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ORIGINAL CONTRIBUTION

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The Cost of Cancer-Related Physician Services to Medicare

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Although physician services represent a substantial portion of cancer care costs, little is known about trends in the costs of physician cancer services in the fee-for-service Medicare program. We analyzed aggregated data from all Part B Medicare claims for physician and supplier services attributed to cancer patients from 1999 to 2012 to characterize how billing and payments have changed over time for the most common cancer types. Billing and expenditure data are from the Medicare Statistical Supplement, and age-adjusted incidence data are from SEER. Physician services for cancer patients grew from $7.6 billion in 1999 to $12.3 billion in 2012 (60 percent increase). Reimbursements for physician and supplier services for cancer treatment in Medicare Part B beneficiaries steadily grew from 1999 to 2005 and then plateaued through 2012, led by a decrease in reimbursements for prostate cancer care. These trends may reflect shifts toward hospital-based care or changes in aggressiveness of care.

INTRODUCTION

Approximately $124 billion was spent on cancer-related costs in 2010, and as the U.S. population ages, it is likely that this figure will continue to grow [1]. Currently, 1 in 12 dollars spent in the Medicare Fee-For-Service (FFS†) Program is spent on cancer care [2]. One of the larger components of this spending is for physician and supplier services (henceforth referred to as physician services, for brevity) [3]. Cancer spending in particular is disproportionately focused on physician services compared to other disease states [2], though no recent analysis has been performed on this significant subset of cancer spending.

"Physician services" is a technical term used to describe a specific set of expenditures covered by the Medicare Part B program. When a provider performs a treatment for a patient, Medicare Part B reimburses that physician for his or her time [4]. Additional payments may be included for drugs administered by a physician that a physician must purchase beforehand or if the physician is performing the procedure in his or her own office. Finally, supplier services, which constitute non-durable equipment like bandages, are sometimes analyzed in this category as well, though these are not paid to the physician [3]. Our analysis is limited to physician and supplier services,

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†Abbreviations: SEER, Surveillance, Epidemiology, and End Results Program; FFS, fee-for-service; CPI, consumer price index; MMA, Medicare Modernization Act; ADT, androgen deprivation therapy; GnRH, gonadotropin-releasing hormone; FOLFOX, folinic acid, Fluorouracil, Oxaliplatin regimen; IMRT, intensity-modulated radiation therapy; OIPDA, Office of Information Products and Data Analysis; ICD-9-CM, International Classification of Diseases.

Keywords: cancer, Medicare, Medicare Part B, insurance, physician services, prostate cancer, colorectal cancer, breast cancer, lung cancer, SEER program

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which represent a sizeable proportion of cancer expenditures. In 2011, physician services composed 41 percent of total Medicare expenditures for cancer care, compared to 25 percent for outpatient hospital fees, and 22 percent for inpatient hospital fees. Hospice, home health, and skilled nursing facilities constituted the rest [2].

Although recent debate over the Sustainable Growth Rate has led to an increased scrutiny of physician services, little is known about how physician expenditures have grown for cancer care in particular [5]. A descriptive analysis of these expenditures over the past decade provides the background for an informed discussion of payment reform affecting physician reimbursement. Furthermore, comparing the amount physicians charge to Medicare to the amount Medicare actually reimburses the physicians may reveal a disconnect between physician-defined value and the government's willingness to pay. At the least, a growing divide between physician charges and actual Medicare payment may reflect the current reality in which physician charges are increasingly independent from what is actually reimbursed. Since some private insurers use actual physician charges to determine physician reimbursement and as many providers directly bill charges to uninsured patients [6], a growing difference between the charged and reimbursed amount could represent containment of health care expenditures via Medicare's fee schedule relative to the amount reimbursed by other payers.

