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Cost Differences for Oncology Medicines Based on Site of Treatment

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AT A GLANCE

Previous research demonstrates that payments from third-party payers for infused oncology medicines are higher when care is provided in hospital outpatient departments (HOPDs) compared with physician offices (POs). Some have speculated this is due to differences in patient characteristics and treatment regimens between the two sites of care. This study employed a novel analytical approach that distinguishes differences in the cost of drugs due to price alone from differences attributable to drug mix and treatment intensity for cancer patients. The analysis was based on 18,195 users of the top 37 infused oncology drugs prescribed to employment-based and commercially insured patients in 2016.

Key findings:

- Hospital prices for the top 37 infused cancer drugs averaged 86.2 percent more per unit than in physician offices.
- For every drug examined, HOPDs charged more on average with statistically significant relative differences ranging from 128.3 percent (nivolumab) to 428.0 percent (fluorouracil).
- The mean annual reimbursement to providers per user of infused cancer drugs was $13,128 in POs and $21,881 in HOPDs.
- Had hospital unit prices matched physician office prices, holding drug mix and treatment intensity constant, we estimate that commercial insurers would have saved $9,766 per user of these medicines in 2016, a savings of 45 percent.

Our findings have implications for private third-party payers, including employers and commercial insurers. To counter higher HOPD pricing, employers can aim to negotiate contracts with hospitals for site-neutral payments to ensure that costs for the same treatment are not higher in the HOPD relative to the PO. In the absence of countervailing market power, third-party payers can engage cancer patients through plan design to guide them to less costly sites that are clinically appropriate for their care. Insurers use both value-based insurance design (VBID) and reference pricing to vary patient cost-sharing based on the choices that they make regarding use of health care services. However, one thing to consider is whether cancer patients receiving oncology services will be sensitive to cost-sharing, since they are some of the highest-cost claimants. They not only are more likely than the average person to reach their deductible, they are also more likely to reach their out-of-pocket (OOP) maximum. Hence, higher patient cost-sharing may not be effective unless clinically appropriate VBID or reference pricing tools remain in force for patients who exceed OOP maximums.

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Introduction

There has been a marked change in site of treatment for cancer patients in the U.S. over the past 15 years. In 2004, approximately 94 percent of chemotherapy infusions for employment-based or commercially insured patients were administered in physician offices (POs), but by 2014 that percentage had dropped to 57 percent with a corresponding shift toward hospital outpatient departments (HOPDs) (Winn et al. 2018). During this same period, the difference in average cost to commercial carriers for chemotherapy administered in HOPDs vs. POs ballooned from 25 percent higher in 2004 to 42 percent higher in 2014 (Fitch, Pelizzari, and Pyenson 2016). Various studies have attempted to ascertain whether the higher payments made to HOPDs are associated with more complex patients, greater resource use, or higher-cost drugs. The consensus is that patient mix and treatment modalities are basically similar across sites of care but that payment rates are much higher in hospital settings whether care is delivered on hospital-based campuses or free-standing hospital-owned clinics (Fisher et al. 2017) (Fitch, Pelizzari, and Pyenson 2016) (Gordon et al. 2018) (Winn et al. 2018). However, data limitations constrain researchers' ability to match cancer patient characteristics across sites of care. None of the secondary data sources used in these prior studies included information on cancer stage, tolerance for alternative treatments, survival prognosis, and other patient-specific factors that could influence drug choice and cost.

In this study, we examine how payments from third-party payers for infused oncology medicines differ by site of care for a market basket of identical medicines. Using a novel analytical approach, we distinguish between differences in HOPD and PO oncology medicine costs due to price differences in drug mix and annual dosage levels. The method allows us to estimate the aggregate extra spending in HOPDs that is unrelated to patient care without having to directly account for patient characteristics. We provide estimates of potential savings to third-party payers and patients using a combination of accounting cost deconstruction and counterfactual simulation.

Methods

Data Source and Study Sample

This study analyzes data from a sample of over 1.7 million members under age 65 enrolled in employment-based health coverage and commercial insurance plans in the 2016 MarketScan® Commercial Claims and Encounters database.[1] We created a dataset of outpatient infused oncology claims as follows. First, from the outpatient medical file, we extracted all claims with Current Procedural Terminology (CPT) codes in the J9XXX range as well as other identified oncological agents in the J85XX range and those with temporary CPT codes (i.e., "C" and "Q"). Next, we selected the 37 most prescribed oncology medications that together captured 92 percent of total chemotherapy utilization and spending. Claims volume for the remaining agents was too small to analyze individual drugs, but even in the aggregate this omission would unlikely affect our main conclusions. Patients with claims that had missing, negative, or zero payments or zeros in the drug units field were excluded. The final study sample was derived after an investigation of the validity of the dose field for infused oncology agents, as described below.

