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# Site of Service Cost Differences for Medicare Patients Receiving Chemotherapy

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## EXECUTIVE SUMMARY

National spending on cancer care in 2010 is estimated at \$125 billion.<sup>1</sup> About 8 million of the almost 14 million Americans living with cancer are over age 65,<sup>2</sup> and approximately half of cancer care spending is associated with Medicare beneficiaries<sup>3</sup>. Approximately 12% of active cancer patients among Medicare beneficiaries receive chemotherapy in a given year, and the total healthcare costs for these beneficiaries is about three times the cost (Medicare allowed) of other cancer patients not receiving chemotherapy, as described later in this report. The authors have published similar findings for commercial patients.<sup>4</sup>

This paper examines differences in the cost of care for Medicare fee for service cancer patients depending on the site of chemotherapy service. In recent years, the site of service for chemotherapy has received attention as Medicare reimbursement policy continues to change.<sup>5</sup> Most chemotherapy is delivered in oncologist's offices, although another common site for chemotherapy is a hospital outpatient facility.

Cancer is an important cost issue for Medicare. Based on our analysis of the Medicare Limited Data Set for 2006-2009, about 10% of the Medicare fee-for-service population has one or more claims with a cancer diagnosis in a calendar year. During these years, a Medicare beneficiary receiving cancer chemotherapy in a given year incurred, on average, allowed Part A and Part B costs of approximately \$4,600 per month compared to about \$1,500 per month for a cancer patient not receiving chemotherapy.

Our analysis describes results for all cancers and has details on 10 common cancer types where chemotherapy is a key treatment modality. These 10 cancers account for 75% of cancer patients in a Medicare population, and 12% of the 10 cancer cohort population actively receives chemotherapy in a year. The members receiving chemotherapy and having one of the 10 cancers make up about 0.9% of Medicare members.

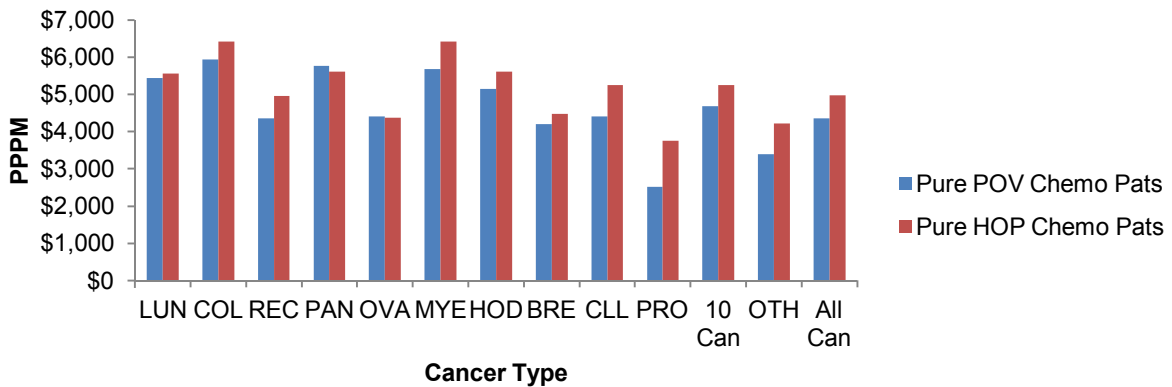
We used the Medicare Limited Data Set (LDS) for 2006-2009 (also known as the Medicare 5% Sample data) to examine the demographics of cancer patients, utilization of chemotherapy services, Medicare allowed costs, and patient cost sharing. The LDS contains all Medicare paid claims for a representative sample of Medicare beneficiaries. (We selected the fee-for-service population, as Medicare Advantage data may be incomplete in this source.) The results contained in this report represent the average of four calendar years' results – 2006 to 2009, which, in approximate terms, is the period centered on January 1<sup>st</sup>, 2007. The calendar year analysis is convenient for annual budget considerations, but it does not reflect cancer episodes.

As noted above, our analysis focuses on the cost and utilization differences for Medicare chemotherapy patients receiving their chemotherapy in physician offices versus hospital outpatient settings. For simplicity, we compared two cohorts—those who receive all of their chemotherapy in physician offices (POV) and those who receive all of their chemotherapy in a hospital outpatient (HOP) setting. These two cohorts make up the majority of patients receiving chemotherapy, with more patients in the “pure” physician office cohort. Relatively few chemotherapy patients receive chemotherapy in both settings in a year. In particular, of the 79,376 chemotherapy patients identified in the dataset, 53,087 patients (or 66.9%) were Pure POV; 19,161 patients (or 24.1%) were pure HOP; and 7,128 patients (or 9.0%) received chemotherapy in both settings.

Per-Patient-Per Month (PPPM) allowed costs are lower for the Pure POV group, and this holds for most of the “top 10” cancers. Specifically, the total PPPM allowed cost for the Pure POV group is \$4,361 while the PPPM costs for the Pure HOP group is \$4,981, a

difference of over \$600 per patient per month. On an annualized basis, taking into consideration the average number of member months that chemotherapy patients are covered by Medicare in a year, the total costs for a Pure POV patient and a Pure HOP patient are approximately \$47,500 and \$54,000, respectively. This produces an annual cost difference of approximately \$6,500. Patient pay amounts were about 10% higher for the Pure HOP patients, which totals over \$650 per patient per year. Please note that even within the types of cancer shown, there could be a fair amount of variability in diagnosis, stage and other factors. The costs cited in this report include all Medicare covered Part A and Part B services incurred by the patient, but our earlier work shows that chemotherapy-associated costs typically dominate care costs for these patients.<sup>6</sup>