The overall cost of cancer treatment varies by cancer type due to differing incidence rates, types of treatments, and treatment costs [1]. Though prior studies of cancer spending over time have focused on individual disease sites [7-9], treatment modalities [10], or earlier periods [11,12], this paper analyzes how Medicare's physician charges and payments have changed for cancer services overall and for the most common cancer types (colorectal, female breast, lung, and prostate cancers) over the past decade. In 2010, these cancers made up over half of all new cancers reported in the United States [13]. By isolating physician expenditures, we are able to characterize general trends affecting an important subset of cancer expenditures over the past decade.

METHODS

Overview

Medicare reimbursements for physician services in oncology are complex because physicians must purchase physician-administered drugs and are reimbursed for the cost of the drug after therapy. Our analysis, therefore, includes payments to physicians for the services they provide and the cost of most chemotherapy used to treat patients.

We combined recent spending and incidence data to examine national cancer costs for physician services to Medicare's Part B Program. Notably, we did not have data regarding costs charged by and reimbursed to hospital-based outpatient facilities and, therefore, have focused on physician service and supplier costs. We controlled for case number to focus on cost growth due to technology development, care intensity, and reimbursement rates. We further compared submitted charges with the amounts reimbursed by Medicare to measure how provider-defined costs differ from payer-defined costs. Although charges do not directly correlate with Medicare payments in a given year, they are incorporated into several Medicare reimbursement policies, and they serve as reference points for hospital payment negotiations with non-Medicare private insurers and the uninsured [6].

Study Design

First, we examined trends in the number of beneficiaries from the Medicare enrollment reports to provide context for changes in cancer case number and spending [14]. Next, we obtained national spending data from the Medicare Statistical Supplement [3]. Then we used incidence data from the Surveillance, Epidemiology, and End Results (SEER) databases of the National Cancer Institute to estimate the total number of new cancer cases in the Medicare Part B program each year [15] so we could compare the physician expenditures per case across cancer sites. We also examined how submitted charges varied with payments for each site. Finally, we report descriptive statistics to describe the trends over time.

Data Sources

We retrieved cancer incidence data from the SEER 13 database, submitted in November 2013, using SEER*Stat software [15,16]. The data represent approximately 13.4 percent of the population. Cancer types were identified by International Classification for Diseases — Oncology — Version 3 (ICD-O-3) code [17].

We used the Medicare Statistical Supplement [3] to collect data on the provider-submitted charges and Medicare Part B physician program payments each year for all cancers and female breast, prostate, lung and colorectal cancer. The Statistical Supplement is an annual report published by the CMS Office of Information Products and Data Analysis (OIPDA) that covers calendar years 1999-2012. CMS aggregated all finalized physician and supplier claims that were billed with a primary International Classification of Diseases (ICD-9-CM) diagnosis code for cancer, and our analysis focuses on these aggregated figures. The data are abstracted from the Carrier Standard Analytical File, a compilation of non-institutional claims by physicians, non-physician practitioners, laboratories, and ambulances [18]. These services represent just a subset of Part B expenditures because facility fees in the outpatient hospital setting are excluded [19]. The charge data and payment data both reflect the same patient population (the entirety of Part B physician charges and payments attributed to each cancer).

Due to data limitations, breast cancer statistics are limited to female patients. Lung cost data represent trachea, bronchus, and lung cancers, whereas lung incidence

Table 1. Diagnosis classifications for sources used.

Nomenclature in this Paper	SEER*Stat Nomenclature	ICD-O-3 Codes[a]	Medicare Statistical Supplement Nomenclature	ICD-9-CM Codes[b]
All sites	All sites	See SEER Site-Recode Webpage [17]	All Neoplasms	140-239
Colon	Colon, excluding rectum	C180-189, C260	Colon	153
Lung	Lung, Bronchus, Trachea, Mediastinum, Other Resp.	C339-C349, C381-C383, C388, C390, C398, C399	Trachea, Bronchus, Lung	162
Breast	Female Breast	C500-C509	Female Breast	174
Prostate	Prostate	C619	Prostate	185

[a]International Classification of Diseases for Oncology, 3rd Edition
[b]International Classification of Diseases, Ninth Revision, Clinical Modification

data also include primary mediastinal tumors and other unspecified respiratory neoplasms. Exact coding specifications used are listed in Table 1.

