



Cost Drivers of Cancer Care: 2004 - 2014

Medicare and Commercially Insured Populations

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Agenda

- Study objective
- Study design and methodology
- Key results
 - Dynamics of per-patient cost
 - Components of cancer care
 - Chemotherapy site of service
- Discussion
- Conclusion and questions

Study Objective

Study Objectives

- Using data from 2004 through 2014 in both Medicare and commercially insured populations, our objectives were as follows:
 - To identify trends in the overall costs of cancer care
 - To identify trends in the component costs of cancer care
 - To create comparisons between trends in costs for actively treated cancer patients and cost for the non-cancer population

Study Design and Methodology

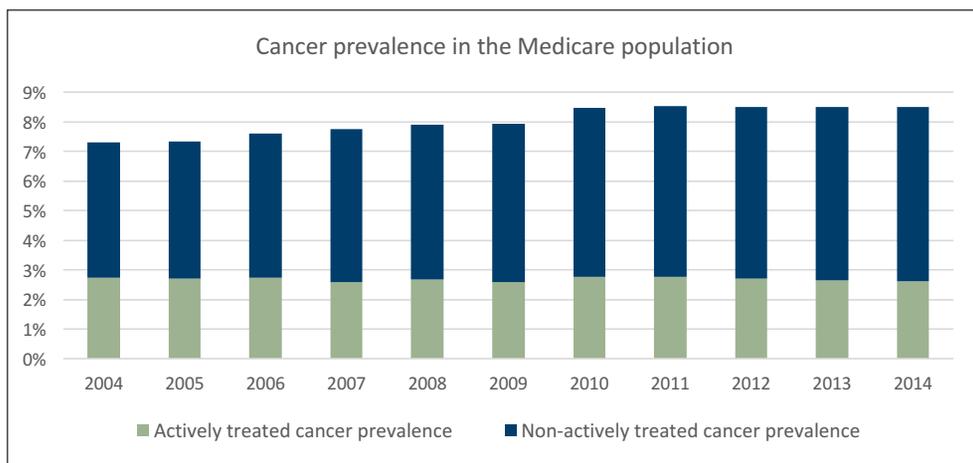
Study Design

- Data sources – 2004 through 2014
 - **Medicare 5% sample:** all Medicare paid claims for 5% of beneficiaries, excluding pharmacy claims
 - **Truven Health Analytics MarketScan commercial claims database:** all paid medical and pharmacy claims for between 15 and 50 million commercially insured lives annually, depending on the year of data
- Key methodological steps performed for each calendar year
 - Identify all cancer patients based on diagnosis coding
 - Identify subset of cancer patients being actively treated based on chemotherapy, radiation therapy, and cancer surgery coding
 - Identify characteristics of the cancer population and the actively treated cancer population
 - Characterize costs by major service categories
- **NOTE: All tables and figures shown in this presentation are based on Milliman analysis of the 2004 – 2014 Medicare 5% sample data and Truven MarketScan data**

