A decade of increases in Medicare Part B pharmaceutical spending: what are the drivers?

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What is already known about this subject

- Medicare Part B pharmaceutical spending more than doubled in 2006-2017, increasing from \$13.9 billion to \$32.0 billion.
- Previous reports have described which individual drugs, drug classes, and disease categories comprise the largest share of Medicare Part B pharmaceutical spending.
- It remains unclear whether increased spending over time represents increased utilization or increased cost per claim.

What this study adds

- In 2008-2016, pharmaceutical spending in Medicare Part B increased by 34%, driven by a 53% increase in the cost per claim; meanwhile, utilization decreased by 12%.
- Medicare Part B pharmaceutical spending grew considerably in recent years, despite decreased utilization, which was driven by increases in the cost per claim and was a product of rising drug prices and increased utilization of more expensive specialty drugs.

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ABSTRACT

BACKGROUND: Medicare Part B pharmaceutical spending has increased rapidly, more than doubling in 2006-2017. Yet, it is unclear whether this increase was driven by increased utilization or increased cost per claim.

OBJECTIVE: To evaluate the relative impact of changes in drug utilization and cost per claim on changes in Medicare Part B pharmaceutical spending in 2008-2016 overall, by drug type (specialty and nonspecialty) and therapeutic category.

METHODS: In this retrospective descriptive study, we extracted all claims in 2008-2016 for separately payable Part B drugs from a 5% random sample of Medicare beneficiaries. Our study included 3 outcomes calculated annually for all included drugs: (1) spending, defined as the sum of total payments; (2) utilization, defined as total number of claims; and (3) cost per claim, defined as spending divided by the number of claims. Estimates of spending and utilization were expressed per beneficiary-year. Spending and cost per claim were adjusted for inflation. For each outcome, we calculated relative changes in 2008-2016. We repeated analyses stratifying by drug type (specialty and nonspecialty) and therapeutic class.

RESULTS: Pharmaceutical spending in Medicare Part B increased by 34% from 2008-2016, driven by a 53% increase in the cost per claim. Utilization decreased by 12%. Spending on specialty drugs increased by 56%, driven by a 48% increase in the cost per claim and a 6% utilization increase. Spending on nonspecialty drugs decreased by 32% driven by an 18% reduction in the cost per claim and a 17% reduction in utilization. Spending on ophthalmic preparations increased by 281%, driven by a 238% utilization increase and a 13% increase in the cost per claim. Spending on antiarthritic and immunologic agents increased by 159%, driven by a 117% increase in the cost per claim and a 19% utilization increase.

CONCLUSIONS: Medicare Part B pharmaceutical spending grew in recent years, despite decreased utilization, driven by an overall increase in the cost per claim. This was a product of rising drug prices and increased utilization of more expensive specialty drugs. These findings support the development of policies that aim to spur competition and control price growth of provider-administered drugs.

Over the last decade, spending on drugs administered by providers in physician offices, clinics, or hospital outpatient departments has increased substantially, accounting for an increasing proportion of pharmaceutical spending.¹ In Medicare, provider-administered drugs are covered under Part B.² Pharmaceutical spending in Part B more than doubled between 2006 and 2017, from \$13.9 billion to \$32.0 billion, accounting for 17% of total Medicare drug spending in 2017.^{3,4}

Previous reports have described which individual drugs, drug classes, and disease categories comprise the largest share of Medicare Part B pharmaceutical spending.^{1,4-6} However, it is still unclear whether increased spending over time represents increased utilization or increased cost per claim. Clarifying the factors behind increases in Medicare Part B pharmaceutical spending is important because spending on provider-administered drugs is projected to continue growing at even faster rates as new provider-administered biologics gain approval by the US Food and Drug Administration (FDA).¹ Furthermore, for Medicare beneficiaries without any supplemental coverage, out-of-pocket spending on Part B drugs has no catastrophic threshold, adding a significant financial burden. Understanding drivers of increasing Part B spending is of major relevance for informing policymakers of the development of measures aiming to contain its growth.

The objective of this study was to assess the relative contribution of changes in drug utilization and cost per claim to changes in Medicare Part B pharmaceutical spending in 2008-2016.

