



# **Cost Differences for Oncology Medicines Based on Site of Treatment**

# Speakers



Paul Fronstin, Ph.D.,  
Director, Health  
Research and Education  
Program, EBRI



M. Christopher Roebuck,  
Founder and CEO,  
RxEconomics LLC



Bruce Stuart, PhD,  
Economist and Health  
Services Researcher and  
Professor Emeritus at the  
University of Maryland  
School of Pharmacy



**Moderated by:** Kris  
Haltmeyer, Vice  
President, Legislative &  
Regulatory Policy, Blue  
Cross and Blue Shield  
Association (BCBSA)

UNIFIED MEETING 5

MAIN ROOM (5) SHARE

Q & A

PARTICIPANTS (5)

- Paul Fronstin (Me)
- EBRI - Marcene Pugh (MODERATOR, SHARING)
- Ask Questions

Chat

Meeting information

**RIGHT CLICK on "Ask Questions" then Click on Chat**

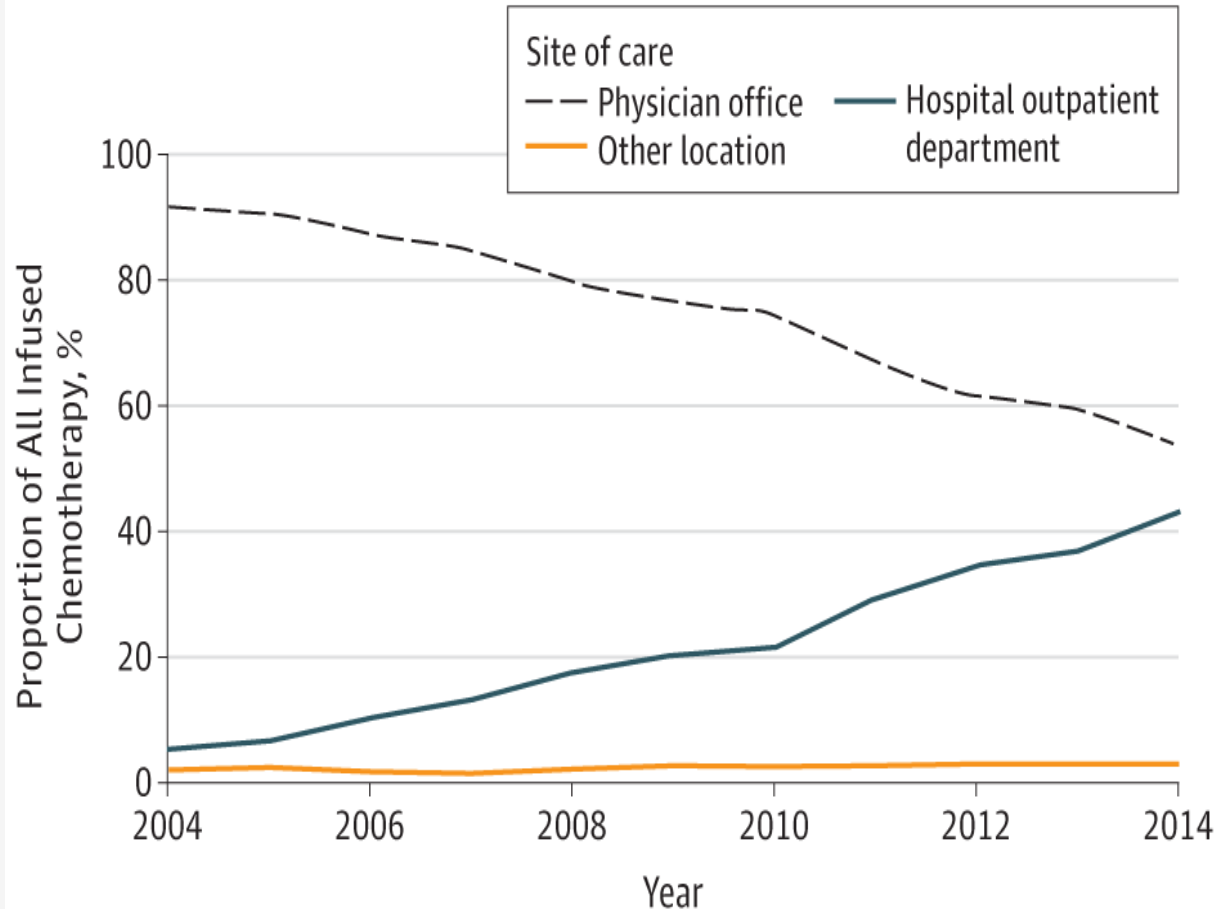
**Chat window will open in the bottom left corner**

