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Rethinking Oncology Trend: Evidence from Medicare Lung and Breast Cancer Spending, 2018–2024

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SUMMARY

Conventional discussions about oncology spending often focus on rising drug prices and increasing treatment costs. However, analysis of the Medicare 5% Limited Data Set (LDS) from 2018 through 2024 suggests that oncology spending is driven less by steady inflation and more by cycles of therapeutic innovation.

Two distinct patterns emerged in that time period. Lung cancer experienced a rapid spending increase driven by the adoption of immune checkpoint inhibitors, particularly pembrolizumab (Keytruda), followed by stabilization once immunotherapy became established as the standard of care. In contrast, breast cancer evolved through a process of innovation and replacement, with emerging antibody-drug conjugates (ADCs) partially offset by biosimilar-driven savings in trastuzumab-based therapies.

These findings suggest that traditional healthcare trend models may be insufficient for forecasting oncology costs. Future oncology spending may depend as much on the timing of therapeutic innovation and adoption as on changes in price and utilization.

INTRODUCTION

Much of the discussion surrounding oncology spend focuses on rising drug prices and increasing financial burden. While these forces are important, they do not fully explain how oncology spending evolves over time.

Using Medicare claims data from 2018 through 2024, this paper examines spending patterns among beneficiaries with lung cancer and breast cancer. Contrary to expectations of continuous growth, spending exhibited distinct periods of acceleration and stabilization. These patterns appear to correspond closely with changes in treatment standards and the adoption of breakthrough therapies.

The central finding of this study is that oncology spending evolves through cycles of therapeutic adoption and replacement rather than through inflation alone. We propose that oncology spending can be understood through five interacting drivers:

Oncology Trend = Price + Adoption + Duration + Benefit Channel + Replacement

DATA AND METHODS

This analysis utilized the Centers for Medicare & Medicaid Services (CMS) Medicare LDS 5% sample for seven calendar years, 2018 through 2024. Two cohorts of beneficiaries were identified:

- Beneficiaries diagnosed with lung cancer (ICD-10 C34.*)
- Beneficiaries diagnosed with breast cancer (ICD-10 C50.*)

The study employed annual open cohorts, with beneficiaries entering and exiting the cohorts over time. Annual spending and per member per year (PMPY) measures were calculated independently for each calendar year, thereby capturing evolving treatment patterns while accommodating changes in cohort composition. Annual cohort sizes by beneficiary count are summarized in **Table 1.**

Table 1. Annual Lung and Breast Cancer Cohort Size

	2018	2019	2020	2021	2022	2023	2024
Lung Cancer	16,985	17,015	16,164	16,218	17,540	17,644	17,593
Breast Cancer	38,652	38,570	35,792	36,026	36,370	36,047	35,596

The analysis focused on physician-administered Part B oncology drugs identified through Healthcare Common Procedure Coding System (HCPCS) J-codes. The major therapeutic categories and representative drugs included in the analysis are summarized in **Table 2**.

Table 2. Oncology Drug Categories Included in the Analysis

Therapeutic Category	Drugs	Treat For	J-Code	Approval Year
HER2-targeted therapies	Trastuzumab (Herceptin)	Breast	J9355	1998
Selected targeted therapies	Fulvestrant (Faslodex)	Breast	J9395	2002
HER2-targeted therapies	Pertuzumab (Perjeta)	Breast	J9306	2012
Antibody-drug conjugates (ADCs)	Ado-trastuzumab emtansine (Kadcyla)	Breast	J9354	2013
Antibody-drug conjugates (ADCs)	Fam-trastuzumab deruxtecan (Enhertu)	Breast	J9358	2019
Antibody-drug conjugates (ADCs)	Sacituzumab govitecan (Trodelvy)	Breast	J9317	2020
Selected targeted therapies	Bevacizumab	Lung	J9035	2004
Chemotherapy agents	Pemetrexed	Lung	J9305	2004
Checkpoint inhibitors (Immunotherapy)	Nivolumab (Opdivo)	Lung	J9299	2014
Checkpoint inhibitors (Immunotherapy)	Durvalumab (Imfinzi)	Lung	J9173	2017
Selected targeted therapies	Amivantamab (Rybrevant)	Lung	J9061	2021
Checkpoint inhibitors (Immunotherapy)	Pembrolizumab (Keytruda)	Lung, Breast	J9271	2014