### Allowed PPPM by Cancer Type

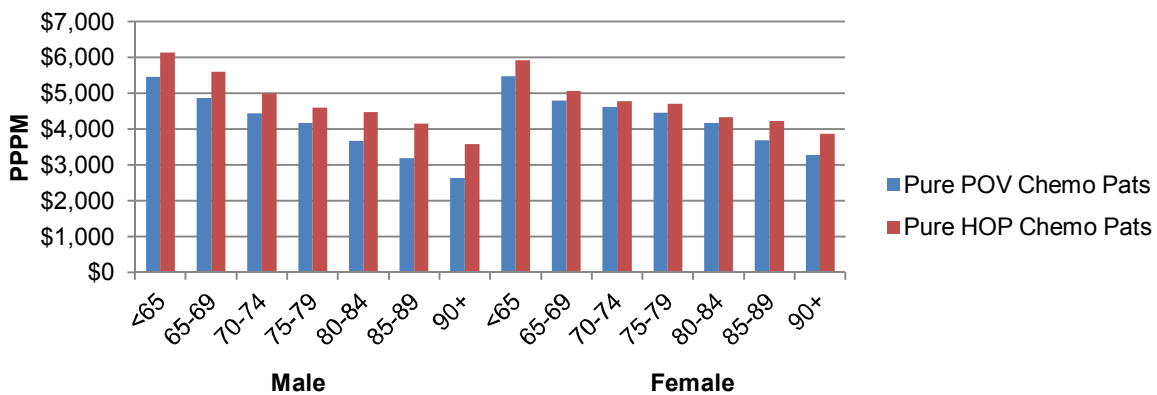


Source: Milliman analysis of Medicare 5% Sample, 2006-2009

The cost difference between Pure POV and Pure HOP persists even when we exclude inpatient hospital costs, as shown in the body of the report.

The lower PPPM cost for Pure POV chemotherapy patients persists across all age-sex categories as shown below. The wider difference for men is probably associated with the much lower cost for Prostate Cancer treated as Pure POV, and the relatively similar cost between Pure POV and Pure HOP for Breast Cancer, as seen above.

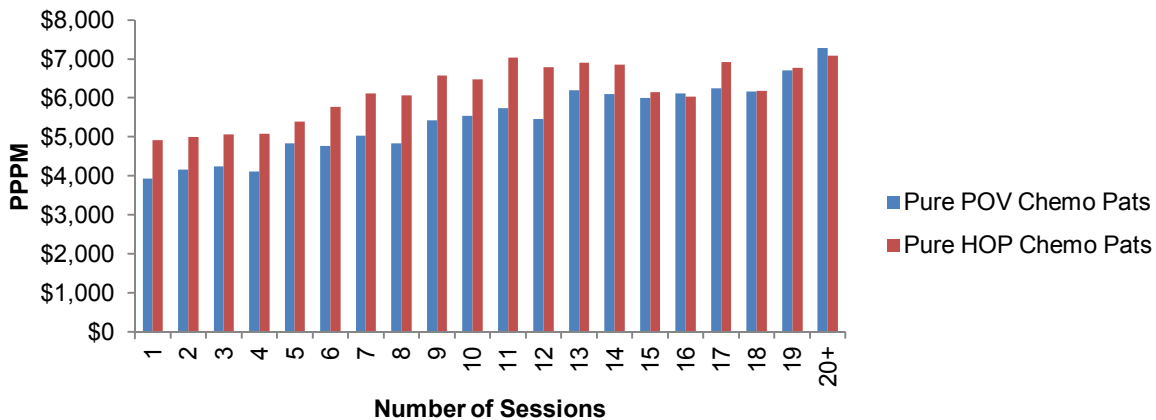
### Allowed PPPM by Demographics Group



Source: Milliman analysis of Medicare 5% Sample, 2006-2009

The number of chemotherapy sessions is an important determinant of treatment cost, and the following table compares the PPPM costs for patients receiving 1, 2, 3, etc. chemotherapy sessions in a year. Again, the same pattern of lower costs for Pure POV patients persists, especially for patients with fewer than 15 sessions. We note that relatively few patients have more than 15 sessions in a year.

**Allowed PPPM by Number of Chemo Sessions**



Source: Milliman analysis of Medicare 5% Sample, 2006-2009

An important limitation of our analysis is that claims data do not permit a complete assessment of patient severity. The choice of site for chemotherapy may depend on the availability of services, convenience, physician preference, patient preference, potential need for more intense services, or other characteristics, none of which we examined. The higher cost of patients receiving all chemotherapy in a hospital outpatient setting persists across the numerous variables we examined. However, other researchers using other methods may find different results. In particular, an examination of patient charts in the two settings could help determine whether claims-based analyses miss important factors that bias results. While our results are suggestive, they should be used cautiously; simple shifts in patient site of service may not generate cost savings equal to the difference in the historical costs. The authors welcome further research using other methods.

This paper was commissioned by McKesson Specialty Health, a division of McKesson Corporation, on behalf of The US Oncology Network, one of the nation’s largest networks of community-based oncology physicians. McKesson has businesses that include supplying drugs, including chemotherapy drugs, to various types of medical providers. This paper reflects the research of the authors. It should not be considered an endorsement of any policy or product by Milliman, Inc. Cancer therapy is a rapidly changing field, and readers should note that this paper may not reflect current therapeutic considerations. The figures presented here are, unless otherwise noted, national averages developed from historical databases. Because of the variability in healthcare and health benefits, these figures may not be appropriate for particular organizations or particular purposes. We urge the reader to examine the full report as it contains important information not contained in this Executive Summary.