Measuring Dose for Infused Oncology Agents

The MarketScan® outpatient medical claims file contains a field named "units", which is meant to capture the number of milligrams of each drug infused per claim. This field has only recently been included in MarketScan,® which means that there are no published reports to verify the validity of values contained in this field. For this

reason, we conducted the following validity checks. First, we reviewed drug-specific common dosages as recommended in package inserts to identify plausible ranges for each drug according to patient weight or body surface area. Approximately 78 percent of infused oncology claims with positive integers in the units field had plausible values based on this criterion (results not shown).

However, about 20 percent of claims reported a single unit dispensed despite the fact that only one drug in our sample (BCG intravesical) had a recommended dose of 1 milligram. We believe that this discrepancy arose because some providers bill by National Drug Code (NDC) rather than CPT. An NDC specifies the drug manufacturer (labeler), drug, and package size. Thus, an NDC-billed claim should correspond to the number of units included in that packet (e.g., 1 vial (NDC) may equal 100 mg (units)). Unfortunately, we had no way to independently verify this conjecture as MarketScan® does not record the basis of payment. We thus excluded all patients with infused oncology claims reporting 1s in the unit field (retaining patients prescribed BCG intravesical).

After removing single-unit doses, we still observed non-plausible values at both extremes of the units distribution including small integers (e.g., 2s and 3s) and large volumes many times the normal dosage range. We removed these extreme values by Winsorizing the claims data at the 1st and 99th percentile of the drug-specific units' distributions. As with single-unit values, we excluded all patients with any Winsorized claim. This exercise reduced the sample by an additional 7 percent. Finally, to confine the analysis to patients treated exclusively in hospitals and physicians' offices, we dropped patients who received oncology therapy in other outpatient settings (e.g., in-home) or who received treatment in both a physicians' office and a hospital during the year (less than 2 percent of the sample).

Study Design

Unlike previous studies, we made no attempt to directly control for differences in characteristics of cancer patients treated in HOPDs and POs. Rather, we started by building an accounting cost deconstruction model that isolates elements of oncology claims payments in both sites of care. Using this model, we isolated the extent to which differences are driven by price vs. other factors. The model comprises three variables, each computed separately by site of care:

1. Drug mix: the proportion of users receiving each drug (note that patients taking more than one drug are counted as users of each drug taken).
2. Treatment intensity: the mean number of units of each drug administered annually to each user (which in turn can be decomposed into number of therapy sessions and units infused per session).
3. Unit price: the mean payment amount (plan + member) per unit of each drug.

The unit price variable is established via negotiation between third-party payers and providers before care is delivered. For this reason, it represents the best measure of differences in infused cancer drug prices charged by HOPDs and POs.

The other two variables in our model are both influenced by treatment patterns. Drug mix is strongly influenced by cancer type and disease severity as well as by patient tolerance for cancer therapy. Treatment intensity varies by a patient's weight or body surface area, type of cancer, and duration of therapy. In our accounting model, total annual spending on oncology medicines (S) is equal to the unit price (P) times number of patients receiving each drug (Q) times mean units dispensed (U) per user in both the HOPD and PO.

$$\text{Annual Spending (S)} = \text{Price per Unit (P)} \times \text{Number of Patients (Q)} \times \text{Number of Dispensed Units (U)}$$

By standardizing drug mix and treatment intensity across the two sites of care, we removed variation in cost due to treatment differences and isolated the fraction due to price alone. This in turn permitted us to estimate the counterfactual cost of oncology drugs if prices observed in POs had applied in HOPDs. In other words, how much could potentially be saved if HOPD pricing were brought in line with what physician practices receive for identical products?

Figure 1

Hypothetical Example Showing How Differences in Payments for Infused Chemotherapy Drugs in Hospital Outpatient Departments and Physician Offices Can Be Partitioned by Drug Mix, Treatment Intensity, and Unit Price

Model Variables	Panel 1. Accounting Cost Deconstruction			
	Setting and Drug Products			
	HOPD		PO	
	Drug (a)	Drug (b)	Drug (a)	Drug (b)
Number (%) of Users Prescribed Drug* (Drug Mix)	75 -75%	25 -25%	60 -60%	40 -40%
Mean Units per User (Treatment Intensity)	15	9	13	8
Unit Price	$100	$50	$60	$30
Mean Payment per User	$1,500	$450	$780	$240
Mean Payment Across All Drugs	$1,238		$564	
Difference in Mean Payment by Site of Care	$674			

