

Cost Differential by Site of Service for Cancer Patients Receiving Chemotherapy

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Although cancer death rates have consistently decreased because of improved early detection, prevention, and treatment, the cost of cancer care has significantly increased in conjunction with these accomplishments.¹ The National Institutes of Health estimated that the United States spent \$89 billion on the treatment of cancer in 2007.¹ Given the total 2011 national health expenditure of \$2.7 trillion—which is more than 10 times the \$256 billion spent in 1980—cancer represents approximately 4% of all healthcare costs in the country.^{2,3} As cancer patients live longer and consume more healthcare dollars, this percentage will likely increase.² Within a system of limited resources, maximizing patient outcomes and minimizing costs are primary concerns. Chemotherapy is a common cancer treatment modality that contributes significantly to the overall high cost of cancer treatment. Within the population diagnosed with cancer, approximately 22% of patients will receive chemotherapy in a given year.⁴ In a commercial population, cancer patients make up about 0.68% of a population but account for about 10% of the overall healthcare cost.⁴

Chemotherapy is administered in a variety of settings, although the majority is administered as outpatient treatment.⁵ For outpatient sites of care, patients predominantly receive treatment at a hospital outpatient (HOP) department or community oncology clinic (COC). In recent years, market conditions have caused some medical oncologists to shift from community to hospital sites of service, and as a result, a larger proportion of oncology services are being provided in the HOP setting.^{2,6} In a review of CMS claim payments, it was noted that the share of fee-for-service chemotherapy administration procedure claims in the HOP increased considerably over time—from 13.5% in 2005, to 33% in 2011.⁶ In a time of scarce healthcare resources and increased scrutiny around healthcare spending, how this shift in the site of care impacts oncology costs bears consideration.

The objectives of this study were to compare the costs of: 1) chemotherapy across clinical, demographic, and geo-

ABSTRACT

Objectives: To compare the costs of: 1) chemotherapy treatment across clinical, demographic, and geographic variables; and 2) various cancer care-related cost categories between patients receiving chemotherapy in a community oncology versus a hospital outpatient setting.

Study Design: Data from the calendar years 2008 to 2010 from the Truven Health Analytics MarketScan Commercial Claims and Encounters Database were analyzed. During 2010, the data set contained approximately 45 million unique commercially insured patients with 70,984 cancer patients receiving chemotherapy. These patients were assigned to cohorts depending on whether they received chemotherapy at a community oncology or hospital outpatient setting.

Methods: Cost data for 9 common cancer types were extracted from the database and analyzed on a per member per month basis to normalize costs; costs included amounts paid by the payer and patient payment. Community oncology and hospital outpatient setting chemotherapy treatment costs were categorized and examined according to cancer diagnosis, patient demographics, and geographic location.

Results: Patients receiving chemotherapy treatment in the community oncology clinic had a 20% to 39% lower mean per member per month cost of care, depending on diagnosis, compared with those receiving chemotherapy in the hospital outpatient setting. This cost differential was consistent across cancer type, geographic location, patient age, and number of chemotherapy sessions. Various cost categories examined were also higher for those treated in the hospital outpatient setting.

Conclusions: The cost of care for patients receiving chemotherapy was consistently lower in the community oncology clinic compared with the hospital outpatient setting, controlling for the clinical, demographic, and geographic variables analyzed.

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Take-Away Points

This study demonstrates that cost of care for chemotherapy patients is lower in the community oncology clinic than the hospital outpatient setting.

- Mean per member per month cost of care, depending on diagnosis, was 20% to 39% lower for those receiving chemotherapy in a community oncology clinic compared with the hospital outpatient setting.
- Cost differential was consistent across diagnosis, geography, patient age, and number of chemotherapy sessions.
- As a larger proportion of oncology services are being provided in the hospital outpatient setting, policy makers and payers should be aware that shifts in sites of service may negatively impact cancer spending.

graphic variables; and 2) various cancer care-related cost categories between patients receiving chemotherapy in a COC setting with those receiving chemotherapy in an HOP setting.