## MEDICARE BENEFICIARIES RECEIVING CANCER CHEMOTHERAPY

### Distribution of Chemotherapy Patients by Site of Service in the Medicare Population

There are numerous types and stages of cancer. Some cancers have a very high cure rate, while for others treatment success is measured by extending life a few months. Our analysis focuses on 10 common cancer types where chemotherapy is a key treatment modality. These 10 cancer types account for 75% of patients with cancer claims in a typical Medicare population, and 12% of the patients in this 10 cancer cohort population receive chemotherapy in a year. The members receiving chemotherapy and having one of the ten cancers make up about 0.9% of Medicare beneficiaries. The table below shows the number and distribution of cancer patients identified in the data set by type of cancer and the prevalence of chemotherapy as a treatment modality.

### Distribution of Cancer Patients and Chemotherapy Patients by Type of Cancer

	Sample Size of Cancer Patients in Data	Distribution of Cancer Patients	Sample Size of Patients on Chemotherapy	Portion of Cancer Patients on Chemotherapy
Lung	61,938	9%	17,280	28%
Colon	48,841	7%	8,722	18%
Rectal	12,242	2%	1,297	11%
Pancreatic	7,601	1%	2,363	31%
Ovarian	10,101	2%	3,874	38%
Myeloma	11,500	2%	2,334	20%
Hodgkin's	10,975	2%	4,014	37%
Breast	127,883	19%	9,580	7%
CLL	17,831	3%	2,754	15%
Prostate	179,724	27%	7,685	4%
10 Cancers	488,636	75%	59,903	12%
Other Cancers	167,250	25%	19,473	12%
All Cancers	655,886	100%	79,376	12%

Source: Authors' analysis of Medicare 5% Sample 2006-2009

This distribution comes from averaging data across 2006 to 2009. Individuals who have been diagnosed in the past with cancer but are not being actively treated for cancer (no claims coded with cancer during the analysis year) are not included in our sample. Further, we do not include patients on hormonal therapy only in our cohort of chemotherapy patients, as these patients are often on long-term maintenance therapy or in remission.

Of the total Medicare beneficiaries with these 10 cancer types, about 12% will receive chemotherapy in a given year. The prevalence of chemotherapy use for all other cancer types is roughly equal.

Our analysis focuses on cost and utilization differences for chemotherapy patients receiving their chemotherapy in physician offices versus hospital outpatient settings. For simplicity, we compared two cohorts—those who receive all of their chemotherapy in physician offices (POV) and those who receive all of their chemotherapy in a hospital outpatient (HOP) setting. These two cohorts make up the majority of patients receiving chemotherapy, with more patients in the “pure” physician office cohort. Relatively few chemotherapy patients receive chemotherapy in both settings in a year. In particular, of the 79,376 chemotherapy patients identified in the dataset, 53,087 patients (or 66.9%) were pure POV; 19,161 patients (or 24.1%) were pure HOP; and 7,128 patients (or 9.0%) received chemotherapy in both settings.

Of Medicare beneficiaries who receive chemotherapy, most receive all of their sessions in a physician office setting (Physician Office Visit or POV) and fewer receive all sessions in a hospital outpatient (HOP) setting. This is true across all cancers, as shown in the following table.

**Site of Chemotherapy Services: POV or HOP**

Cancer Type	% Chemo Patients w/ All Sessions POV	% Chemo Patients w/ All Sessions HOP	% Chemo Patients w/ Both POV and HOP
Lung	69%	26%	6%
Colon	57%	18%	25%
Rectal	59%	19%	22%
Pancreatic	60%	30%	10%
Ovarian	59%	34%	7%
Myeloma	66%	26%	8%
Hodgkin’s	63%	29%	8%
Breast	70%	25%	5%
CLL	69%	25%	6%
Prostate	81%	12%	7%
10 Cancers	67%	24%	9%
Other	67%	26%	7%
All Cancers	67%	24%	9%

Source: Authors’ analysis of Medicare 5% Sample 2006-2009. Percentages may not add to 100% due to rounding.

Note that for the remainder of this report, we focus on the two patient cohorts receiving chemotherapy treatment exclusively in a physician’s office or exclusively in a hospital outpatient setting. We identify these two cohorts as 100% POV or Pure POV and 100% HOP or Pure HOP. From 2006 to 2009, for all cancers, the portion of 100% POV patients decreased from 70% to 65% and the portion of 100% HOP patients increased from 22% to 26%.

**Demographic Characteristics of Chemotherapy Patients**

The chart below shows the average age (as of the end of the calendar year) of Medicare beneficiaries receiving chemotherapy split by site of service and gender. The cancer patient receiving chemotherapy in a physician office setting is consistently about two to three years older than the average patient receiving treatment in a hospital outpatient setting. This age difference is consistent among all cancer types and both genders. It is

also rather consistent by state (not shown). The reasons for this difference are not clear, but may reflect the different preferences of older or younger patients.

**Average Age of Chemotherapy Patients**

Cancer Type	Male		Female	
	100% POV	100% HOP	100% POV	100% HOP
Lung	73.1	71.7	72.7	70.9
Colon	73.1	71.3	73.7	71.9
Rectal	72.7	69.1	74.2	71.7
Pancreatic	73.4	71.6	74.5	72.2
Ovarian	---	---	73.2	71.1
Myeloma	73.0	71.0	73.9	70.5
Hodgkin's	74.6	70.6	75.2	72.2
Breast	72.8	70.4	70.9	68.2
CLL	75.3	72.1	76.3	73.4
Prostate	78.8	75.9	---	---
10 Cancers	75.1	72.1	72.7	70.5
Other	74.5	71.9	75.2	72.4
All Cancers	75.0	72.0	73.2	70.9

Source: Authors' analysis of Medicare 5% Sample 2006-2009

**Patient Duration on Medicare and Average Age during the Year of Chemotherapy**

Survival of patients receiving chemotherapy can reflect the severity of disease, complication rates (including complications of chemotherapy), and overall health status. Because most beneficiaries maintain coverage from age 65 until death, a rough measure of survival is the member months in Medicare during the calendar year the beneficiary received chemotherapy. Normally, a beneficiary's member months in a calendar year equals 12 unless the beneficiary began enrollment after January in his or her first year with Medicare or dies before December.