	Panel 2. Counterfactual Simulations					
	HOPD With PO Unit Price		HOPD With PO Drug Mix		HOPD With PO Treatment Intensity	
	Drug (a)	Drug (b)	Drug (a)	Drug (b)	Drug (a)	Drug (B)
Unit Price	$60	$30	$100	$50	$100	$50
Number (%) of Users Prescribed Drug* (Drug Mix)	75 -75%	25 -25%	60 -60%	40 -40%	75 -75%	25 -25%
Mean Units per User (Treatment Intensity)	15	9	15	9	13	8
Mean Payment per User	$900	$270	$1,500	$450	$1,300	$400
Mean Payment Across All Drugs	$743		$1,080		$1,075	
Estimated Savings**	($495) (-73%)		($158) (-23%)		($163) (-24%)	

*Drug users may exceed the number of patients in cases where some individuals take more than one drug. In such cases, the proportion of users taking each drug is denominated by total users, not total patients.

**Difference between actual and counterfactual for each element holding other values constant.

Notes: HOPD=hospital outpatient departments; PO=physician offices

Figure 1 presents a hypothetical two-drug example of how these elements combine to explain the source of differences in overall payments in the two sites of care. The upper panel shows how drug payments are calculated. The mix of drugs provided in HOPDs favors the more expensive drug (a) by 75 percent to 25 percent, whereas in POs the drug mix is 60 percent for drug (a) and 40 percent for drug (b). Treatment intensity is also higher in HOPDs at 15 units vs. 13 units for drug (a) and 9 vs. 8 for drug (b). Drug (a) has a unit price of $100 in HOPDs and $60 in POs. The prices per unit for drug (b) are $50 and $30, respectively. In this example, the annual reimbursement paid per user of drug (a) is $1,500 in HOPDs and $780 in POs. For drug (b), the respective payments per user are $450 and $240. Weighting mean payment rates by the proportions of users of each drug in each site generates an average per user payment of $1,238 in HOPDs vs. $564 in POs, a difference of $674.

The bottom panel of Figure 1 uses a counterfactual simulation technique to demonstrate how mean reimbursement rates would be affected (1) if unit prices from POs were applied to the drug mix and treatment intensity found in HOPDs, (2) if the drug mix found in POs were priced at HOPD payment rates with HOPD treatment intensity, and (3) if treatment intensity found in POs were priced at HOPD rates with drug mix from HOPDs. The first counterfactual replaces HOPD unit prices with those found in POs. The second and third counterfactuals are computed in a similar fashion with drug mix and treatment intensity substitutions.

The results from the first counterfactual simulation suggest that insurers could reduce reimbursement by $495 per drug user per year (a 73 percent savings) if PO prices replaced HOPD prices, assuming no change in either drug mix or treatment intensity. Similarly, setting HOPD drug mix and intensity to PO levels results in projected savings of 23 percent and 24 percent, respectively. Note that these estimates are not additive because any changes in one element will affect the estimated impact of changes in the others. Our simple counterfactual model does not include any behavioral assumptions, but they could be added in more sophisticated versions.

Our empirical analyses use the deconstruction/simulation approach with tables showing, for each site of care, counts of cancer patients by drug, mean units administered per patient per year, mean payment amounts per unit of each drug, and mean actual/counterfactual payment amounts per patient per year. For clarity of presentation, we have not shown measures of variance for mean values. Statistically significant HOPD/PO differences at $p<0.05$ are indicated with asterisks (*).

Results

The final study sample included 18,195 users of the top 37 infused oncology drugs prescribed to employment-based and commercially insured patients in 2016, of whom 51 percent were treated in POs and 49 percent in HOPDs. Figure 2 shows the mix of users by site of care. The drugs are listed in decreasing order of use in POs. The distributions were heavily concentrated, with the top seven drugs accounting for approximately half of all users in each site of care. By contrast, the bottom 14 drugs accounted for just 6 percent of all users in each site of care. However, there were notable differences by site of care. The top three most prescribed medicines in our sample (paclitaxel, carboplatin, and cyclophosphamide) accounted for 27.9 percent of all users in HOPDs but only 24.6 percent in POs. On the other hand, 6.5 percent of PO patients were prescribed either leuprolide or BCG intravesical, compared with just 1.1 percent in HOPDs.