Methods

DATA SOURCES AND STUDY SAMPLE

We obtained 2008-2016 claims data from a 5% random sample of fee-for-service Medicare beneficiaries from the Centers for Medicare & Medicaid Services (CMS). Services covered under Medicare Part B are billed using Healthcare Common Procedure Coding System (HCPCS) codes. In

order to differentiate Medicare Part B drug claims from the rest of claims, we obtained 2008-2016 quarterly lists of HCPCS codes for Part B-covered drugs from CMS.⁷ Each year, we extracted all Medicare claims of separately payable “J” codes (drug codes) and “Q” codes (temporary codes). This included injectable and infusion drugs, typically administered by providers; certain self-administered drugs, such as oral anticancer agents, oral antiemetics, immunosuppressive drugs, or hemophilia clotting factor; and drugs used in conjunction with durable medical equipment, such as inhalation drugs used with a nebulizer. Our initial sample included 663 HCPCS codes. We excluded all claims with denied payments. After these exclusions, our sample included 597 HCPCS codes.

We identified all National Drug Code (NDC) numbers for the study sample using CMS crosswalks of HCPCS codes to NDC numbers. Then, we used a list obtained from a national pharmacy benefit manager to identify NDC numbers of specialty medications,⁸ as previously done in the literature.⁹ HCPCS codes were classified as specialty when at least 50% of their corresponding NDC numbers were identified as specialty medications. All other HCPCS codes were classified as nonspecialty (Table 1). We used the Uniform System of Classification codes obtained from AnalySource (reprinted with permission by First Databank, Inc) to identify therapeutic classes.^{10,11} Specifically, we classified HCPCS codes into a convenience sample of 7 therapeutic classes with the largest cumulative spending in 2008-2016, including antineoplastic agents, antiarthritic and immunologic agents, blood factor and hemostatic modifiers, gastrointestinal agents, hospital solutions, musculoskeletal agents, and ophthalmic preparations. HCPCS codes that did not fall under either of these 7 therapeutic classes were classified as “other classes” (Table 1).

Given the widespread off-label use of bevacizumab for ophthalmic indications, we differentiated its intravitreal use from all other uses. Intravitreal use of bevacizumab was defined as having the HCPCS code J9035 (bevacizumab injection) and the *Current Procedural Terminology* code 67028 (under vitreous procedures on the posterior segment of the eye) concomitantly billed under the same claim.¹²

OUTCOMES

Outcomes included spending, utilization, and cost per claim. Spending was defined as the sum of total payments (Medicare program payments and beneficiary cost sharing) for all claims for drugs in the study sample. We defined utilization as the total number of claims (more details about our selection of number of claims as measure of utilization

TABLE 1 Changes in Pharmaceutical Spending, Utilization, and Claim Cost in Medicare Part B, Overall, by Drug Type, and by Therapeutic Class, 2008-2016

	Spending per beneficiary- year			Number of claims per beneficiary-year			Cost per claim			Contribution toward 2008-2016 overall	Contribution toward 2008-2016 overall
	2008	2016	Change	2008	2016	Change	2008	2016	Change	Spending increase	Utilization decrease
Overall (N = 597)	213.2	286.6	34.4%	0.7848	0.6886	-12.3%	271.7	416.3	53.2%	100.0%	100.0%
Drug type											
Specialty drugs (n = 159)	160.9	251.1	56.1%	0.1598	0.1689	5.7%	1,006.9	1,486.5	47.6%	113.7%	-71.1%
Nonspecialty drugs (n = 438)	52.4	35.5	-32.1%	0.6250	0.5197	-16.9%	83.8	68.4	-18.4%	-13.7%	171.1%
Therapeutic class											
Ophthalmic preparations ^a (n = 13)	18.0	68.6	280.9%	0.0145	0.0491	238.3%	1,242.0	1,398.2	12.6%	57.3%	-113.8%
Antiarthritic and immunologic agents ^b (n = 35)	10.1	26.1	159.0%	0.0337	0.0403	19.4%	298.3	647.0	116.9%	18.5%	-29.7%
Hospital solutions ^c (n = 43)	4.1	8.8	117.0%	0.0647	0.0294	-54.5%	62.7	299.1	377.1%	5.6%	95.2%
Musculoskeletal agents ^d (n = 13)	8.3	14.8	77.1%	0.0109	0.0168	54.4%	769.0	881.8	14.7%	7.8%	-21.6%
Gastrointestinal agents ^e (n = 14)	17.3	23.1	33.2%	0.0123	0.0101	-17.8%	1,404.0	2,274.9	62.0%	7.9%	3.7%
Other classes ^f (n = 302)	16.4	21.2	29.2%	0.4050	0.3976	-1.8%	40.5	53.3	31.6%	6.8%	-82.9%
Antineoplastic agents ^g (n = 119)	95.5	89.0	-6.7%	0.0911	0.0613	-32.7%	1,047.9	1,451.5	38.5%	1.6%	70.8%
Blood factors and hemostatic modifiers ^h (n = 59)	43.5	35.0	-19.5%	0.1525	0.0839	-45.0%	285.2	417.2	46.3%	-5.4%	178.3%

