Original Research

Medicare Volume Growth and Shift in Payments From Physicians to Non-Physician Practitioners Under Statutory Budget Neutrality

INQUIRY: The Journal of Health Care Organization, Provision, and Financing
Volume 61: 1–9

DOI: 10.1177/00469580241249076
journals.sagepub.com/home/inq
Sage

Eric W. Christensen, PhD[1,2], Gregory N. Nicola, MD[3], Elizabeth Y. Rula, PhD[1], Lauren P. Nicola, MD[4], and Joshua A. Hirsch, MD[5]

Abstract

Volume increases, inflation, statutory freezes in physician payments, and the budget neutrality requirement for the Medicare Physician Fee Schedule have resulted in persistent inflation-adjusted conversion factor decreases. This study aimed to determine if relative value unit (RVU) volume increases on a per beneficiary basis has counteracted conversion factor decreases and inflation to maintain Medicare reimbursement per beneficiary, overall and across specialties. Using aggregated data for 100% of Medicare part B claims (2005-2021), we computed the percentage change in reimbursement per beneficiary, nominal and inflation-adjusted, by specialty. These trends were then adjusted by separately holding constant RVUs per beneficiary and the conversion factor to demonstrate the impact of budget neutrality. Inflation-adjusted reimbursement per beneficiary increased 9.9% over the 2005 to 2021 period; this trend encapsulated a 64.8% increase in RVUs per beneficiary, offsetting a 33.6% inflation-adjusted conversion factor decline. RVU changes per beneficiary varied widely across clinicians (+45.5% for physicians to +328.2% for non-physician practitioners) and by specialty (−36.1% for cardiac surgery to +1106% for nurse practitioners). Given RVU increases, conversion factor decreases, and inflation combined, reimbursement per beneficiary decreased 2.3% for physicians and increased 16.3% for limited-license physicians and 206.5% for non-physician practitioners. Overall, increased RVU volume per beneficiary has offset conversion factor declines within the budget neutral system. However, substantial redistribution has occurred across provider types, with reimbursement declining slightly for physicians while tripling for non-physician practitioners. Certain physician specialties, particularly procedural specialties, have declined most. Future research should assess the impact of specialty-specific reimbursement changes on patients' access to care.

Keywords

budget neutrality, conversion factor, Medicare reimbursement, Medicare Physician Fee Schedule, inflation

What do we already know about this topic?
Statutory freezes in physician payments and the requirement for budget neutrality for the Medicare Physician Fee Schedule (MPFS) has resulted in persistent inflation-adjusted conversion factor decreases for services provided to Medicare fee-for-service beneficiaries.

How does your research contribute to the field?
The degree to which volume increases (overall and by specialty as measured by relative value units) have offset conversion factor declines in Medicare reimbursement per fee-for-service beneficiary is unknown.

What are your research's implications toward theory, practice, or policy?
This study provides important information on how Medicare reimbursement per fee-for-service beneficiary has been redistributed across specialties given the budget neutrality requirement; future research should assess the impact of specialty-specific reimbursement changes on patients' access to care.

Introduction

The Centers for Medicare and Medicaid Services (CMS) is responsible for funding the medical care of the Medicare population, which has grown 60% from 2001 to 2021[1,2] and is, on average, living longer[3] and is increasingly burdened with chronic conditions that require more care.[4] To control aggregate Medicare spending, congress has instituted a series of reforms including the Medicare Economic Index (1972), Medicare Volume Performance Standards (1989), the Sustainable Growth Rate (1997), and the Medicare Access and CHIP Reauthorization Act or MACRA (2015). These reforms altered, made ineffectual, or replaced prior reforms.[5] The Omnibus Budget Reconciliation Act of 1989 created the Medicare Physician Fee Schedule (MPFS) and the budget neutrality requirement, which requires that increases in Medicare payments in one area be offset by decreases elsewhere.[6] While various Medicare reforms have succeeded in lowering MPFS payments, statutory freezes on Medicare physician payments in conjunction with budget neutrality have resulted in payment cuts, which will ultimately impact access to care for Medicare patients.[5,7]

Under the MPFS, CMS reimburses providers based on relative value units (RVUs), which define the relative value of a service, multiplied by a monetary conversion factor. When changes in the MPFS are sufficient (>$20 000 000) to trigger a budget neutrality adjustment, cuts are required elsewhere. Typically, cuts are achieved through a conversion factor reduction that decreases payments for all services. For example, the conversion factor declined significantly in 2009, 2011, and 2021 due to changes in patient cost sharing as required by the Affordable Care Act, and increased reimbursements for evaluation and management services.[8-11] Together, the dynamics of volume, distribution across services, the RVUs assigned to each service, and the conversion factor must be balanced to prevent a budget increase in this zero-sum game.