Estimating the Number of Incident Cancers Among Medicare FFS Beneficiaries

Because the Medicare Statistical Supplement does not provide data on the number of beneficiaries treated for each disease, we needed to estimate the number of Medicare FFS beneficiaries diagnosed with cancer in each year examined. We estimated this number by multiplying incidence data from SEER with the total number of Medicare beneficiaries enrolled in Part B each year. Annual Part B beneficiary counts were obtained from Medicare Enrollment reports [14]. We used delay-adjusted incidence data from SEER to overcome expected delays in cancer registry reporting.

Because Medicare provides coverage for both the aged (age 65 and over) and disabled (under age 65), we used SEER*Stat to calculate separate incidence rates for the population older than age 65 and the population younger than age 65. We multiplied the SEER-derived cancer incidence rates for the population over 65 by the total number of FFS beneficiaries over age 65. We repeated this for the populations under age 65. We then summed these figures to estimate the total number of new cancer cases among Medicare part B beneficiaries each year. Our model for cancer incidence therefore excludes Medicare Advantage beneficiaries, so spending and incidence data focus only on FFS Medicare.

In order to obtain accurate estimates of Part B female breast and prostate cancer case numbers, we estimated the number of female and male enrollees by multiplying the total number of Part B enrollees by the gender ratio of beneficiaries who received physician and supplier services [3].

Cost of Care

The Medicare expenditures for each cancer type (compiled by Medicare based on each claim's primary ICD-9 diagnosis code) were directly obtained from the Medicare Statistical Supplement [3]. As noted previously, the examined values only include physician and supplier expenditures for Medicare Part B and therefore exclude hospital facility fees. All costs were adjusted for inflation to 2011 dollars using the historical consumer price index (CPI) for all urban consumers [20]. To calculate the cost per incident cancer, we divided the annual costs attributable to each cancer type by the estimated number of new cancers diagnosed for each year.

Statistical Analysis

We first report descriptive statistics describing changes in enrollment demographics and cancer incidence across all sites. Next, we examined costs in each cancer type, adjusting for the number of incident cases in a year. Finally, we used available data on submitted charges and program payments to explore the role of incidence and reimbursement policies on Medicare physician expenditures over time.

RESULTS

Trends in the Number of New Cancer Cases and Medicare Beneficiaries

Although the overall number of new cancer cases stayed within 5 percent of its 1999 value, there was large site-specific variation (Figure 1). The number of colon cancer cases fell 26.6 percent over the study period. The number of prostate cancer cases decreased 16.7 percent overall over the study period. The number of lung cancer cases remained fairly constant, whereas the estimated number of breast cancer diagnoses decreased 10 percent and subsequently returned to 1999 levels by 2011.

This occurred during a time of a steady growth in Medicare FFS beneficiaries from 37 million to over 45 million [14]. The disabled (under age 65) population became a larger proportion of those enrolled in the Medicare