METHODS

Data

This study is based on data culled from the Truven Health Analytics MarketScan Commercial Claims and Encounters Database, which contains eligibility, demographic, and medical and pharmacy claims data for commercially insured members (patients). During 2010, the data set contained 45,239,752 unique lives covered by commercial insurance plans. The data analyzed for this study included patient demographic, geographic, facility, physician claims, pharmacy claims, and plan eligibility information for calendar years 2008 to 2010.

Member Identification and Exclusion

To be included in the study, a patient had to first have 1 facility or 2 physician claims with an *International Classification of Diseases, Ninth Revision, Clinical Modification* diagnosis code for 1 of the cancer types listed in **Table 1**. All diagnosis codes (eg, primary diagnosis, secondary diagnosis) were used. Laboratory and radiology claims, however, were not used. Patients with a diagnosis of multiple cancer types were assigned to 1 type, according to the hierarchical list in Table 1. Patients were also required to have at least 1 chemotherapy drug claim, defined according to the Health Care Financing Administration Common Procedural Coding System and National Drug Codes. Study participants were identified if they met these criteria in calendar years 2008 to 2009; claims were accrued for 2008 to 2010 to allow for a larger exposure period.

Patients were excluded if they did not have cancer (n = 43,854,833); were not concurrently receiving chemothera-

py (n = 1,244,899); had HIV/AIDS or an organ transplant (n = 20,937); had <2 physician cancer claims and no facility cancer claims (n = 37,804); had <90 days of insurance eligibility beginning with the first date of service (DOS) for chemotherapy (n = 874); had chemotherapy administration at both HOP and COC facilities (n = 7659); or had leukemia (these patients were excluded because of a large difference in age between cohorts) (n = 1762). We did not exclude based on age. The oldest patients we

found (commercially-insured, no Medicare) were born in 1943 and the youngest were born in 2009; 2008 and 2009 were used for identification, so some patients were aged ~1 year (albeit very few).

Eligible patients were grouped into 2 cohorts depending on the site of service (ie, COC vs HOP) for their chemotherapy administration. Place of service (POS) from the claims was used to determine the setting, with a POS of 11 used to indicate claims at a physician's office, and a POS of either 22 or 95 used to indicate a claim in the outpatient setting. Patients with chemotherapy in both settings were excluded, as parsing the data would have been challenging.

Claims Mapping and Accrual

Costs—the amount paid by the payer and excluding patient payment—including chemotherapy drug costs, were accrued for calendar years 2008 to 2010, beginning with the first DOS for chemotherapy. Claims with a trauma diagnosis were excluded; this was a claims-level exclusion, not a member-level exclusion. Member months were calculated beginning with the first DOS for chemotherapy and continuing for as long as a member maintained his or her plan eligibility or if no more data were available. Months were included on a fractional basis (ie, number of days included/number of days in that month), allowing for analysis of partial months.

The per member per month (PMPM) costs (adjusted for disease mix between the HOP and the COC cohorts) were evaluated according to cancer type, geographic location (ie, urban, suburban, rural), patient age, and number of chemotherapy sessions. Other cost categories, including inpatient, outpatient/physician office, or emergency department site of service; chemotherapy drugs; supportive care drugs (eg, anti-emetics, anti-infectives); other drug costs; and other medical expenses were also evaluated according to the setting of chemotherapy drug administration (ie, COC vs HOP). Costs associated with inpatient and/or emergency department sites of service may have

Table 1. Patient Distribution and Demographics According to Cancer Type, Diagnosis Code, Gender, and Age