Notes: Estimates of spending were adjusted for inflation using the Consumer Price Index.¹³ Drug classes are ordered by descending changes in spending per beneficiary-year. Numbers may not sum up to totals due to rounding. All calculations were conducted from unrounded values.

^aOphthalmic preparations include products with USC level 2 code 61000 and off-label intravitreal bevacizumab. We determined the intravitreal use of bevacizumab when HCPCS code J9035 (bevacizumab injection) and CPT code 67028 (under vitreous procedures on the posterior segment of the eye) were concomitantly billed under the same claim.¹² Our study sample included 597 HCPCS codes. However, given the split between off-label ophthalmic bevacizumab (J9035 + 67028) and oncologic bevacizumab (J9035), the therapeutic class sample included 598 codes.

^bAntiarthritic and immunologic agents include products with USC level 2 codes 09000 and 86000.

^cHospital solutions include products with USC level 2 code 53000.

^dMusculoskeletal agents include products with USC level 2 code 59000.

^eGastrointestinal agents include products with USC level 2 code 23000.

^fOther classes include all other USC level 2 codes.

^gAntineoplastic agents include products with USC level 2 codes 30000 and 35000.

^hBlood factor and hemostatic modifiers include products with USC level 2 codes 11000 and 48000.

CPT = Current Procedural Terminology; HCPCS = Healthcare Common Procedure Coding System; USC = Uniform System of Classification.

in [Supplementary Methods](#), available in online article). Cost per claim was calculated by dividing pharmaceutical spending by the number of claims.

Estimates of spending and utilization were expressed per beneficiary-year to account for the shorter observation

period for beneficiaries with partial enrollment or who died, as well as to account for changes in Medicare enrollment over time. Estimates of spending were adjusted for inflation using the Consumer Price Index and are expressed in 2016 US dollars.¹³

FIGURE 1 Overall Trends in Pharmaceutical Spending, Utilization, and Claim Cost in Medicare Part B, 2008-2016

Note: Estimates of spending and cost per claim were adjusted for inflation using the Consumer Price Index¹³ and are expressed in 2016 US dollars.

ANALYSES

We calculated estimates of pharmaceutical spending, utilization, and cost per claim each calendar year in 2008-2016. For each outcome, we calculated relative changes in 2008-2016. We repeated analyses stratifying by drug type (specialty or nonspecialty) and by therapeutic class.

We further estimated the relative contribution of each subgroup toward the overall 2008-2016 change in spending and utilization. Additionally, we calculated the relative contribution of each drug type and therapeutic class toward total Medicare Part B spending and utilization each year in 2008-2016. Finally, for each therapeutic class, we calculated the relative 2008-2016 changes in spending, utilization, and cost per claim for the top 5 drugs with the largest spending

in 2016. These product-level results allow us to discern what factors drive aggregated trends within the category for each therapeutic class.

SENSITIVITY ANALYSES

We repeated our analyses stratified by drug type, changing our specialty code definition. In these analyses, all HCPCS codes that included at least 1 NDC number for a specialty medication were classified as specialty and the rest as nonspecialty. All analyses were conducted at the HCPCS code level. This study was approved as exempt by the University of Pittsburgh Institutional Review Board because deidentified data was used. We conducted all analyses using statistical software SAS version 9.4 (SAS Institute).

