Physician Behavior Impact When Revenue Shifted From Drugs to Services

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Objectives: In partnership with a large nonprofit healthcare insurer for the Mid-Atlantic region of the United States, we launched the first cancer clinical pathway in the United States in August 2008. Due to its early success with regard to savings and physician participation and compliance, a second-generation pathways program—the Oncology Medical Home—was piloted in 2011. This program offered a physician reimbursement model that shifted the source of revenue from drug reimbursement margin to professional charges for cognitive services (evaluation and management codes). We report our observations of the impact of that reimbursement model on physician prescribing behavior.

Study Design: This was a retrospective analysis.

Methods: A select group of practices that participated in the first-generation pathways program were invited to voluntarily participate in the Oncology Medical Home and its cognitive weighted reimbursement design. A matched control group was chosen from the first-generation pathways participants. Comparisons of physician behavior parameters were made pre- and postimplementation and between the Oncology Medical Home practices and the first-generation pathways control group.

Results: Physician behavior was not significantly modified by cognitive weighted reimbursement. No significant change in frequency of office visits for established patients was observed. No change in chemotherapy prescribing was observed. Observed increases in generic regimen use were no different than matched control.

Conclusions: Observations from this oncology medical home pilot program suggest that reimbursement methodology alternatives to the prevailing fee-for-service may have less impact on prescribing behavior than has been conjectured. Future research is ongoing to validate these observations and assess additional influences on prescribing behavior.

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United States direct medical costs associated with cancer are projected to increase exponentially, from $104 billion in 2006 to over $173 billion in 2020.[1] Variability in medical practice plays a large role in increasing costs without achieving better patient outcomes.[2] Clinical care pathways have been cited as solutions to help bend the rising costs of cancer care by reducing unnecessary and costly treatment variation while improving quality of care.[1-5]

In August 2008, a large nonprofit healthcare insurer for the Mid-Atlantic region of the United States partnered with Cardinal Health to launch the first inclusive provider network cancer care pathway in the United States. This program marked a milestone in the evolution of cancer treatment by demonstrating that an oncology pathway program can be deployed across an entire plan network comprised of disparate providers (single/group, community/academic, independent/affiliated) benefitting all parties by improving consistency and quality of care while reducing costs without reducing provider reimbursement.[6,7]

We previously reported that high participation and compliance levels in our pathways program led to changes in physician patterns of care that resulted in significant decreases in overall oncology expenditures.[8] Similar physician behavior changes were observed in a Blue Cross Blue Shield Michigan pathway program, where aligned stakeholder incentives drove high levels of provider participation and compliance.[5,9] Despite these and other pathway program successes, critics suggest that the observed savings benefits are small and unsustainable.[10]

The fee-for-service payment system has been identified as one of the main drivers of cancer care cost—the more physicians do for patients, the more reimbursement they receive.[11] In this model, oncologists directly purchase chemotherapy from manufacturers and/or wholesalers (typically below, at, or slightly above average sales price [ASP]) and are reimbursed by the payer at prices usually exceeding ASP by 6% (Medicare presequestration) to 30% or more (commercial payers). Studies have shown that providers' choice of chemotherapy can be affected by reimbursement, resulting in their prescribing chemotherapy more often and utilizing more costly brand name chemotherapy over less expensive brand or generic alternatives.[10-12]

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Increased use of chemotherapy and more expensive drugs has been correlated with the "buy-and-bill" reimbursement model; therefore, we shifted the primary source of provider revenue from drug reimbursement to professional charges in our payer-sponsored Oncology Medical Home pathways program.

- Analysis showed that this novel reimbursement model did not alter physician prescribing behavior with regard to the type or frequency of chemotherapy administrations, or established and new patient visits.
- These observations suggest that medical oncology treatment selection and cancer care practice patterns may not be influenced by fee-for-service reimbursement.
- Research is ongoing to validate these observations and assess additional influences.

