. Stages I, II; HER2 underexpression, ER/PR positive	6
	6. Stage III; HER2 overexpression, ER/PR negative	12
	7. Stage III; HER2 overexpression, ER/PR positive	12
	8. Stage III; HER2 underexpression, ER/PR negative	6
	9. Stage III; HER2 underexpression, ER/PR positive	6
	10. Stage IV; anti-estrogen therapy only	4
	11. Stage IV; treatment with all other medications	4
Colon	12. Stages I, II; no chemotherapy	6
	13. Stages II, III	9
	14. Stage IV	4
Lung	15. Small-cell, any stage	4
	16. Non–small-cell, stages I, II	4
	17. Non–small-cell, stage III	4
	18. Non–small-cell, stage IV, nonsquamous histology	4
	19. Non–small-cell, stage IV, squamous histology	4

Abbreviations: ER, estrogen receptor; HER, human epidermal growth factor receptor; PR, progesterone receptor.

Table 2. Summary of Payment Method Used in Fee-for-Service and the Episode Model for Various Service Types

	Payment Method	
Service Type	Episode Model	Standard Model
Physician office visit	FFS	FFS
Chemotherapy administration	FFS	FFS
Chemotherapy medications	ASP + 0%	ASP + contracted %
Diagnostic radiology	FFS	FFS
Laboratory	FFS	FFS
Physician hospital care	Episode	FFS
Hospice management	Episode	FFS or none
Case management	Episode	None

Abbreviations: ASP, average sales price; FFS, fee-for-service.

Table 3. Quality and Use Measures From the Episode Payment Program

Each clinical episode (19 separate episodes)	Total cost of care
	Emergency room and hospitalization rates
	Parenteral drug costs per episode
Aggregate	Average drug cost per episode
	Admissions for cancer symptoms
	Admissions for treatment-related symptoms
	Time to first progression for relapsed patients
	No. of lines of therapy for relapsed patients
	Hospice days for patients who died
	Days from last chemotherapy to death
	Costs in the last 30 days of life
	Survival from date of condition enrollment (relapsed patients only)
	Cost per admission and length of stay
	Diagnostic radiology use
	Laboratory service use
	Durable medical equipment use
	Surgical services, use and cost
	Febrile neutropenia occurrence rate
	Granulocyte colony-stimulating factor usage rate
	Erythropoetin use

NOTE. All medical groups were identified in the results reporting.

Members of both cohorts had the same accrual period for each prepilot and pilot period. The baseline period for the study began with episodes starting October 2006 through July 2009, and the pilot period included episodes beginning October 2009 through December 2012. The unit of measurement for the pilot was a unique episode.

The primary metric of the pilot was total medical cost per episode of care, which excluded retail pharmacy claims. The estimated sample size to demonstrate a 10% effect was 400 observations. The secondary metric, chemotherapy drug cost (CDC), measured the cost of chemotherapy medications using the average sales price for all observations. The results for both measures were determined using the aggregate of all of the 19 episode categories.

The total medical cost was modeled as a function of the episode payment condition, age, and sex using a linear regression technique. The model included terms that indicated whether the observations were from the episode medical groups or controls and whether the observations were from the prepilot period or the pilot period. An interaction term between treatment group and time period was included and was the key term used to interpret the success of the program. The savings estimate of the pilot program was derived from the log-transformed regression model of total medical cost per episode.

Results

There were 1,024 patients enrolled in the episode program through the end of 2012. Of these, 810 patients were used in the analysis. Patients were ineligible if they had not completed a treatment episode by year end 2012 (n = 210), did not incur any medical cost in the analytic time window (n = 3), or had an incorrect episode assignment (n = 1). Any differences in the patient mix, as well as differences in baseline performance, were accounted for in regression modeling.

The predicted fee-for-service total cost for the episodes cohort was $98,121,388, but the actual total medical cost for this cohort was $64,760,116, representing a net savings of $33,361,272. The predicted CDC was $7,519,504, and the actual CDC was $20,979,417, with a net increase in spending of $13,459,913. In a subset analysis, the control group was limited to 50 medical groups that contributed at least 70 patients to the registry—the minimal number contributed by each episode medical group. There was no difference in the results using this smaller control population.

The study was not powered to determine the expenses that drove the differences in total medical cost. A subset analysis did demonstrate a statistically valid decrease in hospitalization and therapeutic radiology usage for the episode arm.