Cancer Type	ICD-9-CM Code	Number of Patients		Percent of Male Patients (SD)		Mean Age in Years (SD)	
		HOP	COC	HOP	COC	HOP	COC
Lung	162.XX	3048	12,158	44.9 (0.5)	46.8 (0.5)	56.8 (7.6)	57.7 (6.8)
Colon	153.XX	2107	9356	49.6 (0.5)	51.4 (0.5)	54.5 (8.4)	55.4 (7.9)
Rectal	154.XX	247	949	40.5 (0.5)	43.1 (0.5)	53.6 (8.3)	55.4 (7.6)
Pancreatic	157.XX	566	1653	55.5 (0.5)	51.2 (0.5)	56.2 (8.0)	57.3 (6.8)
Ovarian	183.XX	1291	3258	0.0 (0)	0.0 (0)	55.1 (8.0)	55.5 (8.2)
Multiple myeloma	203.0X	452	1475	55.5 (0.5)	51.7 (0.5)	55.7 (9.8)	57.2 (7.2)
Lymphoma ^a	201.XX, 200.3X, 200.4X, 200.6X, 200.7X, 202.0X	952	2671	51.7 (0.5)	50.8 (0.5)	43.2 (17.1)	48.1 (13.7)
Breast	174.XX, 175.XX	5465	24,340	0.9 (0.1)	0.8 (0.1)	52.1 (8.3)	53.1 (8.2)
Prostate	185.XX	207	789	100.0 (0)	100.0 (0)	58.6 (6.2)	60.0 (5.0)

COC indicates community oncology clinic; HOP, hospital outpatient department; ICD-9-CM, *International Classification of Diseases, Ninth Revision, Clinical Modification*.

^aHodgkin, non-Hodgkin, diffuse large B cell, and mantle cell.

reflected treatment- or disease-related complications, adverse reactions to chemotherapy, practice patterns, patient frailty, or other effects.

Geographical Considerations

The Truven Health Analytics MarketScan Database contains the Metropolitan Statistical Area (MSA) in which each member resides. To group patients into urban, suburban, and rural, we used the US Census Bureau’s estimate of the population of the MSA as of July 2011. MSAs with ≥1,000,000 inhabitants were classified as urban, those with >100,000 but <1,000,000 were classified as suburban, and those with ≤100,000 were classified as rural. Any patients living outside of the MSA areas were classified as rural.

Statistical Considerations

Statistical analysis for difference in mean PMPM cost was performed using the Mann-Whitney *U* test. A linear regression was fitted to determine whether or not a variety of covariates impacted cost, and how much of the total variation was explained by these covariates. The covariates evaluated were cancer type, gender, number of chemotherapy sessions, and geographic location. Covariate analysis included only data available through claims. Differences in populations according to clinical risk profile or severity of illness were not captured in the claims data and therefore could not be analyzed.

RESULTS

The analysis was computed on a PMPM basis to normalize costs. Conditions included 9 common cancer

types (Table 1). These types represented approximately 80% of all patients diagnosed with cancer in the database, providing a comprehensive view of spending while avoiding examination of very small patient populations. A total of 70,984 patients were identified and grouped into either the COC or HOP cohorts. Eighty percent (n = 56,649) of patients received their treatment in a COC setting, whereas 20% (n = 14,335) received treatment in a HOP setting.

Gender distribution between the COC and HOP cohorts was similar. However, the mean age in the COC cohort was higher for all disease states, with the largest being a 4.9-year difference for lymphoma patients. All other disease states had mean age differences within 2 years (Table 1).

Costs and Utilization

The COC cohort had an overall mean PMPM cost of \$6578—30% lower than the HOP cohort’s overall mean PMPM cost of \$9412 (*P* < .001). This difference was 20% to 39% lower in the COC cohort, depending on diagnosis, and was statistically significant for each cancer type evaluated (*P* < .001) (Table 2). The cost differential was consistently higher for patients receiving chemotherapy in the HOP cohort across each cancer type (Table 2), regardless of whether a patient was in an urban, suburban, or rural area (data not shown). The cost differential was also consistently higher in the HOP cohort across year of birth (Figure 1A) and number of chemotherapy sessions (Figure 1B). Interestingly, the mean number of chemotherapy administrations per member was higher for the COC cohort (16.9) than the HOP cohort (14.6), whereas the mean