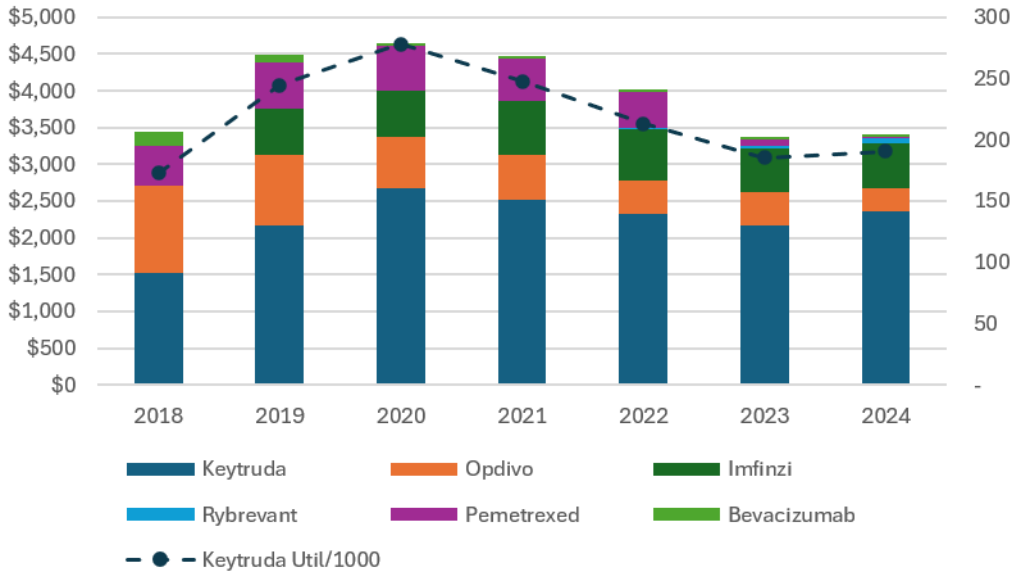
Annual oncology drug spending, membership, and PMPY costs were calculated for each cohort.

RESULTS

Lung Cancer: Innovation Through Adoption

Figure 1 illustrates the rapid increase in lung cancer PMPY spending between 2018 and 2021, followed by stabilization through 2024. Drug-level analysis indicates that this pattern was driven primarily by the rapid adoption of pembrolizumab (Keytruda), while spending associated with pemetrexed, nivolumab (Opdivo), and bevacizumab declined. Rather than representing isolated utilization changes, these trends reflect a broader shift toward immunotherapy-based treatment. Once checkpoint inhibitors became embedded in clinical practice, spending growth moderated despite continued utilization. The annual utilization of Keytruda, expressed as prescriptions per 1,000 members, is shown by the dashed line on the right-hand axis.

Figure 1. Lung Cancer Part B Oncology Drug Spending PMPY by Therapeutic Class, 2018–2024

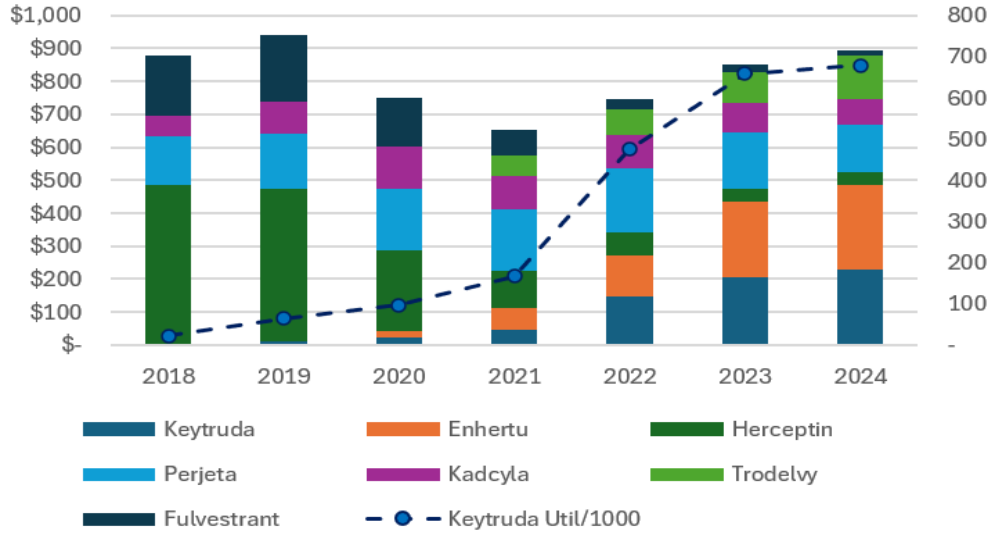


The lung cancer experience illustrates an adoption cycle: rapid spending growth during diffusion of a breakthrough therapy followed by stabilization after the new standard of care becomes established. This pattern suggests that the greatest financial impact of a breakthrough therapy may occur during its adoption phase rather than after it becomes established as the standard of care.

Breast Cancer: Innovation Through Replacement

Breast cancer followed a markedly different trajectory. **Figure 2** illustrates the ups-and-downs in breast cancer PMPY spending between 2018 and 2024.

Figure 2. Breast Cancer Part B Oncology Drug Spending PMPY by Therapeutic Class, 2018–2024



Spending on newer therapies, particularly antibody-drug conjugates such as Enhertu and Trodelvy, together with immunotherapy (Keytruda) for selected patients, grew rapidly during the study period. However, much of this growth was offset by declining spending on trastuzumab (Herceptin) following biosimilar entry. As a result, substantial therapeutic innovation occurred without a corresponding increase in aggregate PMPY spending.

The breast cancer experience illustrates a replacement cycle: new therapies gain market share while older therapies become less expensive or lose utilization, producing a more stable spending trajectory. Unlike lung cancer, innovation did not produce sustained spending growth because newer therapies were introduced alongside meaningful cost offsets from biosimilar competition.