Most quality outcomes had insufficient numbers for statistical analysis. Kaplan-Meier survival curves were monitored for all patients with metastatic disease. Lung cancer survivors were the only evaluable subgroup, and there was no significant survival difference between the episode and registry patients. Hospitalization rates showed that one medical group was an outlier for all cancer types. The group learned that follow-up appointments to their clinic were scheduled for several weeks after the initial hospital discharge, causing frequent readmissions for the same problem. The group now evaluates patients within 48 hours of discharge, and their hospitalization rates have decreased to peer levels. Overall, multiple quality measures were monitored, and none of them provided an early signal that quality of care was different than controls.

Discussion

This program had two objectives. The primary objective was to decrease the total medical cost by using aligned financial incentives supported by actionable use and quality information. This goal was met, as demonstrated by a 34% reduction of the predicted total medical cost. The secondary objective was to remove the linkage between drug selection and medical oncology income. Without this linkage, it was expected that CDC trends would decrease. Paradoxically, the pilot resulted in 179% more CDC than predicted when compared with the controls. Despite the additional $13 million for chemotherapy drugs, the total medical costs were reduced by $33 million.

The source of the cost savings is enigmatic. The primary end point of the study was detection of a 10% change in the total medical costs for the aggregate group. Subset analyses confirmed statistically valid decreases in hospitalization and usage of therapeutic radiology, but it is not possible to make a statistically valid quantification of the savings. The study used two interventions—financial incentives and data sharing—to change behavior. It is not possible to determine the relative effect of each incentive, but this is an important question to answer in future studies.

The five groups met twice during the study period to review and analyze more than 60 measures of cost, quality, and use.

They had not been exposed to performance data about their practice from any source before joining this project. This measurement may have been the stimulus to improve results. This phenomena, known as the Hawthorne effect, is defined as, "the stimulation to output or accomplishment that results from the mere fact of being under observation."[5] During the meetings, the group leaders discussed potential solutions for variation, and they later shared the data with their practice partners. The regular measures for this payment model may have stimulated different care decisions by the participating physicians.

Larger medical oncology groups like those in this study may have more sophisticated internal resources than smaller groups. For example, larger groups could allow their physicians to focus on specific cancers or they can augment their electronic medical record systems with decision support tools. However, when the comparison group in the registry was restricted to larger medical groups, the results did not change.

Improvement projects by the individual medical groups were not tracked by the study team. Anecdotally, the ability to improve specific performance issues was mixed. The group with high hospitalization rates discussed above is an example of a successful intervention. The use of diagnostic radiology was more problematic. The analyses demonstrated a four-fold variation in the use of diagnostic radiology procedures during the 4-month episode for metastatic disease in all three cancer types. The physician leaders for the medical groups were unable to obtain consensus about defined intervals for radiological evaluation of metastatic disease.

Collaboration was an essential element to the success of the pilot. The data for the project were available to all participants. Variation was explicitly discussed as an opportunity for improvement and not a failure of health care delivery. Problem solving involved the participation of physicians, the medical group business executive, nursing staff, and payer staff. We believe that collaboration was an essential element to obtaining the result.

The increased CDC was not expected. The episode payment program contains several incentives for decreased chemotherapy costs. First, if the selection for a chemotherapy regimen yielded a lower drug margin than the UnitedHealthcare national average for the episode, the group's episode payment was raised to the national average, providing an incentive to select low-cost regimens when appropriate. Second, the oncology practices did not realize any gains by switching to higher priced drugs. Third, the metastatic episode payments continued every 4 months even if the patient was no longer receiving chemotherapy. This policy was intended to compensate the oncologist for the additional work of palliative care. All of these incentives encouraged lower drug expenses.

Can this pilot be generalized? The operational work for this project was substantial. Early identification of the patients was essential to ensure the correct treatment regimen and to explain the unusual claim payments. Claims had to be adjusted by both the payer and the physician's office to conform to the episode payment methods. Claim adjudication was done manually for the same reason. The work load required dedicated time and resources for both payer and medical groups. However, automation of enrollment and claims payment is possible and essential to further generalization.

The episode payment project yielded significant savings for the treatment of patients with cancer without any measurable effect on quality outcomes or toxicity. This study challenges the assumption that any reduction of resources results in worse outcomes for cancer. Further, this approach allowed each medical group to seek the solutions that worked best for their environment. Although the pilot should be replicated to answer the questions about generalization, this study proves the essential concept that the cost of care for future generations can be reduced without sacrificing quality.

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