■ **Table 2.** Mean Number of Chemotherapy Sessions and Mean PMPM Cost by Site of Service

Cancer Type	Number of Chemotherapy Sessions, Mean (SD)		PMPM Cost by Site of Service, Mean (SD)		P
	HOP	COC	HOP	COC	
Pancreatic	13.9 (13.0)	16.6 (13.1)	\$14,191 (12,244)	\$9799 (8091)	<.001
Multiple myeloma	15.8 (16.8)	22.4 (20.8)	\$13,131 (10,835)	\$10,546 (8787)	<.001
Lung	12.6 (12.4)	16.4 (14.3)	\$12,312 (10,632)	\$9082 (7409)	<.001
Colon	16.1 (13.7)	21.5 (17.5)	\$11,752 (10,306)	\$7885 (6909)	<.001
Prostate	12.7 (10.1)	15.8 (13.1)	\$9235 (9852)	\$6667 (6047)	<.001
Rectal	9.7 (9.1)	12.8 (12.6)	\$8503 (9718)	\$6110 (6390)	<.001
Lymphoma ^a	11.2 (8.8)	12.7 (9.7)	\$8383 (9940)	\$5147 (6079)	<.001
Breast	12.9 (12.0)	15.0 (14.9)	\$7529 (6972)	\$5137 (4432)	<.001
Ovarian	12.7 (12)	16.7 (15.1)	\$7491 (7526)	\$5745 (6056)	<.001
Mean PMPM	NA	NA	\$9412 (9395)	\$6578 (6071)	<.001

COC indicates community oncology clinic; HOP, hospital outpatient department; NA, not applicable; PMPM, per member per month.
^aHodgkin, non-Hodgkin, diffuse large B cell, and mantle cell.

number of eligible months was lower for the COC cohort (18.2) than the HOP cohort (18.7). All else being equal, we would have expected more administrations in less time to result in higher PMPM chemotherapy treatment cost.

Differences in cost between the COC and HOP cohorts were also evident across numerous cost categories (Table 3); categories examined were: inpatient, outpatient/physician office, and emergency department site of service; chemotherapy drugs; supportive care drugs; other drugs; and other medical expenses. For all cancer types, the PMPM cost for the HOP cohort was higher in inpatient and outpatient/physician office sites of service and chemotherapy drug costs. Eight of 9 cancer types also had a higher PMPM cost for supportive care drugs in the HOP cohort (Table 4).

Regression Results

All covariates used in the model were statistically significant when used in a multivariate analysis with the exception of prostate cancer patients and patients living in an urban setting. The variables in the model only explain a small amount of the variation in PMPM cost, with $R^2 = 0.118$ and F significance $<.001$ (Table 4). This means that our site-of-service model is able to explain 12% of the variation in cost from our data alone. The implication is that the variables we incorporated are significant, although other cost determinants exist that should be further evaluated in subsequent studies.