Figure 3 presents data on treatment intensity. Among the most prescribed drugs, annual dosage rates per user were largely comparable by site of care. But there was much more variability among less prescribed medications. On average, annual treatment intensity was 21.2 percent lower in HOPDs compared with POs. Decomposing annual dosage into number of therapy sessions and drug units per session helps explain the source of these observed differences in treatment intensity by site of care. For all but two drugs (leuprolide and vincristine), patients treated in POs received more sessions per year than patients treated in HOPDs. However, the reverse was true regarding units infused per session, which were higher in HOPDs for 31 of the 37 drugs.

Figure 2

Differences in Mix Among the Top 37 Infused Chemotherapy Drugs Administered to Employment-Based and Commercially Insured Cancer Patients in Physician Offices and Hospital Outpatient Departments, 2016

Procedure Code	Generic Drug Name	Drug User Mix by Site of Care: PO Number of Users	PO Percentage of Total Users	HOPD Number of Users	HOPD Percentage of Total Users	Percentage Difference in Drug Mix in HOPD Compared With PO
J9267	Paclitaxel	801	8.6%	867	9.7%	112.5%
J9045	Carboplatin	785	8.5%	858	9.6%	113.6%
J9070	Cyclophosphamide	700	7.5%	765	8.6%	113.6%
J9310	Rituximab	617	6.7%	577	6.5%	97.2%
J9190	Fluorouracil	607	6.5%	482	5.4%	82.6%
J9171	Docetaxel	582	6.3%	558	6.3%	99.7%
J9355	Trastuzumab	538	5.8%	523	5.9%	101.1%
J9000	Doxorubicin	535	5.8%	600	6.7%	116.6%
J9263	Oxaliplatin	447	4.8%	361	4.0%	84.0%
J9035	Bevacizumab	367	4.0%	380	4.3%	107.7%
J9060	Cisplatin	355	3.8%	431	4.8%	126.2%
J9217	Leuprolide	324	3.5%	60	0.7%	19.3%
J9201	Gemcitabine	323	3.5%	317	3.6%	102.0%
J9031	BCG (intravesical)	279	3.0%	33	0.4%	12.3%
J9206	Irinotecan	227	2.4%	221	2.5%	101.2%
J9306	Pertuzumab	211	2.3%	243	2.7%	119.7%
J9299	Nivolumab	165	1.8%	197	2.2%	124.1%
J9181	Etoposide	153	1.6%	145	1.6%	98.5%
J9264	Paclitaxel protein-bound particles	146	1.6%	129	1.4%	91.9%
J9305	Pemetrexed	145	1.6%	165	1.8%	118.3%
J9041	Bortezomib	138	1.5%	138	1.5%	104.0%
J9370	Vincristine	131	1.4%	219	2.5%	173.8%
J9395	Fulvestrant	118	1.3%	103	1.2%	90.8%
J9033	Bendamustine	84	0.9%	62	0.7%	76.7%
J9040	Bleomycin Sulfate	73	0.8%	55	0.6%	78.3%
J9130	Dacarbazine	60	0.6%	53	0.6%	91.8%
J9055	Cetuximab	58	0.6%	43	0.5%	77.1%
J9179	Eribulin	52	0.6%	53	0.6%	106.0%
J9271	Pembrolizumab	41	0.4%	52	0.6%	131.9%
J9308	Ramucirumab	37	0.4%	20	0.2%	56.2%
J9354	Ado-trastuzumab emtansine	34	0.4%	36	0.4%	110.1%
J9047	Carfilzomib	33	0.4%	40	0.4%	126.0%
J9303	Panitumumab	33	0.4%	12	0.1%	37.8%
J9228	Ipilimumab	32	0.3%	53	0.6%	172.2%
J9025	Azacitidine	21	0.2%	24	0.3%	118.8%
J9202	Goserelin acetate implant	15	0.2%	31	0.3%	214.9%
J9042	Brentuximab vedotin	8	0.1%	14	0.2%	182.0%
Total		**9,275**	**100.0%**	**8,920**	**100.0%**	**--**

Notes: HOPD=hospital outpatient departments; PO=physician offices

Figure 3

Differences in Treatment Intensity of the Top 37 Infused Chemotherapy Drugs Administered to Employment-Based and Commercially Insured Cancer Patients in Physician Offices and Hospital Outpatient Departments, 2016