EBRI

## Webinar Agenda

- Objective of Study – Paul Fronstin
- Methods, Shortcoming of Literature, Accounting Model – Bruce Stuart
- Data, Sample, Selection of Medications, Findings – Chris Roebuck
- Implications – Paul Fronstin
- Q & A

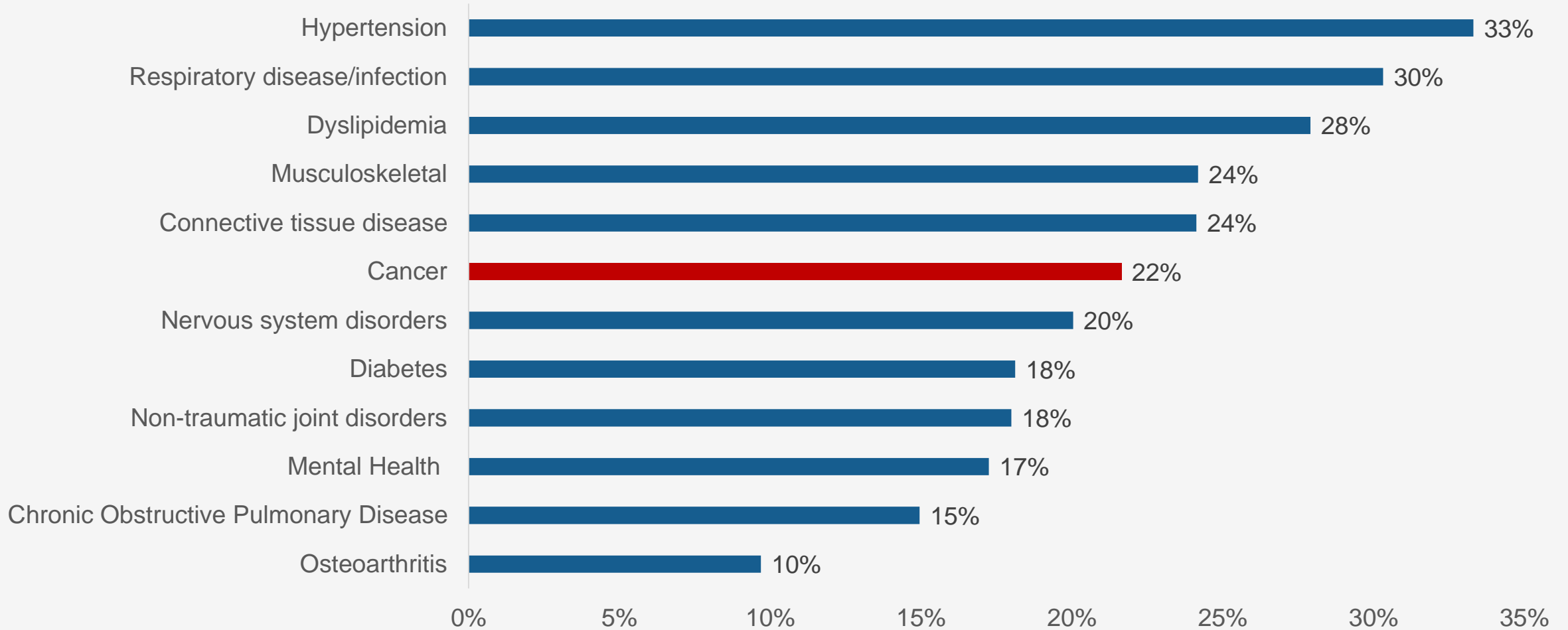
## Shift in Site of Care for Infused Chemotherapy Among Commercially Insured Patients, 2004-2014