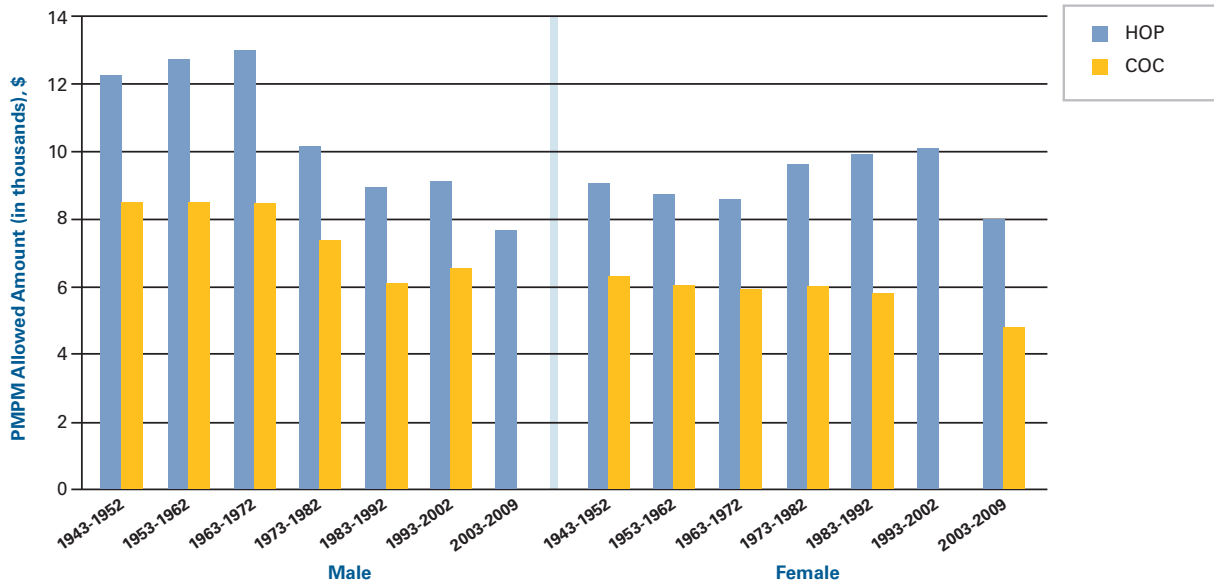
DISCUSSION

To our knowledge, our study results are the first to show that costs were significantly lower when chemotherapy was administered in a COC compared with an

HOP setting and that this cost difference remained significant for each of the 9 cancer types evaluated.^{7,8} The COC cohort had a 30% lower mean PMPM cost (\$6578) than the HOP's cohort (\$9412). The cost differential was consistently higher in the HOP cohort across cancer type, age, number of chemotherapy sessions, and geographic location. The evaluation of other cancer care-associated cost categories also showed higher costs for the HOP cohort in inpatient and outpatient/physician office sites of service and chemotherapy drug costs across all cancer types evaluated. Despite a higher mean age, increased mean number of chemotherapy administrations per patient, and lower mean number of eligible months for patients in the COC cohort, a higher cost of care was not observed. Because chemotherapy contributes significantly to the overall high cost of cancer treatment, treating patients in a COC setting compared with a HOP setting may potentially result in significant savings in healthcare dollars.^{7,8} The results of our study should be interpreted cautiously because the choice of chemotherapy agents, disease stage, or other factors not captured by the database could have significantly influenced the results.

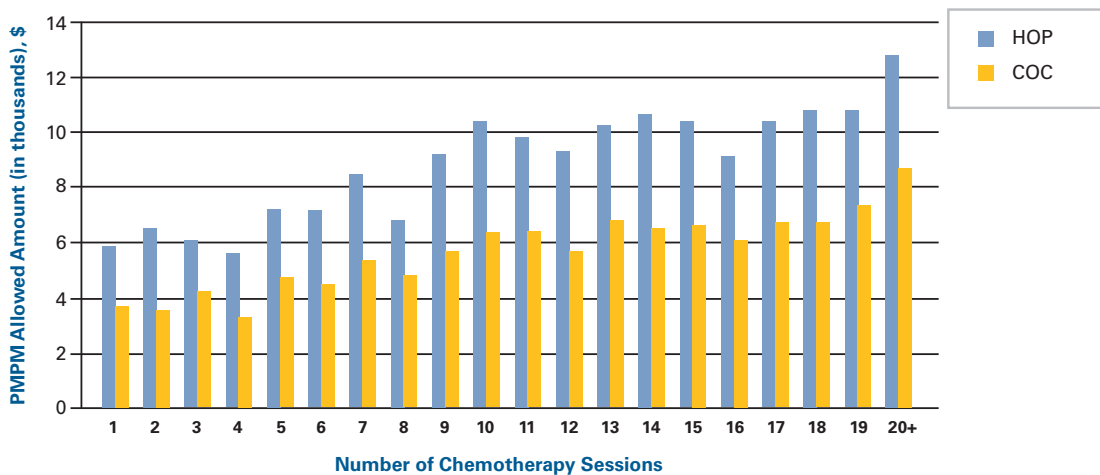
While the limitations of a study based on claims data are recognized, this is the third study using different databases to reach the same conclusion: that cancer care is less expensive in the COC setting.^{7,8} Using the fee-for-service population from the Medicare Limited Data Set from 2006 to 2009, the Milliman group reported an approximate \$6500 annual cost differential in allowable costs for Medicare patients (ie, all Part A and Part B allowable costs, not just costs associated with chemotherapy or cancer treatment) receiving chemotherapy ($n = 79,376$) in a COC compared with an HOP setting.⁷ The cost differ-