The following table shows that for the two cohorts (100% POV and 100% HOP), the average member months of data during the year of chemotherapy treatment is roughly 11 months. Across all cancers, the number of months of survival is slightly greater for the POV cohort. This is surprising because, across cancers, the age of the 100% POV cohort is over 2 years older than the 100% HOP cohort.

Cancer Type	Average Member Months Per Beneficiary on Chemotherapy	
	100% POV	100% HOP
Lung	10.3	10.4
Colon	10.9	10.7
Rectal	10.8	10.7
Pancreatic	9.8	10.0
Ovarian	10.9	10.9
Myeloma	11.0	10.9
Hodgkin's	11.2	11.2
Breast	11.1	10.9
CLL	11.3	11.2
Prostate	11.5	11.0
10 Cancers	10.8	10.7
Other	11.2	10.9
All Cancers	10.9	10.8

Source: Authors' analysis of Medicare 5% Sample 2005-2009

Large differences in member months per member could indicate mortality differences between the cohorts. The observed lack of such differences does not rule out the existence of mortality-related outcome differences. However, the similarity across different cancer types is striking.

### Chemotherapy Treatments

The number of chemotherapy sessions an individual undergoes during a year varies due to many factors, including the protocols used, the chemotherapeutic agents used, side effects and patient response. The following table shows the average number of sessions in a calendar year by type of cancer and treatment setting. Across the 10 cancer types, the average number of sessions in the POV setting is greater than the number of sessions in HOP with the exception of prostate cancer.

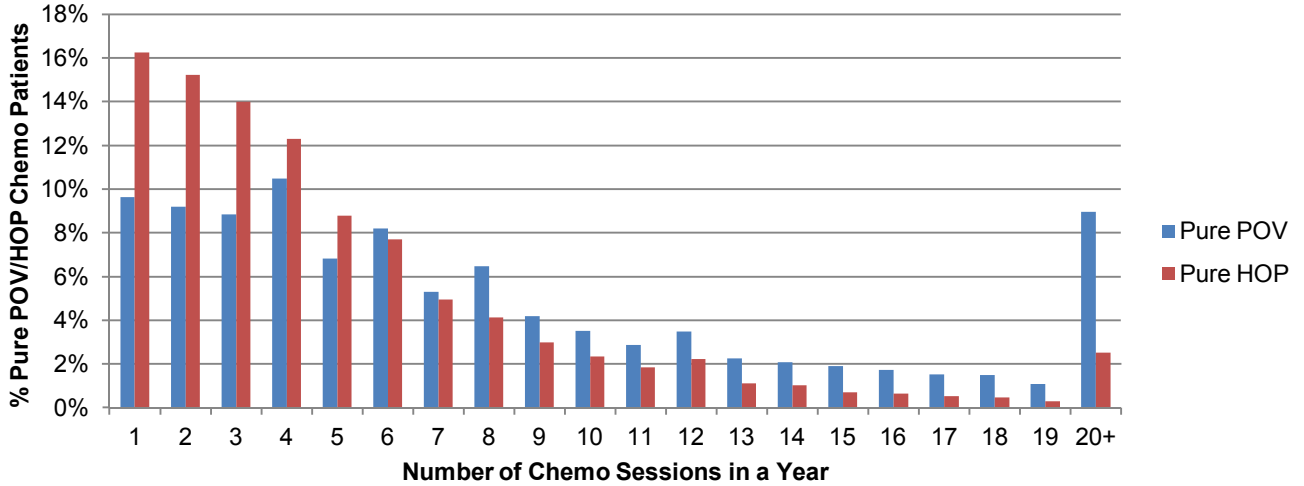
#### Average Number of Chemotherapy Sessions in a Calendar Year

Cancer Type	100% POV	100% HOP
Lung	7.4	3.9
Colon	9.3	4.9
Rectal	6.4	3.8
Pancreatic	8.6	4.5
Ovarian	8.0	4.6
Myeloma	12.4	6.1
Hodgkin's	6.2	3.8
Breast	8.6	5.1
CLL	7.6	4.0
Prostate	3.2	2.9
10 Cancers	7.4	4.3
Other	4.1	2.6
All Cancers	6.6	3.9

Source: Authors' analysis of Medicare 5% Sample 2006-2009

The following graph shows the distribution of patients by the number of chemotherapy sessions they receive split by the 100% POV and 100% HOP patients. On average, the 100% HOP patients receive fewer chemotherapy sessions than do the 100% POV patients. As seen below, the proportion of 100% HOP patients receiving one to five chemotherapy treatments is much greater than the proportion of 100% POV patients. However, this relationship reverses for patients receiving six or more sessions.

**Distribution of Chemotherapy Patients by Number of Sessions in a Year**



Source: Authors' analysis of Medicare 5% Sample 2006-2009

### Healthcare Costs for Medicare Chemotherapy Patients

Based on our 2006-2009 data source, on average, patients receiving some chemotherapy in a calendar year incur \$4,628 per patient per month (PPPM) in total Medicare allowed costs. Cancer patients not receiving chemotherapy incur significantly less cost, at about \$1,555 (PPPM). Note these figures represent all Part A and Part B allowed costs, not just costs associated with chemotherapy or cancer treatment. Allowed costs are the fees set by Medicare before beneficiary cost sharing.