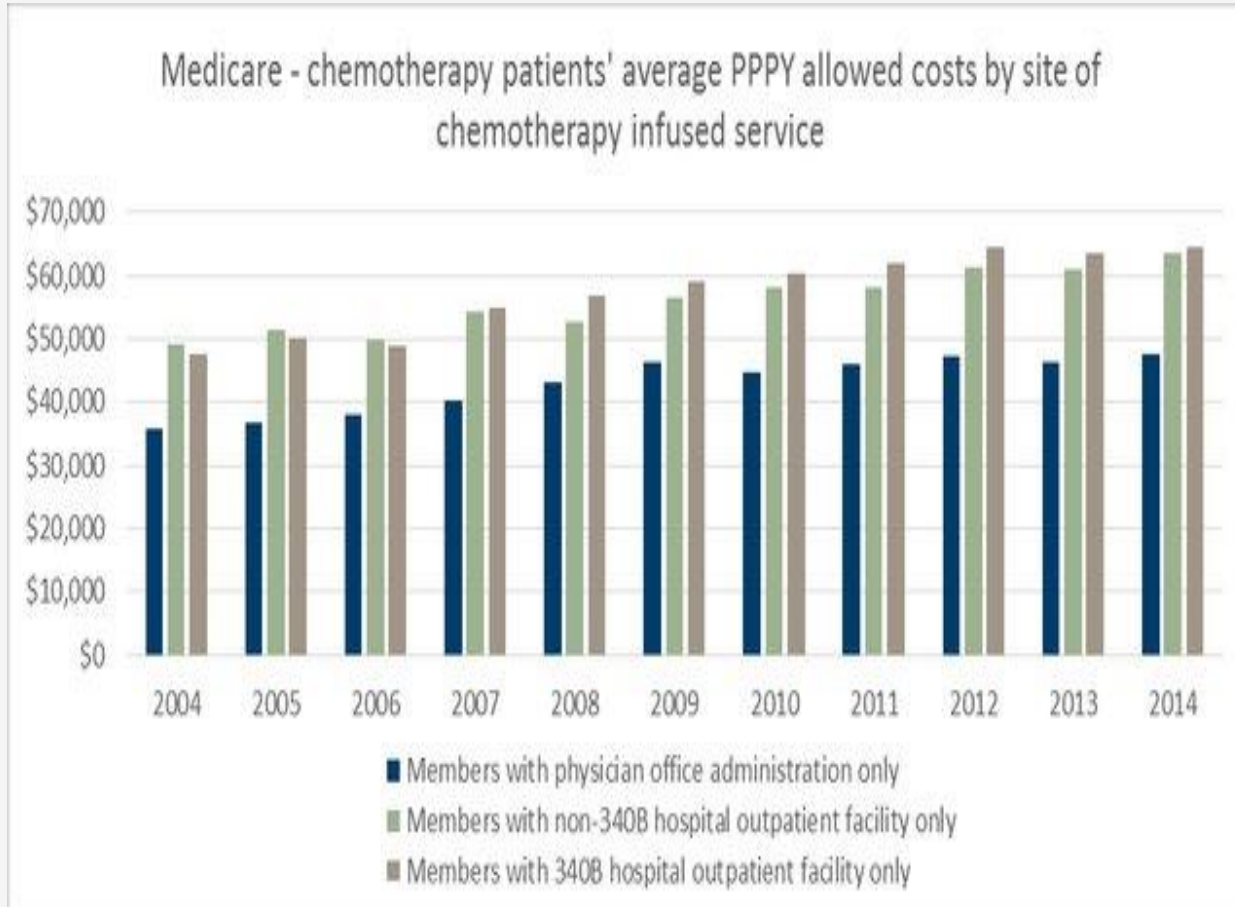
- Marked change in site of treatment for cancer patients.
- In 2004, approximately 94% of chemotherapy infusions for employment-based or commercially insured patients were administered in physician offices (POs), but by 2014 that percentage had dropped to 57%.
- Corresponding shift toward hospital outpatient departments (HOPDs)