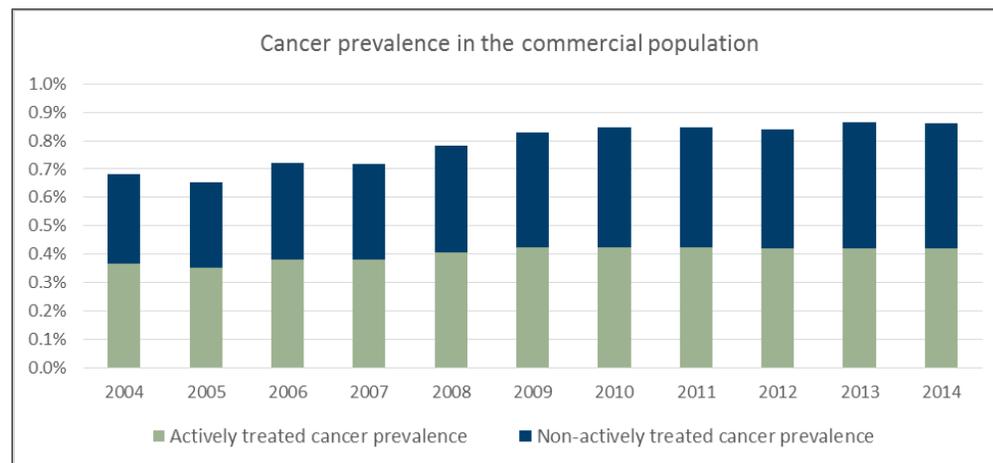
Key Results

Population and per-patient cost dynamics

Cancer prevalence has increased, and this increase is mainly in the non-actively treated population



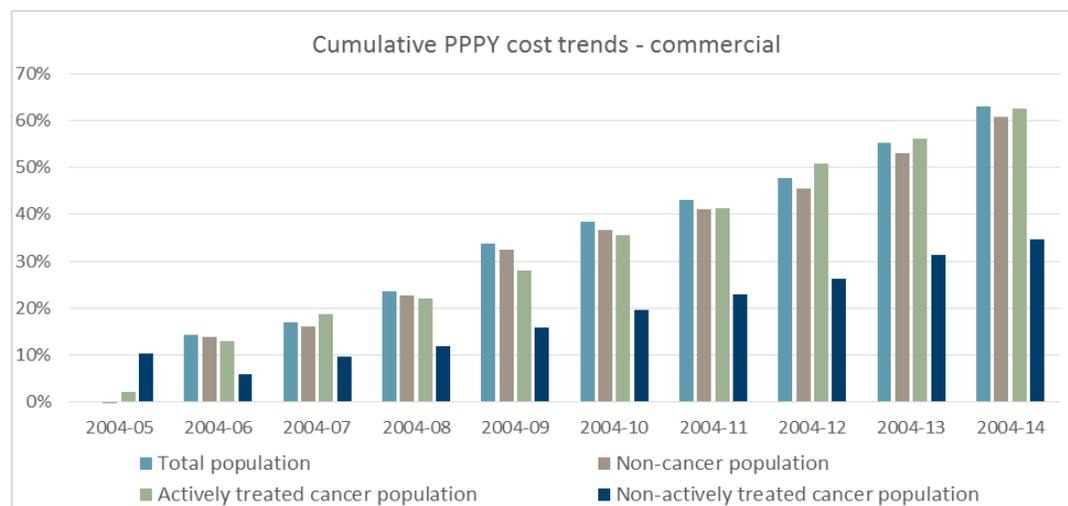
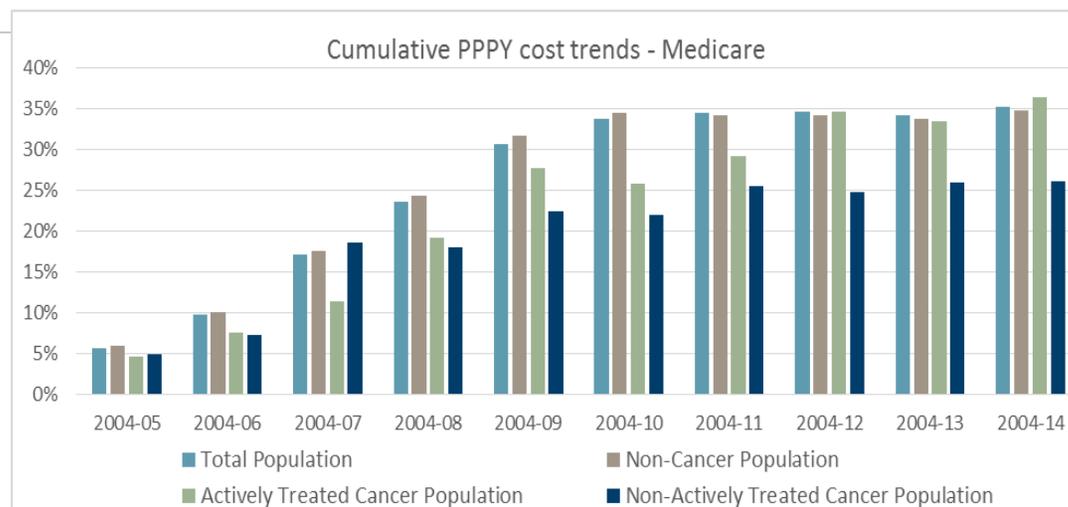
- In the Medicare population, prevalence increased from 7.3% to 8.5% between 2004 and 2014, a 16% increase.