Many argue that this "buy-and-bill" model encourages physicians to overprescribe chemotherapy, creates incentives for price inflation, and distorts clinical decision making, thereby driving up the costs of cancer care.[10,11,13]

With these factors in mind, we piloted a second-generation pathways program, the Oncology Medical Home, in January 2011. The goal of this program was to decrease cancer costs beyond those observed with the first-generation pathways model, and as such, it would address the concern that chemotherapy prescribing is influenced by a "pay-for-volume" rather than a "pay-for-value" reimbursement methodology. In the Oncology Medical Home, physician reimbursement would shift the drug reimbursement margin to professional charges for cognitive services through a dramatically enhanced professional service evaluation and management (E&M) fee schedule. Other cost-saving measures for the Oncology Medical Home included physician commitment to an intensive continuous quality improvement initiative and an end-of-life program, which have been previously presented and will be addressed in a future manuscript.[14-17]

This new cognitive weighted reimbursement model provokes several questions. If payment is based on professional charges rather than drug reimbursement, will physicians then evaluate patients more frequently? If chemotherapy reimbursement margins are at or near cost, will the use of chemotherapy decrease? Will there then be a shift away from brand name drugs to less costly brand drugs and/or generic drugs? To answer these questions, we evaluated the impact of the change in reimbursement on business practices and prescribing behavior for physicians participating in the Oncology Medical Home.

METHODS

Program Descriptions

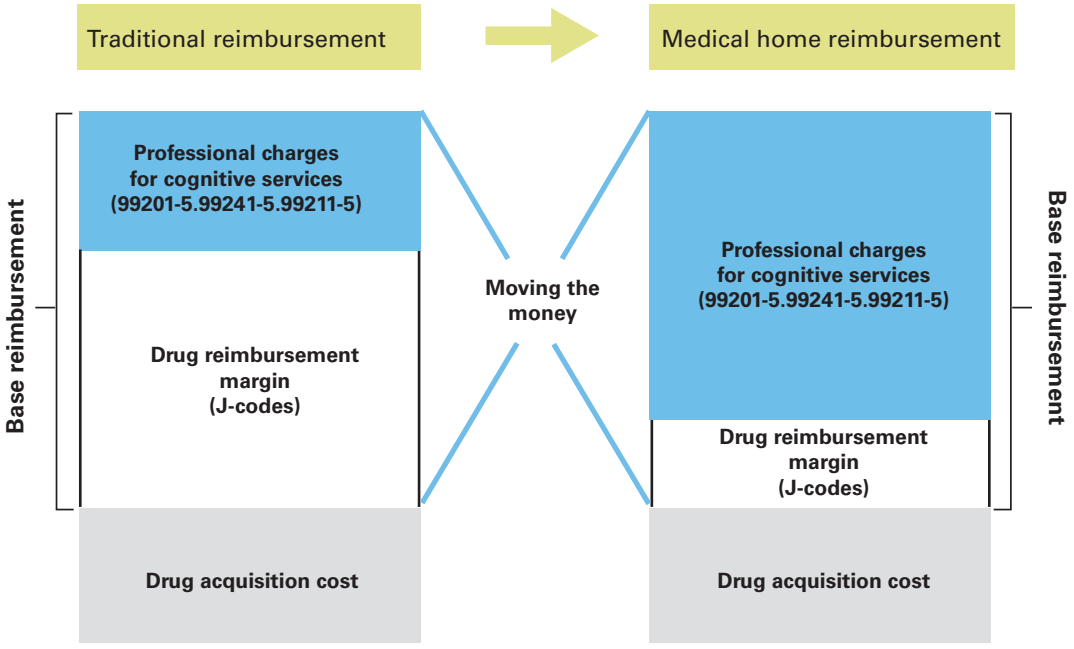
The first-generation oncology clinical pathway program was initiated in August 2008 as a collaborative effort between the payer and its contracted providers. Participation in the program was voluntary; however, providers were given financial incentives to participate in the form of an increased brand and generic drug (J-code) fee schedule as compensation for the additional work flow required to maintain program compliance. A physician steering committee led participating physicians, who jointly and independently developed the content, structure, and implementation of the pathways.