Procedure Code	Generic Drug Name	Mean Units of Drug Administered per User (Treatment Intensity) by Site of Care		Percentage Difference in Treatment Intensity in HOPD Compared With PO	
		PO	HOPD		
J9267	Paclitaxel	1,164.0	1,105.8	95.0%	*
J9045	Carboplatin	46.0	44.2	96.0%	
J9070	Cyclophosphamide	49.2	45.0	91.5%	*
J9310	Rituximab	32.2	29.0	89.9%	*
J9190	Fluorouracil	63.2	58.9	93.3%	
J9171	Docetaxel	512.9	516.3	100.7%	
J9355	Trastuzumab	407.1	363.8	89.4%	*
J9000	Doxorubicin	40.4	37.1	91.8%	*
J9263	Oxaliplatin	1,862.4	1,669.2	89.6%	*
J9035	Bevacizumab	529.7	426.7	80.5%	*
J9060	Cisplatin	41.8	42.7	102.1%	
J9217	Leuprolide	8.0	8.0	100.4%	
J9201	Gemcitabine	68.6	54.0	78.7%	*
J9031	BCG (intravesical)	5.5	5.5	99.5%	
J9206	Irinotecan	96.4	95.3	98.9%	
J9306	Pertuzumab	2,935.7	2,625.5	89.4%	*
J9299	Nivolumab	1,704.4	1,397.9	82.0%	
J9181	Etoposide	198.5	166.8	84.0%	*
J9264	Paclitaxel protein-bound particles	2,051.9	1,492.9	72.8%	*
J9305	Pemetrexed	394.1	351.0	89.1%	
J9041	Bortezomib	523.8	443.5	84.7%	
J9370	Vincristine	8.5	10.5	124.6%	
J9395	Fulvestrant	132.7	125.5	94.6%	
J9033	Bendamustine	1,168.0	1,164.1	99.7%	
J9040	Bleomycin Sulfate	11.8	11.3	95.3%	
J9130	Dacarbazine	60.1	56.0	93.2%	
J9055	Cetuximab	590.4	442.7	75.0%	
J9179	Eribulin	204.3	136.5	66.8%	*
J9271	Pembrolizumab	1,206.3	804.3	66.7%	
J9308	Ramucirumab	666.4	728.9	109.4%	
J9354	Ado-trastuzumab emtansine	2,496.6	1,959.6	78.5%	
J9047	Carfilzomib	1,415.8	940.5	66.4%	
J9303	Panitumumab	343.7	344.1	100.1%	
J9228	Ipilimumab	819.0	863.7	105.5%	
J9025	Azacitidine	4,944.8	2,256.0	45.6%	*
J9202	Goserelin acetate implant	8.2	7.6	93.2%	
J9042	Brentuximab vedotin	762.5	890.1	116.7%	
Mean		**745.3**	**587.0**	**78.8%**	

Notes: HOPD=hospital outpatient departments; PO=physician offices

*Statistical significance of difference in means by site of care denoted as follows: * p<0.05.*

Figure 4 shows how unit prices for the 37 drugs varied by site of care. For every product, HOPDs charged more on average, with differences ranging from 128.3 percent of the mean PO charge for nivolumab to 428.0 percent for fluorouracil. Every difference was statistically significant at $p<0.05$ except for the lightly prescribed brentuximab vedotin. Overall, the weighted average unit price was 86.2 percent higher in HOPDs.

Figure 5 integrates the three elements of our model showing actual mean annual payments per drug user by site of care together with counterfactual payments in HOPDs — what insurers would have spent had they paid PO prices for the exact same market basket of drugs and treatment intensity provided in HOPDs during 2016. Over the full sample of drugs, actual payments averaged $13,128 in POs and $21,881 in HOPDs, a difference of $8,753. Had payers reimbursed HOPD unit prices prevailing in the PO market — which averaged $12,115 over all drugs investigated — the mean payment per user would have dropped by $9,766 or 45 percent. Note that the drug-mix-weighted mean counterfactual reimbursement to HOPDs is just 7.3 percent lower than the actual mean payment made to POs, indicating that most of the observed difference was due to price. The remainder is attributable to higher observed treatment intensity in POs.

Discussion

Our analysis of payments for infused oncology drugs by third-party payers in 2016 demonstrates that large differences in reimbursement rates to HOPDs and POs were primarily due to differences in prices rather than differences in treatment modality. We found that the average employment-based or commercially insured patient receiving oncology medicines cost $9,766 more per year when treated in HOPDs vs. POs. Our findings indicate that higher payments for infused oncology drugs in HOPDs relative to POs are a result of higher prices paid to hospitals relative to prices paid to POs for the same agents.