The total PPPM allowed cost for the Pure POV group is \$4,361 while the total PPPM allowed cost for the Pure HOP group is \$4,981, a difference of over \$600 per patient per month. On an annualized basis, taking into consideration the average number of member months that chemotherapy patients have Medicare coverage in a year, the total costs for a Pure POV patient and a Pure HOP patient are approximately \$47,500 and \$54,000, respectively. This produces an annual difference in cost of about \$6,500. Please note that even within the types of cancer shown, there could be a fair amount of variability in diagnosis, stage and other factors. These are all costs incurred in a year, but our earlier work shows that chemotherapy-associated costs typically dominate patient costs for these patients.<sup>7</sup> The lower cost for the POV cohort compared to the HOP cohort is evident across most cancer types. However, costs for patients with lung, pancreatic, ovarian, and breast cancers are similar between the chemotherapy settings (POV or HOP).

#### Total Healthcare Allowed PPPM Amounts by Type of Cancer and Site of Chemotherapy

Cancer Type	Chemo and Non-Chemo Cancer Patients PPPM	100% POV Chemotherapy Patients PPPM	100% HOP Chemotherapy Patients PPPM	Cancer Patients Not Receiving Chemotherapy PPPM
Lung	\$3,510	\$5,439	\$5,567	\$2,738
Colon	\$2,841	\$5,931	\$6,414	\$2,132
Rectal	\$1,877	\$4,365	\$4,955	\$1,571
Pancreatic	\$4,163	\$5,773	\$5,612	\$3,434
Ovarian	\$2,761	\$4,401	\$4,375	\$1,719
Myeloma	\$3,382	\$5,676	\$6,418	\$2,712
Hodgkin's	\$3,229	\$5,141	\$5,606	\$1,997
Breast	\$1,298	\$4,209	\$4,484	\$1,065
CLL	\$2,069	\$4,409	\$5,244	\$1,583
Prostate	\$1,217	\$2,522	\$3,750	\$1,149
10 Cancers	\$1,878	\$4,684	\$5,257	\$1,471
Other	\$2,021	\$3,397	\$4,220	\$1,804
All Cancers	\$1,914	\$4,361	\$4,981	\$1,555

Source: Authors' analysis of Medicare 5% Sample 2006-2009

The authors note the cost gap between 100%POV and 100%HOP has widened over the 2006-2009 period, with 100%POV PPPM costs increasing 12% from 2006 to 2009 and the corresponding figure for 100%HOP patients increasing 19%. As noted above, the portion of chemotherapy patients who are 100%POV has decreased while the portion of 100%HOP has increased.

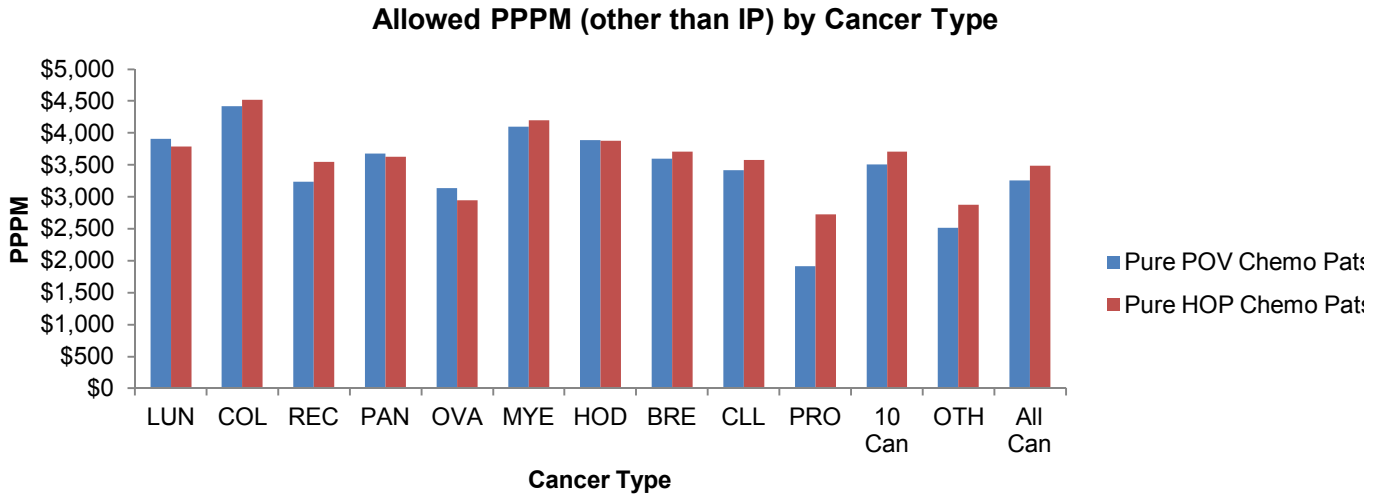
Patient pay amounts follow a pattern similar to that for allowed cost. The 100%HOP patients have patient pay amounts about 10% above those of the 100%POV patients.

**Patient Pay PPPM Amounts by Type of Cancer and Site of Chemotherapy**

<b>Cancer Type</b>	<b>Chemo and Non-Chemo Cancer Patients PPPM</b>	<b>100% POV Chemotherapy Patients PPPM</b>	<b>100% HOP Chemotherapy Patients PPPM</b>	<b>Cancer Patients Not Receiving Chemotherapy PPPM</b>
Lung	\$475	\$852	\$847	\$327
Colon	\$379	\$938	\$975	\$252
Rectal	\$264	\$690	\$800	\$210
Pancreatic	\$510	\$798	\$809	\$372
Ovarian	\$390	\$666	\$650	\$218
Myeloma	\$455	\$862	\$886	\$345
Hodgkins	\$474	\$827	\$862	\$257
Breast	\$215	\$759	\$814	\$172
CLL	\$293	\$722	\$809	\$207
Prostate	\$191	\$412	\$601	\$179
10 Cancers	\$275	\$752	\$819	\$207
Other	\$278	\$546	\$646	\$238
All Cancers	\$276	\$700	\$773	\$215