# Why Focus on Cancer?

## Percentage of Top Spenders With Various Health Conditions



## HOPDs Are Becoming More Costly



- The difference in average cost to commercial carriers for chemotherapy administered in HOPDs vs. POs ballooned from 25% higher in 2004 to 42% higher between 2004 and 2014
- Are higher payments associated with
  - More complex patients?
  - Greater resource use?
  - Higher cost drugs?

## Study Objectives

- Examine how payments from third-party payers for infused oncology medicines differ by site of care for a market of identical medicines.
- Distinguish between differences in the cost of medicine in hospital-outpatient departments (HOPDs) and physician offices (POs) that is due to price difference in the drug mix and annual dosage level.
- Our method allows us to estimate the aggregate extra spending in HOPDs that is unrelated to patient care without having to directly account for differences in patient mix
- We provide estimates of potential savings to third-party payers and patients using a combination of accounting cost deconstruction and counterfactual simulation.



## Background on Study Design

- Prior studies have compared the cost of infused oncology medications delivered to commercially insured cancer patients in physicians' offices (POs) compared to hospital outpatient departments (HOPDs)
- All find that there has been a marked shift in outpatient cancer treatment away from POs and toward HOPDs. These studies also find that hospitals systematically charge much higher prices, while patient mix and treatment modalities appear similar across the 2 sites of care
- However, none of the secondary data sources used in these studies included information on cancer stage, tolerance for alternative treatments, survival prognosis, and other patient-specific factors that could influence drug choice and cost
- Lack of such data makes it difficult to challenge hospitals' assertions that they charge high prices for infused chemotherapy to cover the needs of higher risk patients

## Methods

- Our study takes a different approach—instead of focusing on cancer patients and characteristics that are difficult to measure, we focus on the elements that make up treatment and treatment costs
- Our underlying premise is that if patients receive identical treatment, then providers should receive the same payment regardless of site of care (this premise was first elaborated by MedPAC in regard to Medicare payment reform)
- To accomplish this task, we use a combination of accounting cost deconstruction and counterfactual simulation to assess how much more commercial carriers pay HOPDs compared to POs for the most prescribed chemotherapy drugs in 2016

## Methods

- The accounting model defines annual spending on each drug by site of care ( $S_{HOPD}$  and  $S_{PO}$ ) as the product of 3 variables
- Drug users ( $Q_d$ ): number of patients receiving the drug (d)
- Treatment intensity ( $U_d$ ): mean number of units of the drug administered annually to each patient
- Unit price ( $P_d$ ): mean payment (plan + member) per unit of each drug reimbursed to the provider
- Total spending on drugs in each site of care thus equals:

$$S_{HOPD} = \sum_{d=1}^n (Q_d \times U_d \times P_d)_{HOPD}$$

$$S_{PO} = \sum_{d=1}^n (Q_d \times U_d \times P_d)_{PO}$$

## Methods

- By setting up the spending equations in this manner it is a simple matter to determine how much of the difference in total oncology drug spending by site of care is due to each factor
- Thus, the difference explained only by unit price is:

$$\sum_{d=1}^n (Q_d \times U_d \times P_d)_{\text{HOPD}} - \sum_{d=1}^n (Q_d \times U_d \times P_d)_{\text{HOPD}}$$

where PO prices ( $P_d$ ) are substituted for HOPD prices ( $P_d$ ) in this counterfactual presentation, holding the number of drug users ( $Q_d$ ) and treatment intensity ( $U_d$ ) constant at levels observed in the HOPD population