The Oncology Medical Home was initiated in January 2011, with first patients accrued April 1, 2011 (with the delay needed for fee schedule implementation). The mechanism of drug reimbursement was changed for Oncology Medical Home–participating physicians from drug reimbursement margin to cognitive weighted reimbursement (**Figure 1**). A portion of the overall reimbursement to participating physicians was transferred from intravenous drug fees to E&M code reimbursement, while keeping revenue at the same level, when weighted by utilization. Twelve months of claims for intravenous chemotherapy, supportive care, and E&M codes were analyzed. The change in reimbursement between the preprogram rate of 24.5% margin over ASP and the Oncology Medical Home rate of 8% margin over ASP was calculated for each drug for which there were claims. Fourteen generic drugs were kept at higher reimbursement as an incentive for use where the level of reimbursement was the same for both Oncology Medical Home and control practices. In total, 70 drugs were reduced in price. This reduction was transferred as an increase to a select list of 17 E&M and chemotherapy administration codes. This resulted in an aggregate 62% increase in these fees, with an emphasis on new patient consult codes, which were increased by 166%. When weighted by utilization, the increase in revenue to the Oncology Medical Home physicians was equal to the value of the decrease in drug revenue.

Study Population

The Oncology Medical Home program was offered to a subset of first-generation pathways participants, who had recently organized to form a membership association, Therapeutics and Research in Oncology (TRIO). The TRIO practices operate independently, retaining their individual tax identification numbers, and consist of providers from small and large practices, urban and rural geography, representing the payer's 2 largest metro areas.

Figure 1. Physician Reimbursement Shifts From Drug Sales to Cognitive Services



The initial membership in TRIO included 42 physicians in 16 practices, all of whom participated in the first-generation pathway program. Thirty-three physicians in 13 practices subsequently chose to participate in the Oncology Medical Home. Reasons for nonparticipation included sale of practice to hospital, retirement, and distrust of program.

Selection of the Study and Control Groups for Comparative Analyses

Of the 50 practices that participated in the first-generation pathways program, 32 were chosen for initial data evaluation based on the following criteria: (1) consistent data volume throughout the baseline and evaluation periods, defined as April 2010 to March 2012; (2) volume of >100 patients during the baseline period; and (3) location in Virginia, Maryland, or Washington, DC. Ten of these 32 practices were TRIO practices that participated in the Oncology Medical Home. Data from all 32 practices in the baseline year were used to create propensity scores via logistic regression.

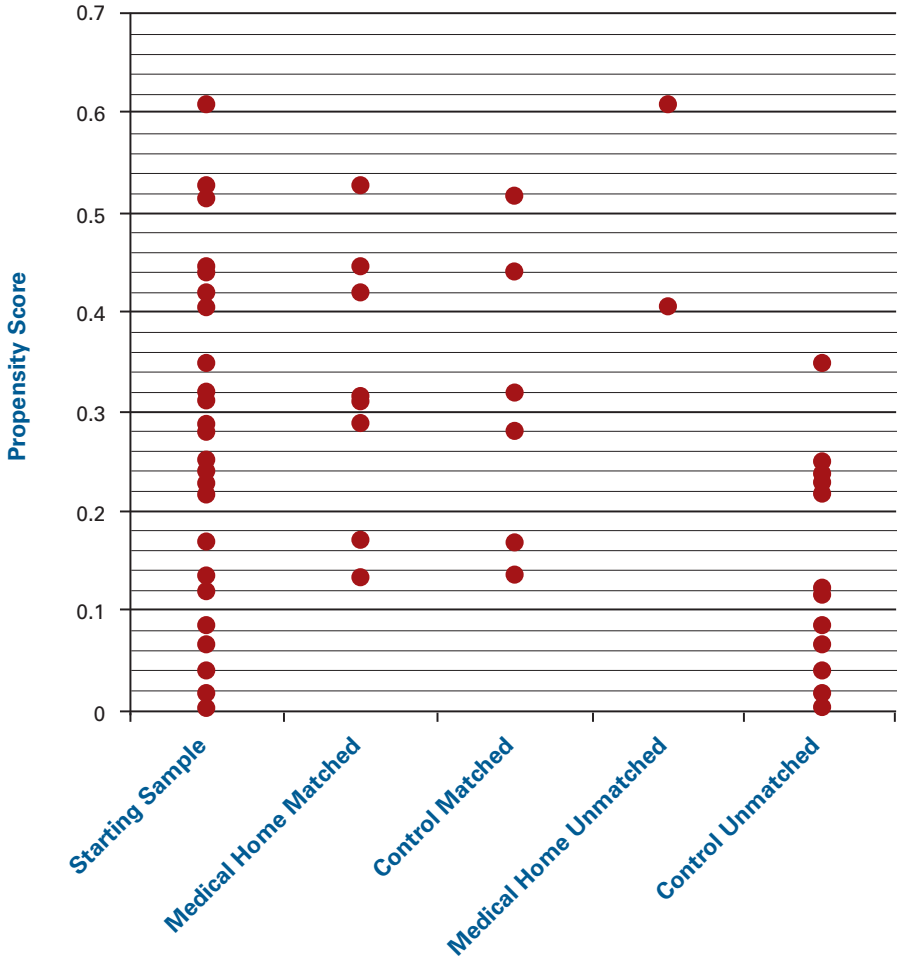
K-nearest neighbor analysis of scores and 1-1 matching with replacement resulted in the pairing of 8 Oncology Medical Home practices to 7 first-generation pathways control practices.[18] The logistic regression for Oncology Medical Home participation included the covariates of cancer and chemotherapy-treated patient volumes, cancer type, patient age group, extent of treatment, and Charlson comorbidity scores.[19]