Source: Authors' analysis of Medicare 5% Sample 2006-2009

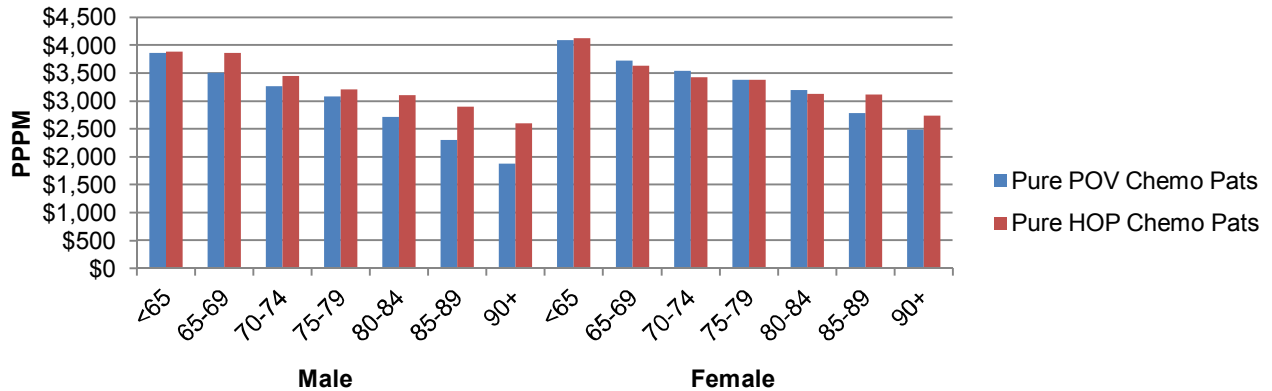
The lower cost for the POV cohort appears even when hospital inpatient costs are excluded. Inpatient admits may reflect complications, adverse reactions to chemotherapy, practice pattern, patient frailty or other causes. After excluding hospital inpatient costs, the PPPM difference for all cancer types is about \$200.



Source: Authors' analysis of Medicare 5% Sample 2006-2009

The cost difference between POV and HOP patients by age and sex varies somewhat. The cost for male patients in the POV cohort is less than the HOP cohort cost for all age groups. However, the cost difference for female patients is relatively small (between POV and HOP) for most age groups. We believe this is consistent with the high portion of breast cancer among women receiving chemotherapy, and the relatively similar costs of the two sites of service cohorts for breast cancer. The following chart compares the costs of the two cohorts by age and sex categories.

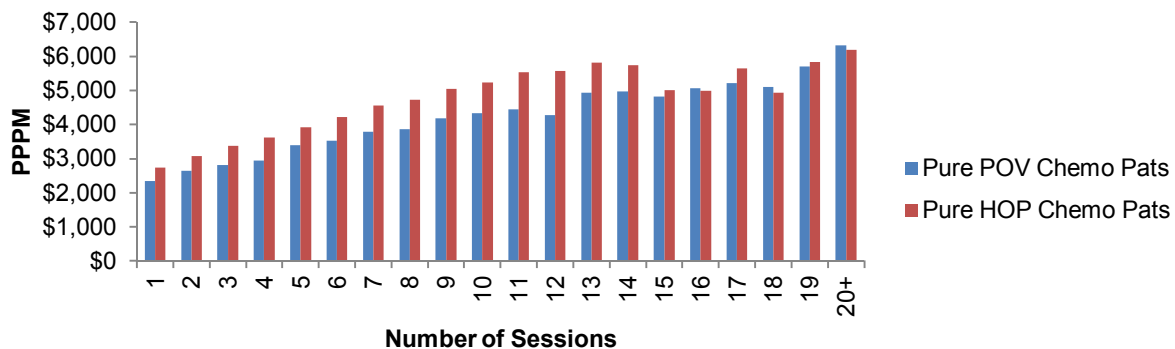
**Allowed PPPM (Other than IP) by Demographics (All Cancer)**



Source: Authors' analysis of Medicare 5% Sample 2006-2009

We examined costs according to the number of chemotherapy sessions to determine whether the number of sessions influenced the observed cost differences. However, the lower cost for the POV cohort compared to the HOP cohort is evident whether the patient receives one or many chemotherapy sessions. However, for patients receiving 16 or more chemotherapy sessions, the PPPM costs are very similar or slightly higher for patients receiving all sessions POV. Only 15% of POV and 5% of HOP patients fall into this category.

**Allowed PPPM (Other than IP) by Number of Chemo Sessions (All Cancer)**



Source: Authors' analysis of Medicare 5% Sample 2006-2009

The cost of care for chemotherapy patients consists of many components. The following table shows the calendar year average PPM by component for 2006-2009, separately for Pure POV and Pure HOP, for all cancers. Inpatient services make up the largest difference, over \$400 PPM. Chemotherapy drug costs appear in the line, "PROF Office Administered Drugs" for Pure POV and in the line, "FOP Pharmacy" for Pure HOP.