Our findings bolster prior research showing that payments for infused oncology drugs in HOPDs exceeded payments in POs by a factor of 1.71 (Gordon et al. 2018) to 2.59 (Winn et al. 2018) between 2004 and 2014. Similar differences have been reported in Medicare Part B payments for infused oncology products (The Moran Company 2013). These studies and others measuring differences in cancer-related medical costs by site of care (Fisher et al. 2017) (Fitch, Pelizzari, and Pyenson 2016) (Kalidindi, Jung, and Feldman 2018) all use some variant of regression modeling to control for potential dissimilarities among cancer patients treated in HOPDs and POs. As we noted earlier, none of the secondary data sources used in these prior studies included information on cancer stage, tolerance for alternative treatments, survival prognosis, and other patient-specific factors that could influence drug choice and cost.

The data used for this study also lacked information on these variables. So instead, we focused exclusively on observed drug treatments and payments. On the treatment side, we explicitly considered differences in drug selection and treatment intensity across the two settings, which together serve as surrogate measures for differences in patient characteristics and practice style.

We make no claims about potential qualitative differences in cancer care or outcomes in POs vs. HOPDs. There may well be differences in quality of care by type of setting. Hospital campuses clearly have greater resources available in the event of treatment failure or other adverse reactions from therapy. However, it is important to note that not all hospital-based oncology practices reside on hospital campuses. In fact, the recent growth in hospital ownership of such practices has concentrated on purchasing existing community-based practices that retain their off-campus locations (Neprash et al. 2015) (Fulton 2017) (MedPAC 2017). In these situations, the quality of care should more closely resemble independent physician practices rather than more integrated campus facilities.

Competitive markets require numerous sellers (and buyers) as well as price transparency. The market for outpatient oncology in the U.S. today meets neither criterion. Our results indicate that the proportion of infused oncology drugs provided in HOPDs has continued to rise from 43 percent reported in 2014 (Winn et al. 2018) to 49 percent in 2016. Independent oncology practices are becoming less common and have disappeared altogether in some markets (Clough, Dinan, and Schulman 2017). The combination of hospital mergers (MedPAC 2017) together with widespread purchases

Figure 4

Differences in Price per Unit for the Top 37 Infused Chemotherapy Drugs Administered to Employment-Based and Commercially Insured Cancer Patients in Physician Offices and Hospital Outpatient Departments, 2016

Procedure Code	Generic Drug Name	Mean Price per Unit by Site of Care		Percentage Difference in Price per Unit in HOPD Compared With PO
		PO	HOPD	
J9267	Paclitaxel	$0.76	$1.40	184.3%
J9045	Carboplatin	$23.48	$32.98	140.5%
J9070	Cyclophosphamide	$60.85	$120.80	198.5%
J9310	Rituximab	$870.19	$1,463.65	168.2%
J9190	Fluorouracil	$3.71	$15.87	428.0%
J9171	Docetaxel	$8.76	$24.34	277.9%
J9355	Trastuzumab	$104.39	$174.98	167.6%
J9000	Doxorubicin	$8.75	$29.40	335.9%
J9263	Oxaliplatin	$1.90	$4.08	214.9%
J9035	Bevacizumab	$82.36	$208.32	252.9%
J9060	Cisplatin	$6.52	$15.87	243.4%
J9217	Leuprolide	$368.29	$817.51	222.0%
J9201	Gemcitabine	$38.54	$69.89	181.4%
J9031	BCG (intravesical)	$153.57	$383.90	250.0%
J9206	Irinotecan	$23.77	$46.91	197.3%
J9306	Pertuzumab	$12.42	$20.68	166.5%
J9299	Nivolumab	$39.10	$50.16	128.3%
J9181	Etoposide	$1.94	$5.56	286.1%
J9264	Paclitaxel protein-bound particles	$11.69	$21.60	184.7%
J9305	Pemetrexed	$77.34	$130.99	169.4%
J9041	Bortezomib	$54.10	$98.09	181.3%
J9370	Vincristine	$13.46	$34.87	259.0%
J9395	Fulvestrant	$109.86	$185.72	169.1%
J9033	Bendamustine	$29.41	$54.98	187.0%
J9040	Bleomycin Sulfate	$63.55	$94.57	148.8%
J9130	Dacarbazine	$6.81	$20.39	299.5%
J9055	Cetuximab	$65.86	$124.62	189.2%
J9179	Eribulin	$121.92	$292.94	240.3%
J9271	Pembrolizumab	$56.73	$92.84	163.6%
J9308	Ramucirumab	$63.99	$102.46	160.1%
J9354	Ado-trastuzumab emtansine	$38.04	$66.04	173.6%
J9047	Carfilzomib	$40.03	$56.35	140.8%
J9303	Panitumumab	$117.67	$185.29	157.5%
J9228	Ipilimumab	$145.29	$241.11	166.0%
J9025	Azacitidine	$4.22	$10.67	252.9%
J9202	Goserelin acetate implant	$426.10	$787.10	184.7%
J9042	Brentuximab vedotin	$129.65	$215.73	166.4% ^
Mean		**$91.49**	**$170.34**	**186.2%**

Notes: HOPD=hospital outpatient departments; PO=physician offices

All differences in means by site of care are statistically significant at the p<0.05 level except where denoted by ^.