Over this seven-year period, unit costs for all drugs have remained relatively stable, largely reflecting underlying inflation. Changes in utilization have been the primary driver of overall cost trends.

The delayed adoption of Keytruda in breast cancer compared with lung cancer reflects fundamental differences in disease biology. Non-small cell lung cancer is generally more immunogenic, enabling checkpoint inhibitors to rapidly become a first-line treatment platform across a broad patient population. In breast cancer, however, the benefit of immunotherapy has been largely confined to selected subtypes, particularly PD-L1-positive triple-negative breast cancer. Consequently, Keytruda fundamentally reshaped the lung cancer treatment landscape, whereas its contribution to breast cancer spending has been more incremental and complementary to established HER2-targeted therapies, endocrine therapies, and antibody-drug conjugates.

TOWARD A NEW FRAMEWORK FOR ONCOLOGY TREND

The findings suggest that there is no single oncology trend. Instead, different cancers exhibit distinct economic responses to therapeutic innovation, as shown in **Table 3** below.

Table 3. Economic Models of Oncology Innovation

	Adoption Model	Replacement Model
Cancer type	Lung cancer	Breast cancer
Role of new therapy	Breakthrough therapy becomes new standard of care	New therapies replacing existing therapies
Economic signature	Rapid PMPY increase followed by stabilization	Stable PMPY - Innovation offset by competition

Although this paper focuses on lung and breast cancer, we believe these two models—adoption and replacement—provide a useful framework for understanding spending patterns in other oncology indications.

Over the study period, lung cancer spending reflected an adoption model. Spending growth was concentrated during the transition to immunotherapy-based treatment, after which costs stabilized as adoption matured.

Breast cancer spending represented a replacement model. Innovation continued throughout the study period, but the financial impact of new therapies was partially offset by biosimilar competition and therapeutic substitution.

These findings suggest that oncology spending should not be viewed solely through the lens of price inflation. Changes in treatment standards, duration of therapy, biosimilar competition, benefit channel, and therapeutic adoption may have a greater influence on spending patterns than annual price changes alone. Accordingly, we propose the following framework for evaluating oncology trend, with each driver summarized in **Table 4** below.

Oncology Trend = Price + Adoption + Duration + Benefit Channel + Replacement

Table 4. Proposed Framework for Evaluating Oncology Trend

Driver	Primary Influence on Trend
Price	AWP/WAC changes
Adoption	Uptake of new therapies
Duration	Longer treatment and survival
Benefit Channel	Part B vs. Part D
Replacement	Biosimilars, generic competition, and therapeutic substitution

IMPLICATIONS FOR MEDICARE AND MEDICARE ADVANTAGE

For actuaries and Medicare Advantage Organizations (MAOs), historical trend may be an incomplete predictor of future oncology expenditures. The largest spending changes observed in this study occurred when treatment standards changed rather than when existing therapies became more expensive. Consequently, forecasting oncology costs may require greater emphasis on understanding emerging technologies, treatment adoption patterns, and future standards of care.

Unlike the first generation of oncology innovation, which was dominated by infused biologics, the next generation is expected to include a growing mix of infused biologics with oral precision therapies. Anticipating these adoption cycles may become as important as measuring historical trend.

LOOKING AHEAD: THE GROWING ROLE OF PART D

This study focuses on physician-administered Part B oncology drugs. These drugs accounted for the major therapeutic innovations observed during the study period, including checkpoint inhibitors in lung cancer and HER2-targeted biologics in breast cancer. Looking forward, future oncology innovation is expected to span both Medicare Part B and Part D, making an integrated view of oncology spending increasingly important.

For lung cancer, precision therapies targeting EGFR, ALK, ROS1, and KRAS mutations have become the standard treatment for biomarker-defined patient populations. For breast cancer, oral CDK4/6 inhibitors and PARP inhibitors have become integral components of care. These therapies complement, rather than replace, Part B biologics, creating a more integrated treatment landscape across the medical and pharmacy Medicare benefits.

For MAOs, this evolution suggests that future oncology trends should be evaluated across both Part B and Part D. Understanding how innovation shifts between benefit channels may become as important as measuring changes in price or utilization when forecasting oncology costs. The migration of innovation across Medicare benefit channels reinforces the central finding of this study: oncology spending is increasingly shaped by how therapies evolve rather than by how existing therapies are priced.

CONCLUSION

Our analysis of the LDS data demonstrates that oncology spending is shaped less by steady inflation than by successive waves of therapeutic innovation.

Lung cancer and breast cancer exhibited fundamentally different spending dynamics despite substantial clinical advances in both diseases. Lung cancer followed an adoption model driven by checkpoint inhibitors, while breast cancer followed a replacement model characterized by innovation offset by biosimilar savings.

Looking ahead, the challenge is no longer simply estimating next year's trend factor. The future of oncology forecasting lies less in extrapolating historical trends and more in anticipating how the next generation of therapies will reshape the economics of cancer care.

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