Study Methods

Comparisons of physician behavior were made between the Oncology Medical Home participating practices and the first-generation pathways control group for the year prior to (year –1) and the year following (year +1) Oncology Medical Home implementation. Behavioral comparisons included number of patients per practice, number of visits per patient, number of patients receiving chemotherapy, chemotherapy administrations per patient, and use of all generic chemotherapy regimens. Claims data from the insurance network database were collected for year –1 (representing April 1, 2010, to March 31, 2011) and for year +1 (representing April 1, 2011, to March 31, 2012).

To measure extent of treatment, therapy lines were assigned based upon grouping of chemotherapy drugs. Drugs given within 30 days of each other were grouped as a drug combination. Changes that occurred beyond 30 days triggered drug combination reassignment and incremented the line of therapy. Exceptions were made for sequential therapies, which were accounted for by distinct grouping rules. Cormorbidity scores were calculated according to Charlson using Deyo's mapping of *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM)* codes.[20] A single modification to the mapping was implemented in flagging claims likely to represent solid tumors with metastases. In addition to using claims with *ICD-9* codes 196.x through 199.1, patients with solid tumors who received 2 or more lines of chemotherapy were marked as with metastatic solid tumor.

Figure 2. Distribution of Practices in the Starting Sample and Subsamples by Propensity Score