Figure 5

Differences in Total Payments for the Top 37 Infused Chemotherapy Drugs Administered to Employment-Based and Commercially Insured Cancer Patients in Physician Offices and Hospital Outpatient Departments, 2016

Procedure Code	Generic Drug Name	Mean Payment per User by Site of Care			Percentage Difference in Counterfactual Compared With Actual Payments in HOPDs
		PO (Actual)	HOPD (Actual)	HOPD (Counterfactual)	
J9267	Paclitaxel	$884	$1,548	$840	184.3%
J9045	Carboplatin	$1,080	$1,456	$1,037	140.5%
J9070	Cyclophosphamide	$2,992	$5,437	$2,739	198.5%
J9310	Rituximab	$28,059	$42,428	$25,225	168.2%
J9190	Fluorouracil	$234	$935	$218	428.0%
J9171	Docetaxel	$4,491	$12,565	$4,521	277.9%
J9355	Trastuzumab	$42,498	$63,659	$37,976	167.6%
J9000	Doxorubicin	$353	$1,090	$324	335.9%
J9263	Oxaliplatin	$3,534	$6,805	$3,167	214.9%
J9035	Bevacizumab	$43,630	$88,888	$35,143	252.9%
J9060	Cisplatin	$273	$678	$279	243.4%
J9217	Leuprolide	$2,934	$6,540	$2,946	222.0%
J9201	Gemcitabine	$2,644	$3,775	$2,082	181.4%
J9031	BCG (intravesical)	$847	$2,106	$842	250.0%
J9206	Irinotecan	$2,291	$4,470	$2,265	197.3%
J9306	Pertuzumab	$36,455	$54,296	$32,603	166.5%
J9299	Nivolumab	$66,643	$70,115	$54,660	128.3%
J9181	Etoposide	$386	$927	$324	286.1%
J9264	Paclitaxel protein-bound particles	$23,994	$32,250	$17,458	184.7%
J9305	Pemetrexed	$30,478	$45,985	$27,149	169.4%
J9041	Bortezomib	$28,334	$43,506	$23,994	181.3%
J9370	Vincristine	$114	$367	$142	259.0%
J9395	Fulvestrant	$14,580	$23,314	$13,791	169.1%
J9033	Bendamustine	$34,351	$64,008	$34,236	187.0%
J9040	Bleomycin Sulfate	$750	$1,064	$715	148.8%
J9130	Dacarbazine	$409	$1,142	$381	299.5%
J9055	Cetuximab	$38,882	$55,176	$29,158	189.2%
J9179	Eribulin	$24,903	$39,978	$16,639	240.3%
J9271	Pembrolizumab	$68,439	$74,668	$45,631	163.6%
J9308	Ramucirumab	$42,642	$74,686	$46,643	160.1%
J9354	Ado-trastuzumab emtansine	$94,974	$129,410	$74,548	173.6%
J9047	Carfilzomib	$56,668	$53,001	$37,645	140.8%
J9303	Panitumumab	$40,447	$63,756	$40,489	157.5%
J9228	Ipilimumab	$118,988	$208,241	$125,481	166.0%
J9025	Azacitidine	$20,867	$24,073	$9,520	252.9%
J9202	Goserelin acetate implant	$3,494	$6,017	$3,258	184.7%
J9042	Brentuximab vedotin	$98,857	$192,018	$115,396	166.4%
Drug Mix-Weighted Mean		**$13,128**	**$21,881**	**$12,115**	**180.6%**

Notes: HOPD=hospital outpatient departments; PO=physician offices

of oncology practices (Alpert, Hei, and Jacobson 2018) (Nikpay, Richards, and Penson 2017) has significantly increased the bargaining power of HOPDs vis-à-vis third-party payers compared with that of independent oncologists.