Results

CHANGES IN OVERALL PHARMACEUTICAL SPENDING, UTILIZATION, AND COST PER CLAIM

Pharmaceutical spending per beneficiary-year in Medicare Part B increased from \$213 in 2008 to \$287 in 2016, representing a 34% increase over this 9-year study period (Table 1 and Figure 1). This increase was driven by a 53% increase in the cost per claim, which rose from \$272 in 2008 to \$416 in 2016. Over the study period, utilization decreased by 12%, from 0.78 claims per beneficiary-year in 2008 to 0.69 in 2016.

CHANGES IN PHARMACEUTICAL SPENDING, UTILIZATION, AND COST PER CLAIM BY DRUG TYPE

Spending per beneficiary-year on specialty drugs increased by 56%, from \$161 in 2008 to \$251 in 2016 (Table 1 and Figure 2). This increase was due to a 48% increase in the cost per claim of specialty drugs, which rose from \$1,007 in 2008 to \$1,487 in 2016, and a 6% increase in utilization, from 0.16 claims per beneficiary-year in 2008 to 0.17 in 2016.

Spending per beneficiary-year on nonspecialty drugs decreased by 32%, from \$52 in 2008 to \$36 in 2016 (Table 1 and Figure 3). This was driven by a 17% reduction in utilization, which decreased from 0.63 claims per beneficiary-year in 2008 to 0.52 in 2016, and a 18% reduction in the cost per claim, which decreased from \$84 in 2008 to \$68 in 2016.

The relative contribution of specialty drugs toward overall pharmaceutical spending in Medicare Part B increased from 75% in 2008 to 88% in 2016 (Supplementary Figure 1, available in online article), while the contribution of nonspecialty drugs decreased from 25% to 12%. Similarly, the relative contribution of specialty

FIGURE 2 Trends in Medicare Part B Pharmaceutical Spending, Utilization, and Claim Cost for Specialty Drugs, 2008-2016

Note: Estimates of spending and cost per claim were adjusted for inflation using the Consumer Price Index¹³ and are expressed in 2016 US dollars.

drugs toward overall Medicare Part B utilization increased from 20% in 2008 to 25% in 2016 ([Supplementary Figure 2](#), available in online article), while the contribution of nonspecialty drugs decreased from 80% to 75%.

CHANGES IN PHARMACEUTICAL SPENDING, UTILIZATION, AND COST PER CLAIM BY THERAPEUTIC CLASS

Over the study period (2008-2016), spending on ophthalmic preparations increased by 281%, due to a 238% increase in utilization and a 13% increase in the cost per claim (Table 1, [Supplementary Figure 3](#), and [Supplementary Figure 4](#)). This was mostly driven by the uptake of 2 high-cost specialty drugs: ranibizumab and aflibercept ([Supplementary Table 1](#)). Utilization of off-label intravitreal

bevacizumab also increased considerably; however, due to its low cost, it had a minimal impact on the overall spending increase within the ophthalmic preparations' category.

Spending on antiarthritic and immunologic agents increased by 159%, due to a 117% increase in the cost per claim and a 19% utilization increase ([Supplementary Figure 5](#)). This was particularly driven by a large increase in price and utilization of abatacept, a large increase in price of natalizumab, and the adoption of new therapies approved throughout the study period (intra-articular hyaluronic acid and intravenous golimumab).

Spending on hospital solutions increased by 117%, despite a 55% decrease in utilization, due to a 377% increase in the cost per claim ([Supplementary Figure 6](#)). This was

mainly driven by changes in the drug mix, with a large decrease in utilization of less expensive hospital solutions but an increased use of high-cost therapies, such as immunoglobulins and anti-inhibitor coagulant complex.

Spending on musculoskeletal agents increased by 77%, due to a 54% utilization increase and a 15% increase in the cost per claim ([Supplementary Figure 7](#)). This was primarily driven by the uptake of denosumab. Spending on gastrointestinal agents increased by 33%, despite an 18% decrease in utilization, due to a 62% increase in the cost per claim ([Supplementary Figure 8](#)). This was mostly driven by an increase in price of infliximab and octreotide depot and the adoption and subsequent price increase of certolizumab.