In unadjusted dollars, the conversion factor peaked at $38.2581 in 2001 and declined to $33.8872 in 2023, or 11.4% less (48.5% less when inflation-adjusted).[12] Numerous studies examining reimbursement trends for common services in a variety of specialties found substantial declines in reimbursement that were largely because payments did not keep up with inflation as measured by the Consumer Price Index.[13-30] For example, the range of service-specific, inflation-adjusted reimbursement declines was 19 to 43% over the 2000 to 2020 period.[13-16,30] While these studies have illuminated changes in reimbursement for specific services, they do not address how the volume and types of services delivered at the patient level have changed, and how such changes have influenced the distribution of payments across specialties.

This study aimed to examine how Medicare reimbursement per beneficiary has changed and how its distribution has changed across specialties and provider types given volume growth differences across these groups. While the explicit purpose of statutory freezes and budget neutrality is to control Medicare spending, the question we explored is how has utilization changed for services from various specialties and provider types? It is expected that continued erosion of Medicare reimbursement will eventually become an access issue for Medicare beneficiaries.[5,7] Accordingly, we modeled the independent contributions of inflation, conversion factor declines, and RVU changes on reimbursement per beneficiary to better understand these trends.

Methods

This study used the Medicare Physician/Supplier Procedure Summary (PSPS) Limited Data Set (2005-2021) to examine reimbursement trends across all provider types reimbursed for Medicare Part B services. PSPS data contain 100% of each year's Medicare fee-for-service claims, aggregated across the combination of procedure code (including modifiers), specialty, place of service, and locality. Utilization of this deidentified dataset does not constitute human subjects research and is thus exempt from institutional review board oversight.

To examine these trends, we used the allowed amount for all claims (both professional and technical components) categorized by specialty of the claim's rendering provider. Reimbursement was broadly categorized by provider types as physicians, limited-license physicians (LLPs), non-physician practitioners (NPPs), suppliers, and other providers. Suppliers include independent diagnostic testing facilities, ambulatory surgery centers, clinical laboratory, and so on, and other providers includes medical supply company, durable medical equipment regional carriers, and so on. The study further categorized reimbursement more narrowly for

[1]Harvey L. Neiman Health Policy Institute, Reston, VA, USA
[2]University of Minnesota, St. Paul, MN
[3]Hackensack Radiology Group, PA, River Edge, NJ, USA
[4]Triad Radiology Associates, Winston Salem, NC, USA
[5]Massachusetts General Hospital/Harvard Medical School, Boston, MA, USA

Received 24 January 2024; revised 19 March 2024; revised manuscript accepted 4 April 2024

Corresponding Author:
Eric W. Christensen, Harvey L. Neiman Health Policy Institute, 1892 Preston White Drive, Reston, VA 20191, USA.
Email: echristensen@neimanhpi.org

physicians across 39 specialties; LLPs as podiatrists, optometrists, chiropractors, and dentists; and NPPs in 10 groups (ie, nurse practitioners, physical therapists, physician assistants, certified registered nurse anesthetists, etc.).

We examined reimbursement trends based on mean reimbursement per Medicare fee-for-service beneficiary across all places of service using a methodology employed in a previous study.[31] As such, it does not represent the mean reimbursement for the average clinician in a specific specialty, but the mean reimbursement per beneficiary for care received from all clinicians in a specialty. Hence, if the care volume delivered by the average clinician in the specialty is unchanged, the mean reimbursement per beneficiary could increase because the number of the clinicians in the specialty increased or the clinicians in the specialty are providing more care to these patients. This approach enabled an examination of the total care received by the average beneficiary as well as trends in the distribution of services across provider types and specialties the average beneficiary received. Accordingly, the results were not sensitive to changes in the relative volume of Medicare to non-Medicare work, which would result from changes in the number of Medicare beneficiaries or number of providers. The yearly number of fee-for-service beneficiaries from CMS was used to convert total PSPS reimbursement values to a per beneficiary basis.[2] This was done in aggregate as well as by the broad provider type and also more narrowly by specialty.