- In the same fashion, we can explain how much of the difference is explained by differences in drug mix and treatment intensity between HOPDs vs POs:

$$\sum_{d=1}^n (Q_d \times U_d \times P_d)_{\text{HOPD}} - \sum_{d=1}^n (Q_d \times U_d \times P_d)_{\text{HOPD}}$$

$$\sum_{d=1}^n (Q_d \times U_d \times P_d)_{\text{HOPD}} - \sum_{d=1}^n (Q_d \times U_d \times P_d)_{\text{HOPD}}$$

## Methods

- Although our primary interest in calculating the extra payment that HOPDs receive due to higher unit prices, we also report results showing difference in HOPD and PO spending due to differences in drug mix and treatment intensity to help answer the question of whether there are fundamental differences in practice patterns by site of care
- We report results for all 3 factors both in the aggregate and at the individual drug level.
- Finally, we present data showing the proportion of the total study population treated in HOPDs and POs in order to emphasize the importance of the growing shift in outpatient cancer treatment from POs to HOPDs

## Dataset Construction

- Source: 2016 MarketScan® Commercial Claims & Encounters data on a sample of 1.7+ million members, age<65, enrolled in employer-sponsored or commercial health insurance
- All outpatient infused oncology 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”) were extracted.
- Next, we selected the 37 most prescribed oncology medications that together captured 92% of both total chemotherapy utilization and spending.
- Patients with claims that had missing, negative, or zero payments were excluded.
- We then examined the “units” field on the medical claims—note: this field has only recently become available in MarketScan®.
- Patients with claims that had missing, negative, or zero units were also excluded.

## Assessing the Units Field on Medical Claims

- To make sense of the “units” field, we first reviewed drug-specific common dosages as recommended in package inserts to identify plausible ranges for each drug (weight- or body surface area-based).
- Although 80% of infused oncology claims had plausible values, most of the remaining 20% reported units=1 (note: only 1 of our 37 drugs had a recommended dose of 1 milligram).
- We concluded that this was due to some providers invoicing by National Drug Code (NDC) rather than by CPT. An NDC specifies the labeler, product, and package. Thus, an NDC-billed claim should correspond to the number of units included in that package (e.g., 1 vial (NDC) may equal 100 mg (units)). Therefore, we excluded all patients with any infused oncology claim where units=1.
- Next, since we still observed non-plausible values at both extremes of the remaining “units” distributions, we Winsorized the data at the 1st and 99th percentiles of the drug-specific units’ distributions and excluded all patients with any Winsorized claims. This reduced the sample by an additional 7%.
- 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 or who received treatment in both a physicians’ office and a hospital during the year (less than 2% of the sample).
- Final sample included 18,195 patients

## Selected Results: Drug Mix

Procedure Code	Generic Drug Name	PO		HOPD		% Diff in Drug Mix in HOPD Compared to PO
		Number of Users	% of Total Users	Number of Users	% of Total Users	
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%
<b>Total</b>		<b>9,275</b>	<b>100.0%</b>	<b>8,920</b>	<b>100.0%</b>	<b>--</b>

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



## Selected Results: Treatment Intensity

Procedure Code	Generic Drug Name	Mean Units of Drug Administered per User in PO	Mean Units of Drug Administered per User in HOPD	% Diff in Treatment Intensity in HOPD Compared to PO
J9267	paclitaxel	1,164.0	1,105.8	95.0%
J9070	cyclophosphamide	49.2	45.0	91.5%
J9310	rituximab	32.2	29.0	89.9%
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%
J9201	gemcitabine	68.6	54.0	78.7%
J9306	pertuzumab	2,935.7	2,625.5	89.4%
J9181	etoposide	198.5	166.8	84.0%
J9264	paclitaxel protein-bound particles	2,051.9	1,492.9	72.8%
J9179	eribulin	204.3	136.5	66.8%
J9025	azacitidine	4,944.8	2,256.0	45.6%
<b>Mean</b>		<b>745.3</b>	<b>587.0</b>	<b>78.8%</b>