Changes in spending, utilization, and cost per claim for all other classes are shown in [Supplementary Figure 9](#), [Supplementary Figure 10](#), and [Supplementary Figure 11](#), as well as in Table 1 and [Supplementary Figure 3](#). The relative contribution of each therapeutic class toward total Medicare Part B spending and utilization in 2008-2016 can be found in [Supplementary Figure 12](#) and [Supplementary Figure 13](#), respectively (all supplementary materials are available in the online article).

RESULTS OF SENSITIVITY ANALYSES

When we modified the specialty code definition to include all HCPCS codes that included at least 1 NDC number for a specialty medication, we obtained similar results. Results of sensitivity analyses can be found in [Supplementary Table 2](#) (available in online article).

Discussion

To our knowledge, this study is the first to quantify how changes in drug

FIGURE 3 Trends in Medicare Part B Pharmaceutical Spending, Utilization, and Claim Cost for Nonspecialty Drugs, 2008-2016

Note: Estimates of spending and cost per claim were adjusted for inflation using the Consumer Price Index¹³ and are expressed in 2016 US dollars.

utilization and cost per claim impact Medicare Part B pharmaceutical spending. Our study yielded 4 main findings. First, pharmaceutical spending in Medicare Part B increased by 34% over the study period, increasing at an average annual rate of 3.8% above inflation. Second, increases in Medicare Part B pharmaceutical spending were driven by increases in the cost per claim, while utilization decreased by 12%. Third, despite specialty drugs representing a relatively small proportion of claims in 2016 (25%), they accounted for the majority of the spending (88%).

Last, we found wide variability across therapeutic classes in terms of spending and utilization trends over time.

A previous report by the Medicare Payment Advisory Commission (MedPAC) evaluated trends in drug utilization and spending in Medicare Part B from 2009-2016, finding that utilization decreased by 0.5% every year and spending increased by 6.4%, driven by price growth.¹⁴ While we found similar general trends, differences in estimates are likely explained by the fact that this MedPAC report did not adjust for inflation, only included Medicare beneficiaries that used Part B drugs, and excluded blood products from analyses.

Also consistent with our findings, a report by the Government Accountability Office found that Medicare Part B pharmaceutical spending growth between 2006 and 2013 was mainly driven by new drugs,

mostly specialty medications.⁶ In contrast, the Pharmaceutical Research and Manufacturers of America found that recent increases in Medicare Part B pharmaceutical spending were mostly driven by increased utilization measured as total number of units administered.¹⁵ This difference may be explained by the utilization measure used—trends in the number of HCPCS code units administered—which can vary largely depending on shifts in drug mix and the unit definition of each HCPCS code.

The overall decrease in the number of claims observed for Part B drugs in 2008-2016 may be explained by a series of factors. These factors include an increased patient preference and use of oral and self-administered drugs (not generally covered by Part B),^{16,17} a shift in utilization toward newer drugs with less frequent dosing regimens,¹ and the gradual bundling of some formerly separately payable drugs into episode-based payments,¹⁸ in particular, drugs used for the treatment of end-stage renal disease bundled into the prospective payment rate for dialysis.¹⁹

Our study shows that overall increases in Medicare Part B pharmaceutical spending were driven by increases in the cost per claim, specifically of specialty medications. In turn, increases in the overall cost per claim are a product of changes in the drug mix, including the shift to newer, more expensive drugs, and rising drug prices. Increases in the cost per claim were also the primary driver of spending growth for most therapeutic classes with the major exception of ophthalmic preparations.

Spending on ophthalmic preparations increased substantially in 2008-2016, accounting for the majority of the overall growth in Medicare Part B pharmaceutical spending. This was primarily driven by the uptake of 2 antivasculal endothelial growth

factor therapies approved for the treatment of age-related macular degeneration, ranibizumab (launched in 2006) and aflibercept (launched in 2011). Both ranibizumab and aflibercept came into the market at very high prices,¹² and their Part B reimbursement rates have only decreased slightly over the study period. Of note, the widespread off-label use of intravitreal bevacizumab, available at a fraction of the cost,¹² greatly mitigated the potential for an even greater spending increase in this category.