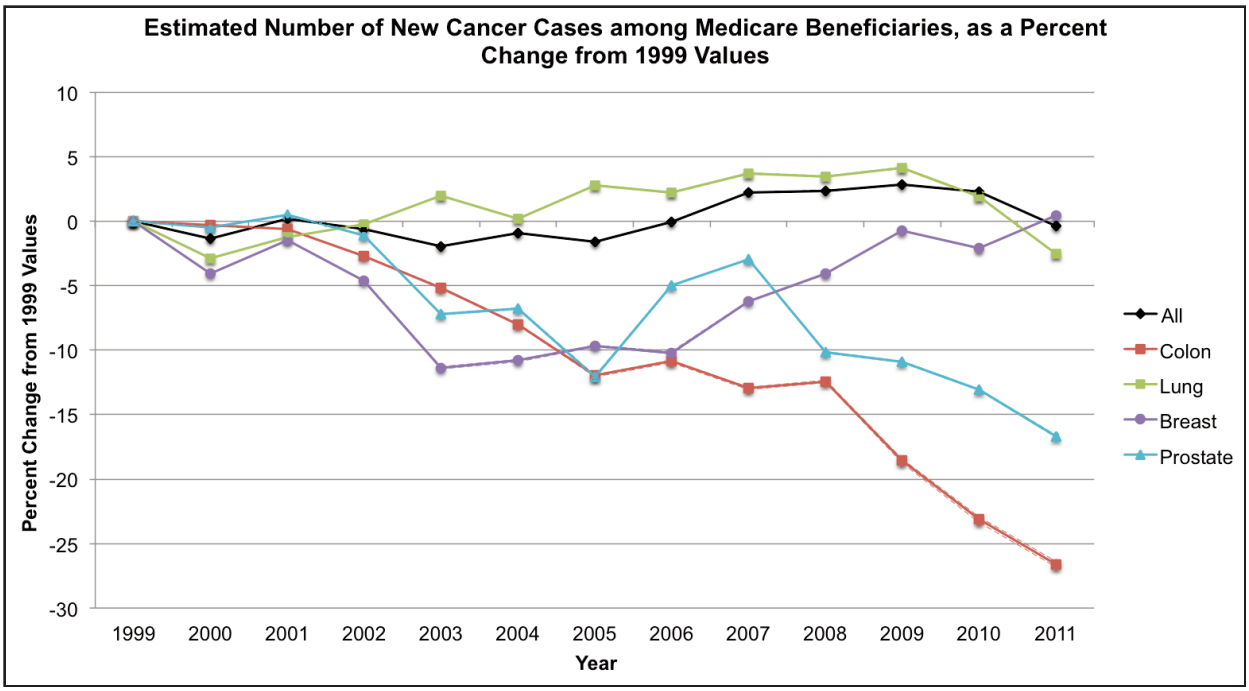

Figure 1. Change in estimated number of incident cancer cases per year among Medicare Part B beneficiaries, as a percent change from 1999 values. Dotted lines represent 95 percent confidence intervals of incidence data from SEER*Stat.