■ **Figure 1A.** Cost Differential by Patient Year of Birth



COC indicates community oncology clinic; HOP, hospital outpatient department; PMPM, per member per month.

■ **Figure 1B.** Cost Differential by Number of Chemotherapy Sessions



COC indicates community oncology clinic; HOP, hospital outpatient department; PMPM, per member per month.

ential was consistently lower in the COC setting across various subgroups, including male gender (any age) and number of chemotherapy sessions (<16 sessions).⁷ A similar analysis by Avalere Health reported similar cost discrepancies between COC and HOP settings in the private health insurance sector. Using a different claims database

(n = 22,204 patients) provided by 4 commercial health insurers between 2008 and 2010, Avalere Health concluded there was a 24% chemotherapy cost differential favoring the COC over the HOP setting.⁹ Similar to these studies, our study showed increased costs in the HOP setting across patient age and number of chemotherapy sessions.

■ **Table 3. PMPM Cost by Cost Category**

Site of Service Medications	Inpatient	Outpatient and Physician Office	Emergency Department	Chemotherapy	Supportive Care	Other	Other Medical Expenses
HOP cohort by cancer type							
Colon	\$2038	\$4173	\$21	\$4480	\$736	\$148	\$157
Lung	\$2367	\$4705	\$24	\$3825	\$1059	\$227	\$104
Breast	\$735	\$3239	\$28	\$2454	\$885	\$134	\$54
Multiple myeloma	\$4179	\$3796	\$5	\$3786	\$729	\$310	\$327
Ovarian	\$1532	\$2891	\$9	\$2110	\$712	\$133	\$104
Pancreatic	\$3572	\$5402	\$25	\$3620	\$1008	\$360	\$204
Lymphoma	\$2328	\$3283	\$10	\$1843	\$718	\$140	\$62
Prostate	\$2192	\$3459	\$29	\$2181	\$1090	\$187	\$97
Rectal	\$2052	\$3765	\$15	\$1882	\$485	\$174	\$129
COC cohort by cancer type							
Colon	\$1683	\$2204	\$12	\$3126	\$592	\$139	\$130
Lung	\$2263	\$2935	\$21	\$2660	\$860	\$223	\$120
Breast	\$675	\$2022	\$13	\$1544	\$674	\$152	\$57
Multiple myeloma	\$3176	\$2743	\$7	\$3380	\$687	\$310	\$243
Ovarian	\$1420	\$1813	\$20	\$1512	\$735	\$141	\$105
Pancreatic	\$2872	\$3168	\$44	\$2442	\$762	\$360	\$152
Lymphoma	\$1171	\$1866	\$10	\$1250	\$681	\$119	\$50
Prostate	\$1630	\$2313	\$37	\$1390	\$955	\$265	\$75
Rectal	\$1706	\$2257	\$7	\$1491	\$436	\$119	\$94

COC indicates community oncology clinic; HOP, hospital outpatient department; PMPM, per member per month.

However, our study also showed an increased cost in the HOP setting regardless of whether a patient was in an urban, suburban, or rural area. The results of our study add further evidence that these costs are generally more expensive in the HOP compared with the COC setting.