Evidence indicates that there are several driving factors behind this trend of consolidation. First, until 2015, Medicare policy awarded hospital acquisition of off-campus physician practices with extra revenue in the form of facility fees, which are unavailable to independent practices. Second, there has been little antitrust enforcement of vertical integration in the hospital marketplace (Gaynor et al. 2014). Third, and perhaps most important, the expansion of the 340B Drug Pricing Program under the Affordable Care Act in 2010 permitted more hospitals to purchase medicines at significantly discounted prices (Desai and McWilliams 2018) (Conti and Bach 2013) (GAO 2018) (Jung et al. 2018). Since these discounts are not available to independent physician practices, 340B provides an extra incentive for oncologists to sell their practices to hospitals. These factors combine to form a perfect recipe for increasing price disparities in cancer treatment by site of care, further adding to the growing cost burden shouldered by the U.S. health care system. The trend is likely to continue unless vigorously challenged. Discussions about health care cost drivers should consider the role that hospitals play in cost growth for physician-administered drugs. Potential solutions include greater price transparency and countervailing market power exercised by third-party payers (Scheffler and Arnold 2017).

Implications for Employers and Insurers

Our findings have implications for private third-party payers, including employers and insurers. Employers can exert pressure on both health plans and hospitals to shift from discounted charge contracts based on a multiple of Medicare or some other prospective case rates. Such a coalition of employers is already trying this (Koller and Khullar 2019). In the absence of such market power, third-party payers can attempt to engage patients through increased price transparency combined with plan design changes to steer them to less costly sites of care for treatment that is clinically appropriate. Employers and insurers can use both value-based insurance design (VBID) and reference pricing to vary patient cost-sharing based on the choices that they make regarding use of health care services. Under VBID, cost-sharing is aligned with the value of health care services received. It is built on the principle of lowering or removing financial barriers to essential, high-value clinical solutions.[2] To the degree that the quality of health care services does not vary with site of care, VBID could be used to encourage patients to seek treatment in POs by lowering cost-sharing, relative to HOPDs, when services are received at that site of care.

Similarly, reference pricing raises cost-sharing when patients seek care at certain health care providers where the quality or outcome of treatment is not dependent on the site of care. Under reference pricing, employers or insurers pay a fixed amount or limit their contributions toward the cost of a specific health care service, and health plan members must pay the difference in price if a more costly health care provider or service is selected (Fronstin and Roebuck 2014). In the context of this study, a reference price could be set at a level that corresponds closest to the cost of services in a PO. If patients choose to receive services in an HOPD, they would pay the difference in costs. The expectation is that patients would choose POs over HOPDs. However, POs below the reference price may increase prices to at or close to the reference price, offsetting some of the savings. This may happen to the degree that there is a competitive market and transparent pricing information.

One thing to consider is whether cancer patients receiving oncology treatment services will be sensitive to the combination of price transparency and cost-sharing changes. Cancer patients are some of the highest-cost claimants. These patients are not only more likely than the average person to reach their deductible, they are also more likely to reach their out-of-pocket (OOP) maximum (Fronstin and Roebuck 2019). And price transparency by itself has been found to be insufficient in reducing hospital prices (White and Whaley 2019). Hence, the potential for price transparency and higher cost-sharing may not be effective unless benefit designs require that the select services impacted by VBID or reference pricing are subject to patient cost-sharing and not fully covered by insurers regardless of patients exceeding an annual OOP maximum.

Study Limitations

There are several study limitations that warrant mention. First, the study focused solely on infused cancer drugs and payment and did not focus on patient characteristics, which means that the results cannot be used to assess qualitative differences in cancer treatment between POs and HOPDs. Second, we report differences in payments for the drugs themselves and do not analyze differences in administration costs or other services provided during therapy sessions. Third, the MarketScan® sample available for analysis was constrained by lack of dosage information on claims using NDC-based payment methods. Fourth, even after excluding putative NDC-based claims, the sample contained non-plausible extreme values that required Winsorization. These exclusion criteria may limit the generalizability of the study findings. Finally, the MarketScan® database, while very large, is a convenience sample and not necessarily representative of all employment-based and commercial health plans.

Conclusion

Our findings demonstrate that payments for infused cancer medicines in the commercial and employment-based markets are nearly two times higher, on average, in the HOPD relative to the PO for the same drug and that these cost differences are due to pricing decisions of hospitals, not differences in modality. On a drug-by-drug basis, HOPDs charged 1.3 to 4.3 times more than POs for cancer medicines. Over one year, employers and insurers could save $9,766 per covered cancer patient if they paid PO prices rather than HOPD prices for infused cancer therapy.

Given that nearly half of oncology therapy takes place in HOPDs, employers could cut their drug costs nearly in half simply by shifting patients to PO settings without necessarily affecting quality of care. They could also negotiate site-neutral pricing for medicines.

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Endnotes

[1] See Truven Health Analytics. MarketScan Databases. https://truvenhealth.com/markets/life-sciences/products/data-tools/marketscan-databases

[2] See http://vbidcenter.org/frequently-asked-questions/

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