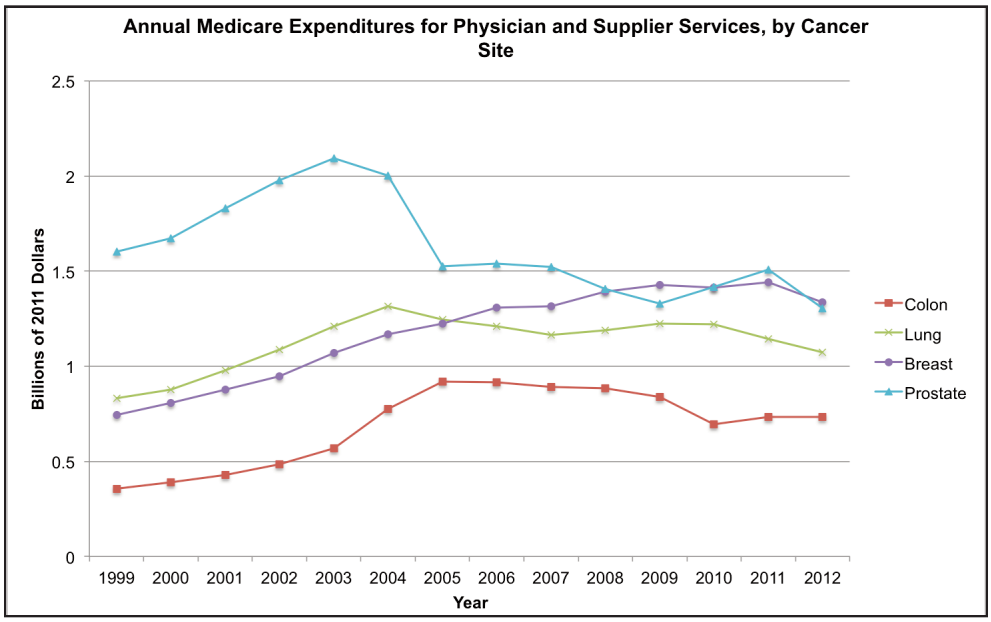

Figure 2. Annual Medicare expenditures for physician and supplier services by cancer site, showing how annual program payments changed over time. Y-axis values are in billions of 2011 dollars.

FFS program, representing 12.5 percent of total enrollees in 1999 and 18 percent of total enrollees by 2011.

Physician Service Expenditures

The overall cost of physician services due to all neoplasms grew from $7.6 billion CPI-adjusted dollars in 1999 to $12.3 billion CPI-adjusted dollars in 2012. The trend in costs varied according to cancer type (Figure 2). Prostate cancer spending declined from a maximum of over $2 billion CPI-adjusted dollars in 2003 to its lowest value of just over $1.3 billion in 2012. Other cancer sites tended to share a pattern of moderate growth over time, with relative increases during the study period of 29 percent for lung, 80 percent for breast, and 105 percent for colon.

Our estimates of yearly physician expenditures per cancer case also show notable variation by cancer site (Figure 3). Although the Medicare physician cost of prostate cancer per case started off highest in 1999 and grew at comparable rates with the other cancer types, it steeply declined from 2003 to 2005. In contrast, all other cancer types examined showed a growth period from 1999 to 2004 and then a relative plateau through 2011. Colon and breast cancer reimbursements per newly diagnosed patient showed the largest increases during the study period.