Higher costs of care in the HOP setting are likely to be at least partially due to different reimbursement rates for HOP-based versus COC-based oncology clinics.⁹ However, future studies evaluating costs between COC and HOP settings should evaluate other potential clinical variables that may influence costs, including choice of chemotherapy agents (eg, specific regimens), clinical (eg, disease stage), biologic (eg, biomarker status), genetic (eg, breast cancer susceptibility gene mutation status), and other disease-related factors. In addition, any legislative variables that may influence or shift treatment of Medicare patients between HOP and COC settings should be considered. For example, with the implementation of sequestration on March 1, 2013, community-based oncologists have experienced a 2% reduction in Medicare electronic record incentive payments, a 2% reduction in Medicare physician reimbursement, and a decrease in chemotherapy drug reimbursement from average sales price

(ASP) + 6% to ASP + 4.3%.¹⁰⁻¹² Two surveys have reported that these reimbursement reductions are leading to shifts in cancer treatment to non-COC settings for Medicare patients.^{13,14} Using oncology census data from the American Society of Clinical Oncology and data from the Milliman report, estimates were made by the Community Oncology Alliance on the annualized cost to Medicare of practices sending Medicare cancer patients to an HOP setting for treatment.¹⁴ They estimated the annualized incremental cost of sending patients to the hospital after 4 weeks of sequestration implementation to be \$750,814,000. By estimating that the sequester cut to cancer drugs saves approximately \$150,000,000 to Medicare each year, the net impact of the sequester cuts for just cancer drugs is an annualized increase in federal spending of \$442,125,000 to \$600,816,000.¹⁴

While the results from our study are likely as far as claims data can go to illuminate the question in cost differential between the HOP and COC settings, this and other study results demonstrate that site of service may have a negative impact on cost. Results from these studies suggest that payers and policy makers should consider site-based cost differentials when developing and

Table 4. Linear Regression Analysis for PMPM Cost

Covariate	Coefficient	SE	t Statistic	P
DOBYR	15	4	4.11	<.001
Sex (male)	-967	83	-11.65	<.001
Breast cancer	-1400	236	-5.93	<.001
Colon cancer	1288	241	5.34	<.001
Lymphoma	-1138	266	-4.28	<.001
Myeloma	3865	292	13.23	<.001
Lung	2890	238	12.14	<.001
Ovarian cancer	-1119	260	-4.30	<.001
Pancreatic cancer	4011	284	14.11	<.001
Prostate cancer	-619	343	-1.80	.071
Rectal cancer	Reference condition			
Hospital cohort	3552	75	47.52	<.001
Community cohort	Reference cohort			
Number of chemotherapy sessions	82	2	40.22	<.001
Urban	8	81	.10	.919
Suburban	-272	88	-3.11	.002
Rural	Reference population setting			

DOBYR indicates date of birth year; PMPM, per member per month. Linear regression intercept was -20,636 (standard error, 6992; t statistic, -2.95); P = .003.

negotiating network participation agreements, benefit structures, patient out-of-pocket responsibilities, and reimbursement rates for providers of cancer care. As a society, we struggle with how to improve patient outcomes and reduce costs related to healthcare treatment. A better understanding of which factors contribute to healthcare costs and how they can be altered to achieve the desired goals is needed.

CONCLUSIONS

Our study demonstrates that costs were significantly lower in the COC than in the HOP setting. This cost differential was consistent across the clinical, demographic, and geographic variables analyzed. In addition, healthcare costs in the COC cohort were lower than in the HOP cohort across urban, suburban, and rural markets. Further evaluation will be needed to determine whether choice of treatment (eg, specific treatment regimen) or various clinical (eg, disease stage), biologic (eg, biomarker status), and genetic factors impact these differences. Nevertheless, site of service alone is at least 1 major contributor to the cost differences observed in this study. Policy makers and payers should be aware of these differences, as our study suggests that changing trends in sites of service may have an unfavorable impact on cancer spending.