Category- FIP=Facility Inpatient; FOP=Facility Outpatient; PROF=Professional	Difference		
	Pure POV	Pure HOP	HOP-POV
FIP Medical	\$611	\$863	\$252
FIP Surgical	\$485	\$625	\$140
FIP Psychiatric	\$4	\$5	\$1
FIP Alcohol and Drug Abuse	\$1	\$1	\$0
FIP Mat Csect Delivery - Mom\Baby Cmbnd	\$0	\$0	\$0
FIP SNF	\$80	\$108	\$29
FOP Emergency Room	\$12	\$16	\$4
FOP Surgery	\$109	\$127	\$18
FOP Radiology General	\$113	\$231	\$118
FOP Radiology - CT/MRI/PET - Cat Scan	\$46	\$85	\$40
FOP Radiology - CT/MRI/PET - MRI	\$11	\$20	\$8
FOP Radiology - CT/MRI/PET - PET	\$23	\$34	\$11
FOP Pathology/Lab	\$28	\$74	\$46
FOP Pharmacy	\$40	\$1,617	\$1,577
FOP Cardiovascular	\$6	\$8	\$2
FOP PT/OT/ST	\$9	\$9	-\$1
FOP Other	\$60	\$177	\$117
FOP Preventive	\$2	\$4	\$2
PROF Inpatient Surgery - Primary Surgeon	\$42	\$49	\$7
PROF Inpatient Surgery - Asst. Surgeon	\$0	\$0	\$0
PROF Inpatient Anesthesia	\$9	\$11	\$2
PROF Outpatient Surgery	\$34	\$40	\$6
PROF Office Surgery	\$45	\$21	-\$24
PROF Outpatient Anesthesia	\$9	\$9	\$0
PROF Maternity - Cesarean Deliveries	\$0	\$0	\$0
PROF Maternity - Non-Deliveries	\$0	\$0	\$0
PROF Maternity - Ancillary	\$0	\$0	\$0
PROF Maternity - Anesthesia	\$0	\$0	\$0
PROF Inpatient Visits - General	\$73	\$77	\$4
PROF Inpatient Visits - Extended Care Visits	\$4	\$5	\$1
PROF Inpatient Visits - Critical Care Visits	\$7	\$7	\$0
PROF Office/Home Visits	\$118	\$104	-\$15
PROF Urgent Care Visits	\$0	\$0	\$0
PROF Office Administered Drugs	\$1,643	\$35	-\$1,608
PROF Allergy Testing	\$0	\$0	\$0
PROF Allergy Immunotherapy	\$0	\$0	\$0
PROF Miscellaneous Medical	\$58	\$12	-\$46
PROF Preventive Other	\$3	\$2	-\$1
PROF Immunizations	\$1	\$1	\$0
PROF Well Baby Exams	\$0	\$0	\$0
PROF Preventive Physical Exams	\$0	\$0	\$0
PROF Vision Exams	\$6	\$4	-\$1
PROF Hearing and Speech Exams	\$0	\$0	\$0
PROF ER Visits and Observation Care	\$13	\$17	\$4
PROF Consults	\$40	\$41	\$1
PROF Physical Therapy	\$5	\$4	-\$1
PROF Cardiovascular	\$13	\$11	-\$2
PROF Radiology IP	\$12	\$14	\$3
PROF Radiology OP - General	\$24	\$43	\$19
PROF Radiology OP- CT/MRI/PET	\$16	\$28	\$12
PROF Radiology Office - General	\$122	\$56	-\$66



Category- FIP=Facility Inpatient; FOP=Facility Outpatient; PROF=Professional			Difference
PROF Radiology Office - CT/MRI/PET	\$85	\$49	-\$36
PROF Pathology/Lab	\$83	\$57	-\$27
PROF Chiropractor	\$2	\$1	\$0
PROF Outpatient Psychiatric	\$2	\$3	\$1
PROF Outpatient Alcohol & Drug Abuse	\$0	\$0	\$0
OTH Private Duty Nursing/Home Health – HH	\$94	\$99	\$5
OTH Private Duty Nursing/Home Health – Hospice	\$59	\$66	\$7
OTH Ambulance	\$24	\$31	\$7
OTH DME and Supplies	\$55	\$51	-\$4
OTH Prosthetics	\$2	\$3	\$0
ADDL Benefits Glasses/Contacts	\$0	\$0	\$0
ADDL Benefits Other	\$17	\$21	\$4
<b>Total</b>	<b>\$4,361</b>	<b>\$4,981</b>	<b>\$619</b>

Source: Authors' analysis of Medicare 5% Sample 2006-2009. Sum of columns may not add to total due to rounding.

While the PPPM chemotherapy drug costs are rather close for Pure POV and Pure HOP cohorts, the chemotherapy drug costs *per session* are much higher for Pure HOP patients, as described in the next section.

### Chemotherapy Drug Claim Costs for Medicare Chemotherapy Patients

The previous section of this report examined the total healthcare costs for Medicare beneficiaries who use chemotherapy services in a given year. We also examined chemotherapy drug claim costs (based on Medicare allowed amounts) that were incurred for these patients. The tables below shows the average chemotherapy drug claim costs (J code claims) by setting (POV and HOP) and by cancer type. The cost of chemotherapy per session is significantly lower in the POV setting than the HOP setting (about \$900 per session lower). This difference may reflect choice of chemotherapy agents or other factors that we did not examine.

#### Chemotherapy Costs per Session

Cancer Type	Allowed Cost Per Session	
	100% POV	100% HOP
Lung	\$1,354	\$2,254
Colon	\$2,241	\$3,759
Rectal	\$1,499	\$2,815
Pancreatic	\$1,018	\$1,821
Ovarian	\$1,032	\$1,453
Myeloma	\$1,279	\$2,020
Hodgkin's	\$2,722	\$3,809
Breast	\$1,557	\$2,347
CLL	\$2,227	\$3,305
Prostate	\$1,259	\$2,337
10 Cancers	\$1,604	\$2,521
Other	\$1,609	\$2,425
All Cancers	\$1,604	\$2,504

Source: Authors' analysis of Medicare 5% Sample 2006-2009

## Prevalence of Hospice Services among Chemotherapy Cancer Patients

Because cancer is often associated with high mortality rates, hospice use among cancer patients is an important measure of end-of-life quality. We compare the portion of chemotherapy patients using and not using hospice. The POV cohort has slightly lower use of hospice than the HOP cohort. The decision to use hospice reflects many factors including patient preferences and physician practices, which may impact the observed differences, as well as the patient health status. The similar figures for hospice use suggest the two cohorts deal with end of life issues in similar ways, although much more detailed analysis would be needed for a definitive conclusion.