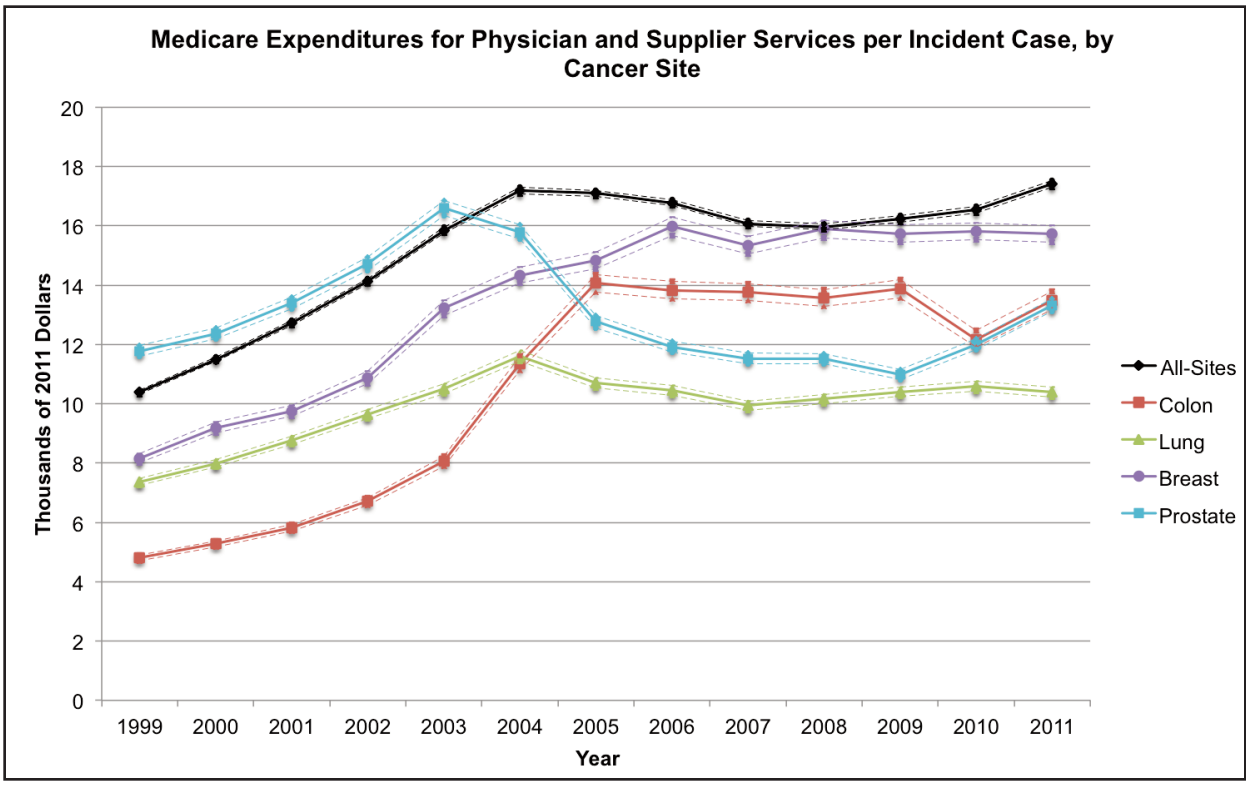

Figure 3. Program payments for physician and supplier services attributed to each cancer site each year divided by the estimated number of incident cases that year. Y-axis values are in thousands of 2011 dollars per case. Dotted lines represent 95 percent confidence intervals. The incidence arises from uncertainty in the incidence estimates from SEER*Stat.

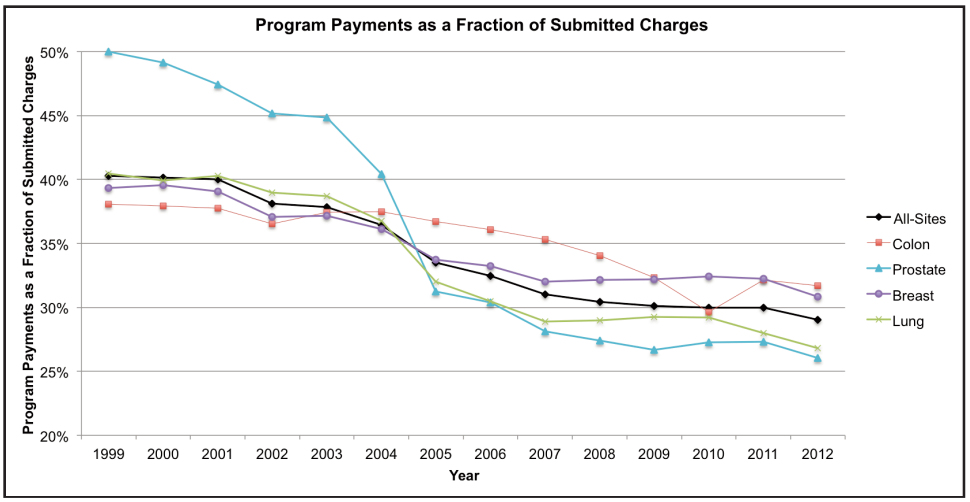

Figure 4. The fraction of submitted charges that are reimbursed as program payments for each cancer type over time for physician and supplier services.

Comparison of Submitted Charges to Medicare and Resultant Payments

For every disease site, provider charges and the associated program payments began growing at a slower rate at some point from 2006 to 2011. However, prostate cancer program payments showed an additional source of stabilization: a rapid decline in the proportion of charges that were reimbursed. Program payments in prostate cancer sharply fell from 2004 to 2005, even though the submitted charges continued to grow. In contrast, colon cancer program payments for physician services trended much more closely with the amount billed, contributing in part to the 150 percent increase in colon cancer program payments from 1999 to 2005. Over the entire period, the reimbursed fraction of submitted charges fell only 6 percent for colon cancer, but 14 percent for prostate cancer (Figure 4).