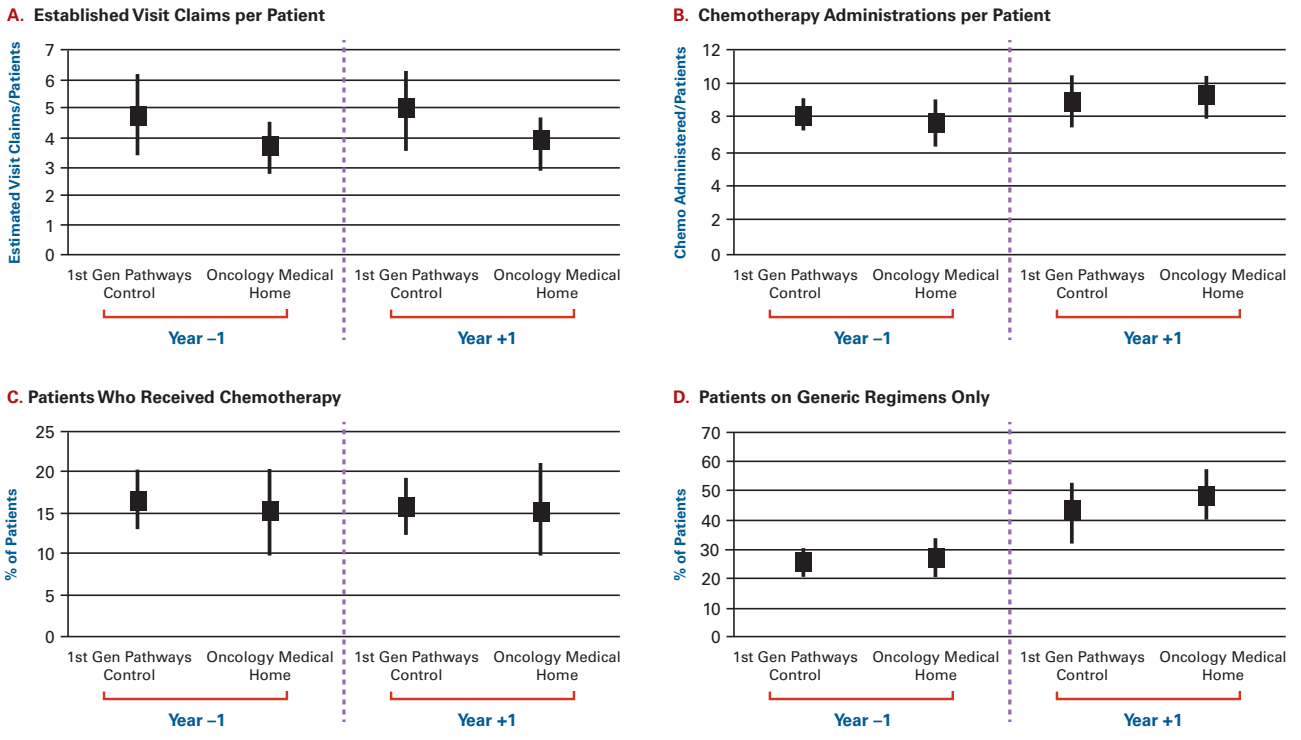
Scores were based upon cancer and chemotherapy-treated patient volumes, cancer type, age group, extent of treatment, and Charlson comorbidity scores. Practices with identical or nearly identical propensity scores are not discernable in the above graph.

All statistical analyses were conducted using SPSS 19 statistical software (IBM, Armonk, New York) with the exception of k-nearest neighbor analyses, which were performed using SPSS Modeler 14.2. Due to the large sample sizes, χ^2 analyses were not used for categorical comparisons. Instead, individual measures were calculated at the practice level and group means were compared by independent *t* tests. All chemotherapy evaluations were based on intravenous chemotherapy claim code 96413. New and established patient visit claim codes 99201-99205, 99241-99245, and 99211-99215 were used in these analyses.

RESULTS

A total of 33 physicians from 13 TRIO practices within the insurance network who participated in the first-generation pathways project chose to join the Oncology Medical Home program. Propensity score analysis identified 8 Oncology Medical Home practices and 7 first-generation pathways practices that were well matched for use in these analyses (**Figure 2**). The matching variables were chosen as a reflection of practice disease focus, treatment preferences, and overall patient volume. After matching, baseline demographics and characteristics were similar in the 2 groups (**Table**). The first-generation pathways control group treated 4847 patients at baseline versus 7213 for the Oncology Medical Home. The ages of patients were similarly distributed between the 2 groups. Approximately 13.5% of patients were under age 50 years, 35% were aged 50 to 64 years, approximately 25% were aged 65 to 74 years, and 25% were aged 75 years or older. Both study groups treated primarily solid tumors (85%).

Figure 3. Physician Behavioral Parameters for the Oncology Medical Home Versus First-Generation Pathways Control for the Years Prior To and Following Implementation of the Oncology Medical Home



Closed squares represent the means and error bars represent 95% confidence intervals.
Year –1 refers to data from the year prior to the Oncology Medical Home implementation; Year +1 refers data during the first year of Oncology Medical Home.

Other tumor types were hematologic (11%) and gynecologic (5%). Seventy percent of patients recieved first-line chemotherapy, 22% percent recieved second-line chemotherapy, and approximatley 9% recieved third-line or higher chemotherapy.