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Authorship Information: Concept and design (JRH, MEB, DCD, DKV, JLE, RB); acquisition of data (JH, DCD, JC, RB); analysis and interpretation of data (JH, JRH, MEB, JG, JLE, JC, RB); drafting of the manuscript (JH, JRH, MEB, DKV, JG, RB); critical revision of the manuscript for important intellectual content (JH, JRH, MEB, JG, JLE, RB); statistical analysis (JH, RB); provision of patients or study materials (RB); administrative, technical, or logistic support (JLE, RB); supervision (JRH, MEB, DCD, DKV, RB).

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REFERENCES

- Meropol NJ, Schrag D, Smith TJ, et al; American Society of Clinical Oncology. American Society of Clinical Oncology guidance statement: the cost of cancer care. *J Clin Oncol.* 2009;27(23):3868-3874.
- Marsland T, Robbins G, Marks A, Cassell R, Phillips DG, King K. Reducing cancer costs and improving quality through collaboration with payers: a proposal from the Florida Society of Clinical Oncology. *J Oncol Pract.* 2010;6(5):265-269.

3. National Health Expenditure Data. CMS website. <http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsHistorical.html>. Updated December 9, 2014. Accessed May 14, 2013.
4. Kate Fitch, Bruce Pyenson; Milliman, Inc. Cancer patients receiving chemotherapy: opportunities for better management. Milliman website. <http://us.milliman.com/uploadedFiles/insight/research/health-rr/cancer-patients-receiving-chemotherapy.pdf>. Published March 30, 2010. Accessed May 15, 2013.
5. Dollinger M. Guidelines for hospitalization for chemotherapy. *Oncologist*. 1996;1(1&2):107-111.
6. The Moran Company. Results of analyses for chemotherapy administration utilization and chemotherapy drug utilization, 2005-2011 for Medicare fee-for-service beneficiaries (preliminary results). <https://media.gractions.com/E5820F8C11F80915AE699A1BD4FA0948B6285786/01655fe9-7f3d-4d9a-80d0-d2f9581673a1.pdf>. Published May 29, 2013. Accessed August 7, 2013.
7. Kate Fitch, Bruce Pyenson; Milliman, Inc. Site of service cost differences for Medicare patients receiving chemotherapy. Milliman website. <http://us.milliman.com/uploadedFiles/insight/health-published/site-of-service-cost-differences.pdf>. Published October 19, 2011. Accessed April 8, 2013.
8. Avalere Health, LLC. Total cost of cancer care by site of service: physician office vs outpatient hospital. Community Oncology Alliance website. <http://www.communityoncology.org/pdfs/avalere-cost-of-cancer-care-study.pdf>. Published March 2012. Accessed April 10, 2013.
9. Brow ME, Okon TA, George ER, et al. Thoughts and recommendations on cancer care site of service. *Commun Oncol*. 2012;9:382-388.
10. Cavallo J. Sequestration's impact on cancer care: budget cuts are jeopardizing patient access to care and threatening scientific research. *The ASCO Post*. May 15, 2013;4.
11. Eagle D, Diaz M. How the sequester cuts are harming oncology. *Oncology (Williston Park)*. 2013;27(5):1-4.
12. Frequently asked questions: EHR Incentive Programs (FAQ8173). CMS website. <https://questions.cms.gov/faq.php?id=5005&faqId=8173>. Published April 18, 2013. Accessed May 19, 2013.
13. ASCO sequestration impact survey: one month out, sequestration affecting care of Medicare cancer patients. American Society of Clinical Oncology website. <http://ascoaction.asco.org/Home/tabid/41/articleType/ArticleView/articleId/479/ASCO-Sequestration-Impact-Survey-One-Month-Out-Sequestration-Affecting-Care-of-Medicare-Cancer-Patients.aspx>. Published May 10, 2013. Accessed May 20, 2013.
14. New survey shows sequester cut to cancer care impacting patients and practices. Community Oncology Alliance website. <http://www.communityoncology.org/site/blog/detail/2013/05/09/new-survey-shows-sequester-cut-to-cancer-care-impacting-patients-and-practices.html>. Published May 9, 2013. Accessed May 26, 2013. ■