- In the commercial population, prevalence increased from 0.7% to 0.9% between 2004 and 2014, a 26% increase.

Per-patient costs are increasing at similar rates across populations studied

- Per-patient costs are increasing at very similar rates throughout the study period for three populations:
 - Total population
 - Actively treated cancer population
 - Non-cancer population
- For Medicare, these three populations trended at 35.2% versus 36.4% and 34.8% respectively
- For commercial, these three populations trended at 62.9% versus 62.5% and 60.8% respectively
- The 95% confidence intervals for each cohort's trend line overlap, and by this measure the 11-year cost trends between these three populations are not statistically different.



Based on Milliman analysis of the 2004 – 2014 Medicare 5% sample data and Truven MarketScan data

Contributions to total spending by cancer patients have increased slightly from 2004 to 2014 for both the Medicare and commercial populations

- In the Medicare FFS population, the contribution to total population spend increased from **19.5% to 20.8% (6.7% increase)**
- In the commercial population, the contribution increased from **9.4% to 10.7% (13.8% increase)**
- Over the same period, the prevalence of cancer (actively treated and non-actively treated) increased at a higher rate than the increase in the spending contribution
 - From 7.3% to 8.5% (16% increase) in the Medicare population
 - From 0.7% to 0.9% (26% increase) in the commercially insured population

Medicare FFS Population	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Non-cancer	80.5%	80.7%	80.5%	80.5%	80.4%	80.6%	80.0%	79.4%	79.2%	79.3%	79.2%
Cancer	19.5%	19.3%	19.5%	19.5%	19.6%	19.4%	20.0%	20.6%	20.8%	20.7%	20.8%
<i>Actively treated</i>	11.6%	11.3%	11.3%	10.4%	10.9%	10.7%	11.0%	11.3%	11.4%	11.1%	11.2%
<i>Non-actively treated</i>	7.9%	7.9%	8.2%	9.1%	8.7%	8.7%	9.1%	9.4%	9.3%	9.6%	9.5%

Source: Based on Milliman analysis of the 2004-2014 Medicare 5% sample data

Commercially Insured Population	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Non-cancer	90.6%	90.5%	90.3%	90.0%	89.7%	89.7%	89.4%	89.3%	89.2%	89.1%	89.3%
Cancer	9.4%	9.5%	9.7%	10.0%	10.3%	10.3%	10.6%	10.7%	10.8%	10.9%	10.7%
<i>Actively treated</i>	7.4%	7.3%	7.7%	7.9%	8.1%	8.1%	8.3%	8.4%	8.5%	8.5%	8.4%
<i>Non-actively treated</i>	2.0%	2.1%	2.0%	2.0%	2.2%	2.2%	2.3%	2.3%	2.3%	2.4%	2.3%