There was minimal difference in behavior change between the Oncology Medical Home and first-generation pathways providers and between study years among providers (**Figure 3**). The number of established patient visits in the Oncology Medical Home group remained stable from year –1 to year +1, with a mean of 3.7 and 3.8 patient visits, respectively. The same was true for the first-generation pathways control group, with a mean of 4.6 and 5 patient visits, respectively. New patient visits increased 2% from year –1 to year +1 for Oncology Medical Home providers compared with a decrease of 2% for the first-generation pathways control group. The percentage of chemotherapy administrations per patient remained stable among study years for both groups, with approximately 8 chemotherapy administrations per patient in each group for each year. The percentage of patients who received chemotherapy remained stable for each group among study years at approximately 15%.

There was no difference in the percentage of patients who received all-generic chemotherapy regimens between the study groups, though there was a trend for increased use of generics in year +1 for both groups; Oncology Medical Home providers increased the use of generic-only regimens by 43% in year +1 compared with first-generation pathways providers, who increased use of generics by 42%. The migration of broadly used agents gemcitabine, docetaxel, irinotecan, and oxaliplatin (transiently) from brand to generic status during the study period was largely responsible for the increase in generic-only regimen prescribing among both groups. The generic regimens lacking any of these 4 drugs accounted for 25% and 23% of control and Oncology Medical Home patients, respectively, in the program year. In the preprogram year, all-generic regimens accounted for roughly 25% of control and 28% of Oncology Medical Home patients.

DISCUSSION

We found that, surprisingly, moving financial incentives from drug administration toward cognitive services

Table. Baseline Characteristics of Matched Oncology Medical Home and First-Generation Pathways Control Groups

Characteristic	First-Generation Pathways Control 7 practices, N = 4847	Oncology Medical Home 8 practices, N = 7213	*P*
Patients per practice, mean No.	693	902	.596
Patients by age group, mean %			
<50 years	15	12	.179
50-64 years	34	37	.462
65-74 years	23	26	.085
75+ years	28	26	.695
Patients by primary cancer type, mean %			
Solid	84	83	.924
Hematologic	11	12	.933
Gynecologic	5	5	.625
Charlson Comorbidity Index	6.2	6.2	.898
Patients receiving chemotherapy, mean %	17	15	.970
Chemotherapy, mean %			
Initial treatment	70	70	.909
Second line	22	21	.609
Third line or higher	8	10	.305

did not alter physician behavior with regard to type or frequency of chemotherapy administrations. We say surprisingly, as expectations based on prevailing wisdom suggest physicians behave in their economic best interest as long as patient outcomes are not jeopardized. This has been demonstrated in previously published reports showing that decreased reimbursement schedules correlate with increased rates of chemotherapy administration and use of more costly chemotherapeutic agents.[10,21] In fact, a recent *New York Times* editorial cosigned by 20 leading academics cited fee-for-service reimbursement as the primary driver for the spiraling cost of cancer care in this country.[11] Our results are quite inconsistent with this idea. Whether this pattern of care was pathway-influenced or is the result of National Comprehensive Cancer Network and other guidelines, brand name prescription drug detailing, cognitive dissonance, our culture of medicine, or other factors, is speculative without more information.

Additionally, the results from this study indicate that, despite a nearly 3-fold increase in E&M code reimbursement, no significant change in established or new patient visits was observed. This was contrary to expectation and could be related to external influences on physician practice behavior, including the historically lower contribution of E&M reimbursement to revenue, standardized and established practice patterns, and maximized throughput within office flow. If so, then the speculated impact of reimbursement reform may be overestimated.

The reimbursement level for generics did not differ between the control and the Oncology Medical Home participants. We acknowledge the potential impact due to the patent expiry of 4 drugs in the program year, which may have minimized pressure to increase reimbursement from E&M claims. However, this is a separate issue from the main question of whether physicians behave to maximize financial gain. The data we provided suggest that given the opportunity to maximize revenue by increasing select cognitive services, physicians remained unchanged in their behavior.