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

*For all drugs displayed, differences in means across site of treatment are statistically significant at the  $p < 0.05$  level.*

## Selected Results: Price per Unit

Procedure Code	Generic Drug Name	Mean Price per Unit in PO	Mean Price per Unit in HOPD	% Diff in Price per Unit in HOPD Compared to PO
J9267	paclitaxel	\$0.76	\$1.40	184.3%
J9070	cyclophosphamide	\$60.85	\$120.80	198.5%
J9310	rituximab	\$870.19	\$1,463.65	168.2%
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%
J9201	gemcitabine	\$38.54	\$69.89	181.4%
J9306	pertuzumab	\$12.42	\$20.68	166.5%
J9181	etoposide	\$1.94	\$5.56	286.1%
J9264	paclitaxel protein-bound particles	\$11.69	\$21.60	184.7%
J9179	eribulin	\$121.92	\$292.94	240.3%
J9025	azacitidine	\$4.22	\$10.67	252.9%
<b>Mean</b>		<b>\$91.49</b>	<b>\$170.34</b>	<b>186.2%</b>

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

*For all drugs displayed, differences in means across site of treatment are statistically significant at the p<0.05 level.*

## Selected Results: Total Payment per User

Procedure Code	Generic Drug Name	Mean Total Payment per User in PO (Actual)	Mean Total Payment per User in HOPD (Actual)	Mean Total Payment per User in HOPD (Counterfactual)	% Diff in Counterfactual Total Payment per User in HOPD
J9267	paclitaxel	\$884	\$1,548	\$840	184.3%
J9070	cyclophosphamide	\$2,992	\$5,437	\$2,739	198.5%
J9310	rituximab	\$28,059	\$42,428	\$25,225	168.2%
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%
J9201	gemcitabine	\$2,644	\$3,775	\$2,082	181.4%
J9306	pertuzumab	\$36,455	\$54,296	\$32,603	166.5%
J9181	etoposide	\$386	\$927	\$324	286.1%
J9264	paclitaxel protein-bound particles	\$23,994	\$32,250	\$17,458	184.7%
J9179	eribulin	\$24,903	\$39,978	\$16,639	240.3%
J9025	azacitidine	\$20,867	\$24,073	\$9,520	252.9%
<b>Drug Mix-Weighted Mean</b>		<b>\$13,128</b>	<b>\$21,881</b>	<b>\$12,115</b>	<b>180.6%</b>

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

## Key Findings

- In 2016, about 98% of all infused oncology patients were treated in either HOPDs or POs.
- Among these, 49% were treated in HOPDs and 51% in POs.
- Hospital prices for the top 37 infused cancer drugs averaged 86.2% 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% (nivolumab) to 428.0% (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, commercial insurers would have saved \$9,766 per user of these medicines in 2016, a savings of 45%.

## Implications for 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.
- 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.
- VBID – lower cost sharing for patients who seek treatment in POs
- Reference-pricing – set reference price at a level that corresponds to the cost of services in a PO
- Price transparency
- Quality transparency

## Next Steps

- Trends in our measures over time
- Geographic variation in the results (by state and MSA)
- Determinants of markup

# Q&A



# Engage with EBRI

**Here are some ways:**

*Register* for upcoming webinars

*Check out* our website – [www.ebri.org](http://www.ebri.org)

*Support* our Research Centers

*Sponsor* our events and webinars

*Sign up* for EBRInsights

*Join* EBRI as a Member. Membership questions? Contact Ryan Smith, Member Relations Specialist, [ryans@ebri.org](mailto:ryans@ebri.org).

*Follow us on Twitter and LinkedIn*

Save the Date for EBRI's next Policy Forum on Wednesday, May 13, 2020