Specialty drugs are often newer, high-cost drugs used to treat complex conditions such as cancer or rheumatoid arthritis.²⁰ Certain characteristics of specialty drugs make them more likely to be administered by a physician and, thus, paid for by Medicare Part B. For instance, specialty drugs are usually injected or infused, their administration requires close monitoring and individualized dosing, and they have unique handling and storage requirements due to their sensitivity to physical conditions such as light, heat, or movement.⁶ In fact, several reports by the Government Accountability Office demonstrated that most of newly approved specialty drugs are primarily covered under Medicare Part B as opposed to Part D.^{6,21} Because the majority of drugs projected to gain FDA approval in the next few years are injectable specialty drugs,¹ Medicare Part B pharmaceutical spending will likely continue to increase.

Despite this, the increasing number of new biosimilar approvals, which are typically marketed at a fraction of the price of originator biologics, hold promise to lower pharmaceutical spending on Part B drugs.¹⁴ However, extensive patent litigation and settlements between manufacturers have blocked the launch of most biosimilars. Moving forward, it will be important to develop policies to protect biosimilar manufacturers and expedite the entry of biosimilars into the market.

The evidence of rising costs per claim is concerning because this can pose a severe financial hardship for beneficiaries, who are responsible for a 20% coinsurance. This is particularly true for those with modest incomes or with significant medical needs. Furthermore, unlike in Part D, out-of-pocket spending on Part B drugs has no catastrophic threshold for Medicare beneficiaries without a supplemental coverage. Out-of-pocket spending in Part B also does not count towards the catastrophic threshold in Part D, adding a significant burden to those beneficiaries that require provider-administered drugs.

Several measures have been implemented or proposed to lower drug spending for Medicare Part B and its beneficiaries. Between 1995 and 2010, Medicare used reference pricing policies, such as the least costly alternative and functional equivalence, under which a group of drugs with similar health effects were paid based on the least

costly product in the group.²² These strategies linked drug reimbursement to comparative-effectiveness evidence, improving the value of care provided.²² Reinstating such policies could lead to large savings for the Medicare Part B program and its beneficiaries, particularly in certain therapeutic classes such as antiarthritics and ophthalmic preparations.²³⁻²⁵

Recently, MedPAC recommended that Medicare Part B develop the Drug Value Program, a voluntary alternative to the current reimbursement system that draws on market forces.¹⁴ Under this program, Medicare would obtain lower prices for Part B drugs by allowing private vendors to use pharmacy management tools (such as formulary design, step therapy, and prior authorization) to negotiate prices with manufacturers and by realigning provider incentives through shared savings opportunities.¹⁴ MedPAC also advanced a proposal to establish common billing codes for reference biologics and their biosimilars, which would spur price competition among these Part B drugs.³

During the Trump administration, Congress proposed a series of measures aiming to control Medicare drug spending and lower beneficiaries' out-of-pocket drug costs.²⁶ These proposals included changes to the Medicare Part B drug reimbursement system, such as establishing a price ceiling based on an international reference pricing system, developing a competitive acquisition program for Part B drugs, or capping growth of Medicare Part B drug reimbursement rates to the rate of inflation.²⁶

Other proposals included realigning incentives for fee-for-service Medicare Part B providers by substituting the current percentage-based provider add-on payment with a fixed payment, or modifying the Medicare Part B benefit design, including an out-of-pocket spending limit.²⁶

These measures would contribute to lower drug prices of Part B drugs, constraining Medicare Part B pharmaceutical spending and ensuring beneficiaries' affordability and access to treatment.

LIMITATIONS

Our study is subject to several limitations. First, these analyses were restricted to a 5% random sample of fee-for-service Medicare beneficiaries. Second, our study includes all separately payable Part B-covered drugs in 2008-2016 and not those bundled under the Outpatient Prospective Payment System. Drugs that became bundled throughout the study period were included in the analyses only while they were separately payable. Finally, this study did not separately evaluate patient out-of-pocket spending and Medicare program payments but rather grouped them together.

Conclusions

Medicare Part B pharmaceutical spending grew considerably in recent years, despite decreased utilization, driven by increases in the cost per claim. This was a product of rising drug prices and increased utilization of more expensive specialty drugs. These findings support the development of policies aiming to spur competition and control price growth of provider-administered drugs.

DISCLOSURES

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