<b>Cancer Type</b>	<b>100% POV Chemo Patients</b>	<b>100% HOP Chemo Patients</b>
Lung	23%	22%
Colon	15%	16%
Rectal	9%	10%
Pancreatic	33%	31%
Ovarian	16%	15%
Myeloma	9%	9%
Hodgkin's	8%	7%
Breast	8%	7%
CLL	7%	6%
Prostate	7%	15%
10 Cancers	14%	15%
Other	8%	10%
All Cancers	13%	14%

Source: Authors' analysis of Medicare 5% Sample 2006-2009

## **APPENDIX A: DESCRIPTION OF KEY DATA SOURCE AND ITS APPLICATION**

Medicare 5% Sample data for 2006-2009. This Limited Data Set contains all Medicare paid claims generated by a statistically-balanced sample of Medicare beneficiaries. Information includes diagnosis codes, procedure codes, and diagnosis-related group (DRG) codes, along with site of service information as well as beneficiary age, eligibility status and an indicator for HMO enrollment. Data does not include prescription drugs that may be covered through Medicare Part D.

Beneficiaries were excluded in any year if they did not have both Part A and Part B coverage or if they were enrolled in an HMO. These excluded populations do not have the same benefits as the majority of Medicare beneficiaries or some claims data may be missing (in the case of HMO enrollees). We did include beneficiaries who were under age 65 or were dual Medicare-Medicaid eligibles. From a total population of about 2.2 million beneficiaries in each of the calendar year files, about 1.7 million remained after exclusions. These figures varied slightly by year across 2006-2009.

## APPENDIX B: METHODOLOGY

### Identification Methodology

We considered a patient to have cancer if they had one inpatient or hospital outpatient claim or two physician claims (other than diagnostic radiology or laboratory) with the following codes in any position of the claim:

- 140.xx through 172.xx
- 174.xx through 208.9x

We then assigned each individual a primary cancer type according to the criteria shown below, which produced a cohort of approximately 70,000 individuals in the 10 cancer types. For individuals coded with more than one cancer, we used the order of the listing below to establish a hierarchy and assign individuals to the cancer highest in the list.

Cancer Type	ICD9 Code
Non small and small cell lung cancer	162.XX
Colon	153.XX
Rectal	154.XX
Pancreatic	157.XX
Ovarian	183.XX
Multiple myeloma	203.0X
Hodgkins, nonhodgkins, diffuse large B cell lymphoma, mantle cell	201.XX, 200.3X, 200.4X, 2006X, 200.7X, 202.0X
Breast	174.XX, 175.XX
Chronic lymphocytic leukemia	204.0X, 204.1X, 204.2X
Prostate	185.XX

We identified individuals receiving chemotherapy if they had one or more claim with a chemotherapy J code. We did not include individuals who were on hormone therapy only but did include those with claims for hormones along with non-hormone chemotherapy claims. Our analysis is based on Medicare Parts A and B allowed costs without adjustments for trend. The central years for the data are 2007-2008, as costs are averaged across 2006 to 2009.

The data reported are averages for 4 years. That is, rather than tracking patients across years, we report calendar year activity—in effect, we report the average of 4 snapshot years. Some patients may appear in more than one year. This approach simulated costs on a financial year basis rather than an episode basis.

### Utilization

The number of chemotherapy sessions in a calendar year figures prominently in this analysis. We identified sessions using the CPT codes below. Each claim coded with one of these CPT codes was considered one session. This approach was used because the

source data did not contain exact dates of service, so we could not determine session count by counting the days on which chemotherapy occurred. If more than one of these codes is billed on the same day, this methodology may overstate the number of sessions.

CPT Code	Narrative
96400	Chemotherapy, sc/im
96401	Chemo, anti-neopl, sq/im
96402	Chemo hormon antineopl sq/im
96405	Chemo intralesional, up to and including 7 lesions
96406	Chemo intralesional, more than 7 lesions
96408	Chemotherapy, push technique
96409	Chemo, iv push, snl drug
96410	Chemotherapy,infusion method
96413	Chemo, iv infusion, 1 hr
96416	Chemo prolong infuse w/pump
96420	Chemo, ia, push tecnique
96422	Chemo ia infusion up to 1 hr
96425	Chemotherapy,infusion method
96440	Chemotherapy, pleural cavity
96445	Chemotherapy, peritoneocentesis cavity
96450	Chemotherapy, into CNS
96542	Chemotherapy injection
96549	Chemotherapy, unspecified

## REFERENCES

<sup>1</sup> Mariotto AB, et al. Projections of the Cost of Cancer Care in the United States: 2010–2020, J Natl Cancer Inst 2011;103:1–12

<sup>2</sup> Ibid

<sup>3</sup> Authors estimates based on Mariotto AB, op cit.

<sup>4</sup> Fitch K, Pyenson B. Cancer Patients Receiving Chemotherapy: Opportunity for Better Management. Milliman, Inc. March, 2010.

<http://publications.milliman.com/research/health-rr/pdfs/cancer-patients-receiving-chemotherapy.pdf>

<sup>5</sup> See, for example, The Advisory Board, “Oncology Rounds,” Sep 14, 2010.

<http://www.advisory.com/Research/Oncology-Roundtable/Oncology-Rounds?page=2&filterTopicID=&filterDate=2010-09-01> . Such concerns are not recent.

See Roemer J, An End to Outpatient Chemotherapy? Medicare Takes Aim at Reimbursement, JNCI, 1999,

<http://jnci.oxfordjournals.org/content/91/17/1444.full?sid=38c53669-2548-4cff-902b-ce8cf51c0546>

<sup>6</sup> Fitch, ibid

<sup>7</sup> Fitch, ibid.