The nature of this observational study may raise questions over bias, and ultimately, conclusions. The methodology of conducting research in such circumstances is difficult; by definition, selection bias exists when programs are voluntary and financially incentivized. However, any selection bias incurred impacted both control and experimental cohorts, which were then matched by propensity scoring. To account for differences in disease focus, diagnosis mix was considered. To account for differences in heavily treated versus newly treated patients, and in early-stage versus later-stage treatment, the distribution of che-

motherapy lines ("extent of treatment") was considered. To account for overall treated patient burden, comorbidity index was considered. Taken together, we believe these measures yielded propensity scores indicative of case mix. However, we acknowledge that claims data, and nearly all secondary data sources, are not sufficient to account for more diverse disease stratifications. For example, race, socioeconomic status, biomarker status, disease stage, or disease histology are not sufficiently represented in claims data. Despite the absence these factors, we believe these cohorts are appropriately matched and the comparisons are valid.

We initiated the Oncology Medical Home program with the intent of further removing financial impact by offering a "white bag" drug delivery system where patient specific medications and supplies are delivered directly to practices from a dedicated specialty pharmacy. Alternatively, practices could continue their legacy buy-and-bill arrangement at a reduced fee schedule, 8% margin over ASP predetermined to be adjusted annually, where they would assume risk for price increases in brand drugs not mitigated by price equilibration for those drugs recently converted to generic. The 8% margin was selected for 2 reasons. First, this was the lowest bid by specialty pharmacy suppliers, as they are unable to purchase drugs at the same discounted prices as oncologists. Second and more importantly, modeling suggested that the 8% margin over ASP, drug utilization from the baseline control period, and the most recent Medicare fee schedule would create no net profit. All practices in the Oncology Medical Home chose to retain their current buy-and-bill practice for drugs. Acceptance of white bagging would have made cohort comparisons less complicated, but the continued buy-and-bill preference by participants, despite profit neutrality and assumed risk, represents an interesting behavioral observation.

We recognize that the Oncology Medical Home program was limited to a single payer, which may not have accounted for sufficient per practice volumes to impact behavior. However, that payer represented approximately one-third of the payers of first-generation pathway providers and more than 50% of their profit, making the program financially relevant to participating practices. Although Medicare may contribute the majority of patients to an oncologist's practice, its contribution to profit is much less significant, making commercial payers increasingly relevant to a practice's financial integrity.

Finally, we recognize that Oncology Medical Home providers, being mature pathways participants of nearly 3 years, may have had established patterns of care that limited variance, thereby reducing the influence of reimbursement. If this is true, then pathways programs such as the first-generation program described herein may be a more palatable provider solution to an unsustainable cost curve than radical reimbursement reform.

Surprisingly, these findings are not revelatory, as related research into patterns of cancer care has resulted in similar observations. Morden et al found that hospice referral rates, hospitalizations, intensive care unit admissions, and chemotherapy use in the last weeks of life were remarkably uniform regardless of institution; profit versus nonprofit, academic versus community hospital, or small versus large facility.[22] These direct observations imply that salaried physicians practice similarly to those reimbursed by fee-for-service methodology, despite vastly different economic incentives.

Observations from Morden and this study suggest that, contrary to prevailing dogma, medical oncology treatment selection and cancer care practice patterns may not be influenced by fee-for-service reimbursement as is often ascribed. Such observations warrant careful consideration as reimbursement methodology is modeled as part of healthcare reform. Research is ongoing to validate these observations and assess additional influences. Other value measures of our Oncology Medical Home that were believed to be both cost-saving and quality-enhancing, included physician commitment to an intensive continuous quality improvement initiative and their participation in an end-of-life care coordination program. The observations related to these components of this Oncology Medical Home pilot were separately reported at the American Society of Clinical Oncology Annual Meeting in 2013 and will be published in the near future.[14-17]

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Authorship Information: Concept and design (BF, WW, RT, JS); acquisition of data (BF, SM, TO, RT, JS); analysis and interpretation of data (BF, SM, TO, DW, JS); drafting of the manuscript (BF, SM, WW); critical revision of the manuscript for important intellectual content (BF, SM, TO, JS); statistical analysis (BF, SM); administrative, technical, or logistic support (RT, JS); supervision (BF).

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