The growth in both breast cancer program payments and submitted charges appeared to slow from 2006 to 2011. Nevertheless, program payments almost doubled from 1999 to 2011, while the number of incident cases was nearly identical in the first and last years.

After prostate cancer, lung cancer showed the least growth in program payments over the course of study, with only a 29 percent increase.

DISCUSSION

Although the number of beneficiaries grew each year, the estimated number of Medicare fee-for-service beneficiaries newly diagnosed with cancer decreased over the study period, driven largely by declining prostate and colon cancer incidence rates. The declining incidence rates likely represent increased colonoscopy screening (and the removal of pre-cancerous polyps) and decreased prostate cancer screening [21,22]. At the same time, the physician service-related cost per case showed steady growth over the first part of the study period but leveled off from 2005 to 2011. Part of the stabilization of cancer care costs was due to the decreasing cost of prostate cancer care.

Compared to 1999 values, the overall cost of physician services as measured by Medicare program payments decreased more for prostate cancer than for other cancer types. There are two possible reasons for this decline. The first explanation is a decline in the cost of care. This is consistent with other reports, indicating that the average cost to Medicare per common surgical and radiation-based prostate cancer treatment declined significantly from 2002 to 2005 [8]. One influential payment policy change that occurred at that time was the Medicare Modernization Act (MMA) of 2003, which reduced the effective reimbursement for androgen deprivation therapy (ADT) drugs by over 50 percent from 2003 to 2005 [23,24]. This represented a substantial shift in cost because reimbursements in 2002 for a single gonadotropin-releasing hormone (GnRH) agonist accounted for $677 million (8 percent of total Medicare drug reimbursements that year) [25]. In addition to the MMA payment reductions, "Least Costly Alternative" policies became more widespread among carriers, which allowed Medicare to reimburse providers at the rate of the least expensive, equally effective drug [25-27].

The second possible contributor to the overall decline in reimbursement is that practice patterns changed to favor less costly treatment. Though more expensive techniques such as minimally invasive radical prostatectomy and intensity modulated radiation therapy became more prevalent during this time [8,9], active surveillance became more popular as an alternative to radiation or surgery, and ADT use declined [9]. Prior studies on the decline of ADT utilization have implicated the MMA [23], though alternative theories such as improved patient outcomes from radiation and surgery have been proposed [23,28]. Therefore, the combined effect of lower payments and utilization of ADT and the increasing rate of active surveillance may have led to a decline in prostate cancer spending.

In contrast, the per-patient cost of colon cancer sharply rose from 2003 to 2005. This may be attributable to the utilization of more expensive chemotherapeutic drug regimens, biologics, and ancillary drugs such as hematopoietic growth factors [29-31]. For example, a prior analysis has suggested that the approval and uptake of folinic acid, Fluorouracil, Oxaliplatin regimen (FOLFOX) was responsible for a 14 percent increase in the cost of treating colorectal cancer [30]. Though associated with improved survival, the cost-effectiveness of these newer drug regimens have been called into question [32]. The trend toward more aggressive treatment of oligometastatic disease with surgery or other ablative therapies may have also increased aggregate costs [33].

The steadily growing breast cancer costs likely represent multiple treatment pattern changes, such the increasing cost of multimodal therapy, including radiation [34], surgery [35,36], chemotherapy, and biologic therapies [37,38]. This has occurred despite a transient decline in breast cancer incidence in 2003 from concerns regarding hormone replacement therapy [39] and in more recent years from a decrease in screening mammography [40]. More expensive radiation technologies like brachytherapy and intensity-modulated radiation therapy (IMRT) [34] and more common surgical intervention such as contralateral prophylactic mastectomy and breast reconstruction after mastectomy [35,36] may have made breast cancer care more expensive. Possible cost drivers from systemic therapies include increased drug administration in the hospital outpatient setting, increased use of colony-stimulating factors with dose-dense chemotherapy, and the development of novel cytotoxic therapeutics and immunotherapeutics [38,41-43].