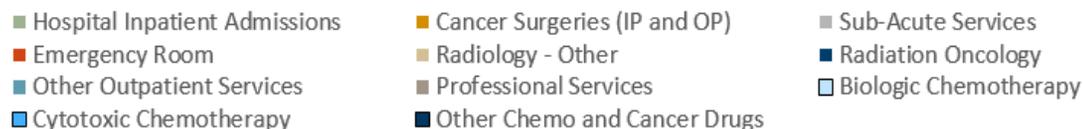
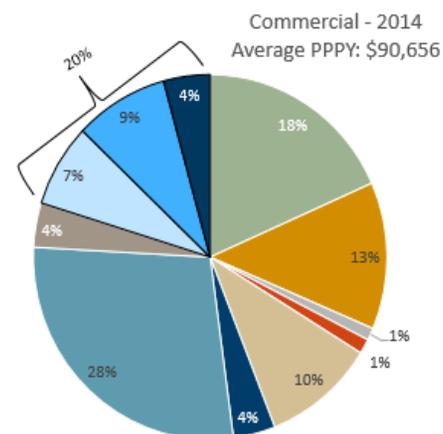
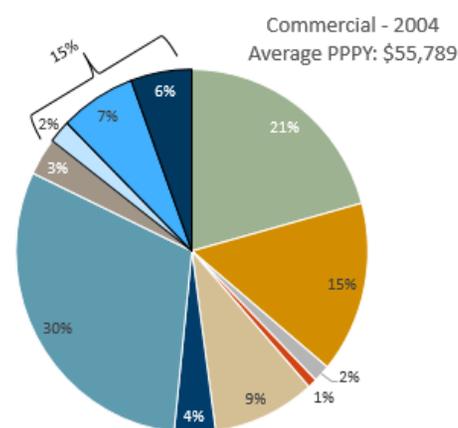
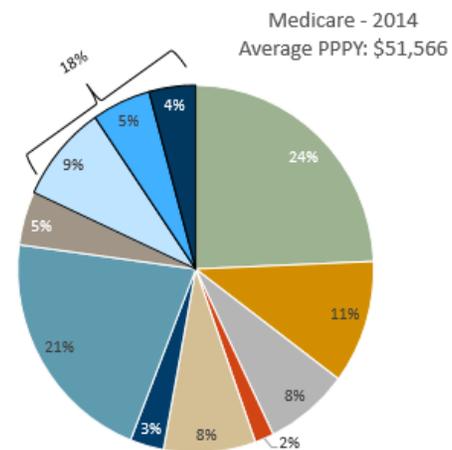
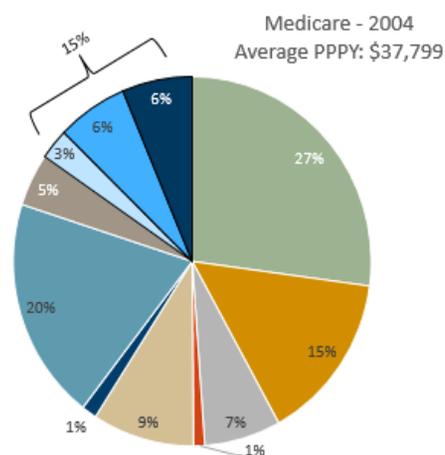
Source: Based on Milliman analysis of the 2004-2014 Truven MarketScan data

Key Results

Components of cancer care

Component costs of cancer care changed at different rates

- Increases in the portion of PPPY spending were seen in:
 - **Chemotherapy drugs**, from 15% to 18% in Medicare and from 15% to 20% in commercial
 - **Biologic chemotherapies**, from 3% to 9% in Medicare and from 2% to 7% in commercial.
- Decreases in the portion of PPPY spending were seen in:
 - **Hospital inpatient admissions**, from 27% to 24% in Medicare and from 21% to 18% in commercial.
 - **Cancer surgeries**, from 15% to 11% in Medicare and from 15% to 13% in commercial.



PPPY trends varied considerably by service category

- Some categories that increased **less than the total PPPY cost trend**
 - Hospital inpatient admissions
 - Other chemo and cancer drugs
- Some categories that increased **more than the total PPPY cost trend**
 - Biologic chemotherapy
- PPPY Medicare trends were lower than commercial trends for all services except sub-acute services and radiation oncology.