Data for lung cancer treatment patterns over this time period are conflicting. General trends include constant or declining radiation and surgery utilization over time, which could be due to the opposing forces of better staging (for example, increased PET scan utilization since 2000 led to a decrease in futile resection of metastatic disease [44]) and advancements in radiation and surgical techniques that allow for the treatment of sicker patients [45]. Finally, although some studies showed an increase in chemotherapy use [44], the development of new drug classes did not appear to strongly raise costs for lung cancer care within some populations [46].

Our study has several limitations. First, our data only include costs for physician and supplier services for FFS Medicare beneficiaries, so it excludes Medicare Advantage patients. Because the costs are from Medicare's perspective, the data also exclude out-of-pocket expenditures and co-insurance from the beneficiary. Cancer drugs covered by Part D, such as hormone therapy for breast cancer treatment, are also excluded. Although carrier claims do not encompass all of Medicare's cancer expenditures, they constitute a large proportion of cancer expenditures [2], and prior studies have used them to track utilization trends [19,47,48]. Second, we may have underestimated cancer-related costs since we cannot capture the treatment for cancer-related comorbidities that are not billed as treatment for the cancer directly. Conversely, it is possible that

we overestimated cancer costs. Costs unrelated to cancer care would be included in our data if physicians incorrectly billed cancer as the principal diagnosis code for a claim. Prior studies report high sensitivity but low specificity of principal diagnosis codes [49]. Third, our data do not take into account the increasing cost of long-term survivorship care as cancer treatments improve and patients live longer [50]. Nevertheless, our findings are a relevant assessment of initial cancer treatment, which represents in some cancer types the most expensive period of care and in all cancer types a significant driver of overall cancer costs [1,2,12].

Finally, perhaps the greatest limitation of our analysis is that we did not include facility charges from hospital-based outpatient offices. Therefore, the overall trends toward slower payment growth that we observed may be partially attributable to the shift in chemotherapy administration from a physician's freestanding facility (included in the accounting of physician service costs) to the hospital outpatient setting (where facility fees are not included in physician service costs) [51]. Prior studies have shown that freestanding facility-based chemotherapy claims represented 86.5 percent of chemotherapy claims in 2005, but only 67 percent in 2011 [51]. This coincides with the time period we observe stabilizing costs, and its effect cannot be measured with our data.

However, because physicians submit claims for each procedure they perform and because physician services represent the majority of all FFS claims [52], physician reimbursement trends provide a reasonable proxy for treatment patterns over time. Furthermore, this study isolates provider-based costs from institutional costs due to hospice care, skilled nursing facilities, or facility fees. Despite any potential shift in medical treatment from freestanding facilities to hospital-based outpatient facilities, the sharp decline in the percent of prostate cancer charges reimbursed relative to other disease sites provides significant evidence that Medicare reimbursement policies can play a significant role in controlling costs.

CONCLUSIONS

Our analysis suggests that the cost of physician services for cancer care in the Medicare FFS population has plateaued in recent years, driven partially by a decline in reimbursement for prostate cancer care and a declining incidence of colon and prostate cancer. This effect can also be partially attributed to a shift in site of service (from freestanding center to hospital-based outpatient center). Since the elderly account for more than half of all cancer cases in the United States and physician services constitute a large portion of Medicare cancer spending, this basic analysis provides a broad look at cancer spending for the four major cancer sites during a period of national concern regarding health care spending.

Our analysis provides a starting point for analyzing cancer costs by disease site. Due to timing differences in relevant reimbursement policies, technology adoption, and epidemiological factors, it is reasonable to suspect that aggregate cost trends vary across cancer sites. By adjusting for incidence trends, we have shown that expenditures for cancer costs are not monolithic. Our data and prior literature suggest multiple etiologies for these differences that should be further explored in future work.

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