Service Category	2004-2014 PPPY Cost Trends	
	Medicare	Commercial
Hospital Inpatient Admissions	22%	44%
Cancer Surgeries (inpatient and outpatient)	0%*	39%
Sub-Acute Services	51%	15%
Emergency Room	132%	147%
Radiology – Other	24%	77%
Radiation Oncology	204%	66%
Other Outpatient Services	48%	49%
Professional Services	40%	90%
Biologic Chemotherapy	335%	485%
Cytotoxic Chemotherapy	14%	101%
Other Chemo and Cancer Drugs	-9%	24%
Total PPPY Cost Trend	36%	62%

PPPY cost trends varied by cancer type

- For the Medicare population, the 10-year trend in annual per-patient costs was **higher than average** for blood cancer and prostate cancer, while the same trend was **lower than average** for lung cancer, pancreatic cancer, and colon cancer.
- For the commercial population, the 10-year trend in annual per-patient costs was **higher than average** for colon cancer, blood cancer, breast cancer, and prostate cancer, while the same trend was **lower than average** for lung and pancreatic cancer.

Cancer Type	2004-2014 PPPY Cost Trends	
	Medicare	Commercial
Blood	53%	73%
Breast	36%	71%
Colon	28%	65%
Lung	21%	59%
Non-Hodgkin's Lymphoma	34%	69%
Pancreatic	25%	54%
Prostate	39%	79%
Other	22%	58%
Total: All Cancers	36%	62%

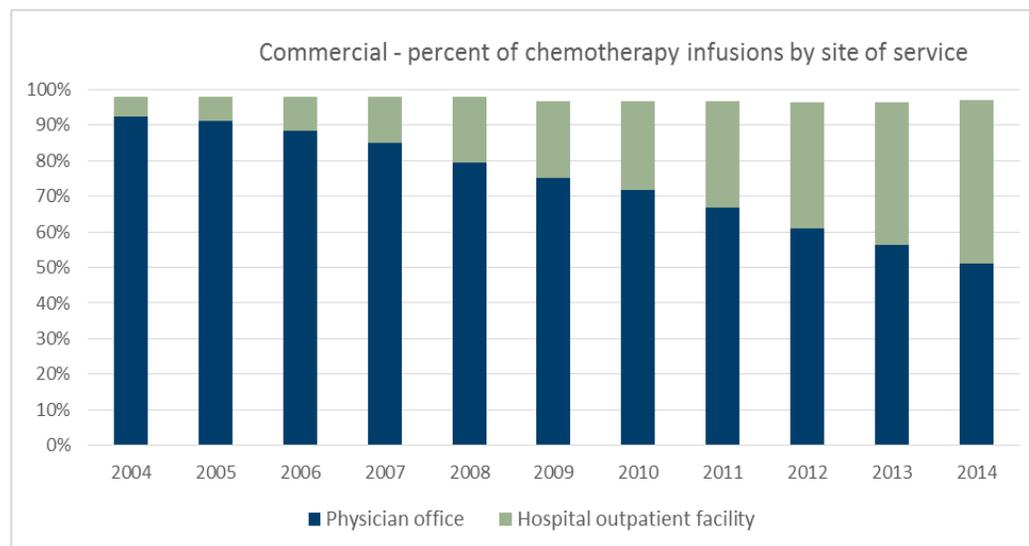
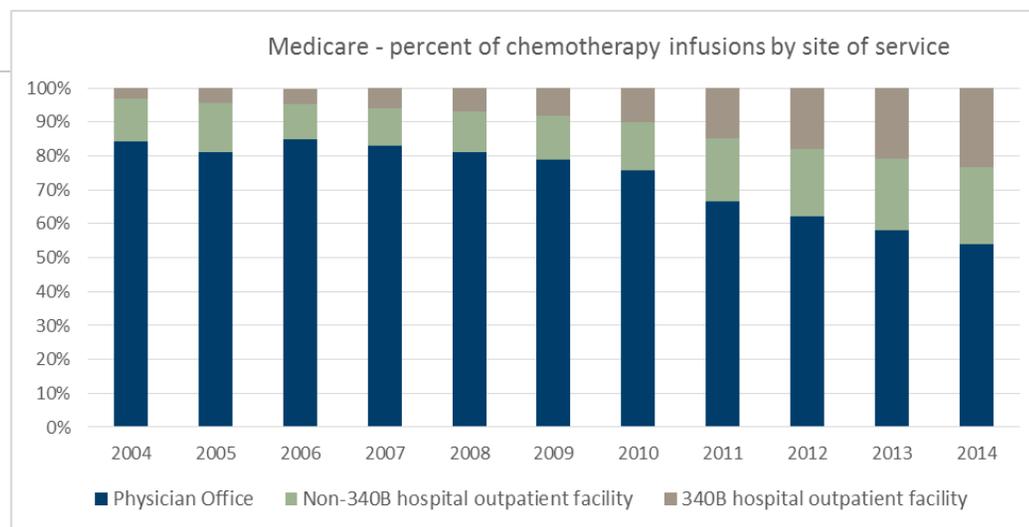
Key Results

Chemotherapy site of service

The volume of chemotherapy infusion claims by site of service shifted notably

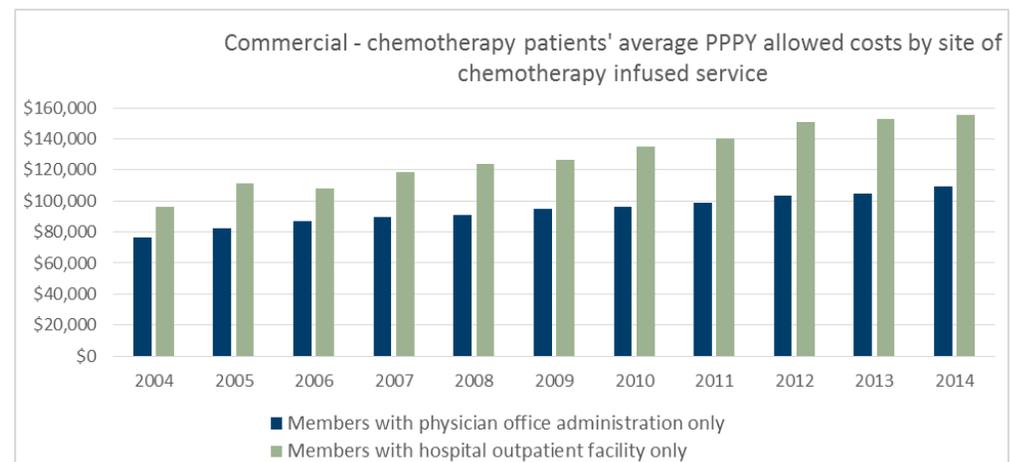
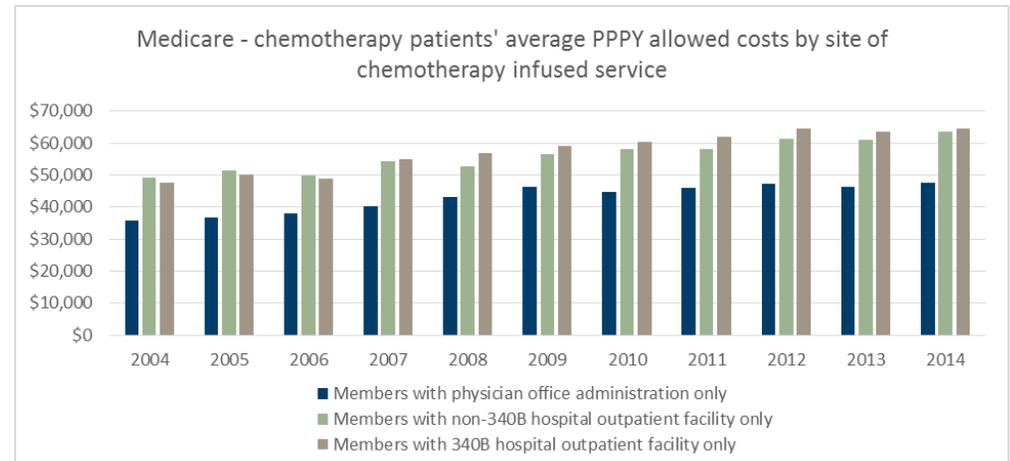
- The portion of chemotherapy infusions delivered in hospital outpatient departments increased:
 - From 15.8% to 45.9% in Medicare
 - From 5.8% to 45.9% in commercial
- In the Medicare population, the portion of chemotherapy infusions administered in a 340B hospital outpatient department increased from 3.0% to 23.1%.
- In 2014, chemotherapy infusions in 340B hospitals accounted for 50.3% of all chemotherapy infusions in hospital outpatient departments.


Based on Milliman analysis of the 2004 – 2014 Medicare 5% sample data and Truven MarketScan data



PPPY was significantly higher when patients were managed in hospital outpatient settings

- Average annual PPPY allowed cost for infused chemotherapy patients was significantly higher when a patient’s chemotherapy infusions were delivered entirely in a hospital outpatient setting versus entirely in a physician office setting.
- Compared to patients receiving all chemotherapy infusions in a physician office, those receiving all chemotherapy infusions in a hospital outpatient facility had a PPPY that was:
 - \$13,167 (37%) higher in the 2004 Medicare FFS population
 - \$16,208 (34%) higher in the 2014 Medicare FFS population
 - \$19,475 (25%) higher in the 2004 commercially insured population
 - \$46,272 (42%) higher in the 2014 commercially insured population



Based on Milliman analysis of the 2004 – 2014 Medicare 5% sample data and Truven MarketScan data

We estimate that Medicare spending would be about \$2 billion lower if the infused chemotherapy site of service shift had not occurred.

- In this analysis, we assumed the 2004 distribution of patients by the site of chemotherapy infusion would be maintained for each subsequent year and applied the annual cost trends observed for each site of service in each year
- This model captures the observed cost trends while maintaining the distribution of patients receiving chemotherapy in the two settings at 2004 levels.
- Caveats:
 - We have assumed the mix of patients receiving chemotherapy infusion in hospital outpatient facility settings and physician office settings were not substantially different.
 - The modeled cost also does not consider regional variation in fee schedules for the commercial population or wage index, DSH or IME reimbursement differences for the Medicare population
 - The site of service estimated cost impact analysis does not account for the tendency for provider organizations to increase fees or utilization to meet revenue goals or the availability of alternate sites of service in all locales.

	Cost impact in billions in 2014 with a shift to...			
	25% of 2004 observed levels	50% of 2004 observed levels	75% of 2004 observed levels	100% of 2004 observed levels
Estimated Medicare FFS spending cost difference in 2014 if observed chemotherapy infusion site of service distribution was shifted toward 2004 site of service distribution	\$0.5	\$1.0	\$1.5	\$2.0

Limitations

- This report was commissioned by Community Oncology Alliance, who received financial support from the following organizations: Bayer, Bristol-Myers Squibb, Eli Lilly and Company, Janssen Pharmaceuticals, Merck, Pfizer, Pharmaceutical Research and Manufacturers of America (PhRMA), and Takeda.
- The findings reflect the research of the authors; Milliman does not intend to endorse any product or organization.
- If this report is reproduced, we ask that it be reproduced in its entirety, as pieces taken out of context can be misleading.
- As with any economic or actuarial analysis, it is not possible to capture all factors that may be significant.
- Because we present national average data, the findings should be interpreted carefully before they are applied to any particular situation.
- These results are based on analysis of Truven MarketScan commercial data and the Medicare 5% sample data from 2004 to 2014. Different data sets, time periods, and methodologies will produce different results.
- Bruce Pyenson is a member of the American Academy of Actuaries and meets the Qualification Standards of the American Academy of Actuaries for this report.



Thank you

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