At a high level, Medicare reimbursement is RVUs multiplied by the conversion factor. Accordingly, this study examined RVU trends for each year and specialty by dividing total reimbursement by the Medicare conversion factor[12] for that year to approximate the number of RVUs provided. For nurse practitioners, physician assistants, occupational therapists, physical therapists, and certified clinical nurse specialists, RVUs were estimated based on their reimbursement rate of 85% of the MPFS (and 75% for licensed clinical social workers).[32] Mathematically, this is the same as multiplying the conversion factor for these clinicians by 85 or 75%. (Note that anesthesia services have a separate conversion factor, which we used for approximate RVUs for these clinicians). As with reimbursement, RVU trends were examined per beneficiary to assess trends in both the volume of services and distribution of services the average beneficiary received.

We examined reimbursement and RVU trends over the 2005 to 2021 period as the percent change from 2005 to estimate the relative impact of various economic factors by broad provider type and by specialty. The actual change *in nominal dollars* reflects non-inflation-adjusted reimbursement. The change in *real dollars* reflected the inflation-adjusted reimbursement (in 2021 dollars adjusted using the Consumer Price Index to reflect real purchasing power over time). To determine the impact of conversion factor changes over time, this study simulated constant reimbursement per unit of effort, demonstrating how per beneficiary reimbursement would have trended if the conversion factor had remained at 2005 levels for the entire 2005 to 2021 period. Finally, the effect of changes in volume per beneficiary were assessed by evaluating how per beneficiary reimbursement would have trended if RVU volume per beneficiary had remained at 2005 levels through 2021.

In charting the percentage change over time, trends for each year are represented relative to 2005. Consequently, values for 2005 are 0% by construction. These trends demonstrate how each factor contributed positively or negatively to reimbursement on a yearly basis as a percentage of inflation-adjusted 2005 reimbursement. Statistical testing was not necessary because the PSPS database is not a sample but includes 100% of claims.

Results

Total MPFS reimbursement was $108.1 billion in 2005 and $149.5 billion in 2021: a 38.3% nominal increase. When inflation-adjusted, this equates to a 0.3% real decline. However, the inflation-adjusted 2005 to 2021 change varied widely by provider type. It increased 178.0% for NPPs, 31.0% for suppliers, and 5.5% for LLPs while it decreased 11.4% for physicians and 29.1% for other providers.

Per beneficiary, nominal MPFS reimbursement was $3180 in 2005 and increased 52.4% to $4848 in 2021. When inflation adjusted, it equated to a 9.9% real increase (Table 1). Over this period, RVUs per beneficiary increased 64.8% (Table 2). By provider type, inflation-adjusted reimbursement per beneficiary increased 206.5% for NPPs, 44.4% for suppliers, and 16.3% for LLPs and decreased 2.3% for physicians and 21.9% for other providers (Table 1). Note that an increase in reimbursement per beneficiary may reflect either a higher average volume delivered by the clinicians in a specialty or an increase in the number of clinicians in that specialty.

For physicians, unadjusted reimbursement per beneficiary increased 35.6% over the 2005 to 2021 period but declined 2.3% when adjusted for inflation, while the conversion factor declined 7.9% nominally from $37.8975 to $34.8931, and when adjusted for inflation, it declined 33.6%. If the conversion factor had remained static at the 2005 level, unadjusted reimbursement per beneficiary for physicians would have increased 46.6% over the 2005 to 2021 period (Figure 1). Over the 2005 to 2021 period, physician RVUs per beneficiary increased 45.5% from 2005 to 2021 (Table 2). Without this volume increase, nominal reimbursement per beneficiary would have declined 7.3% between 2005 and 2021 (Figure 1). Hence, physicians' volumed-based increases in RVUs per beneficiary partially offset the reimbursement declines associated with both conversion factor and inflation.

As the impact of the conversion factor and inflation have the same impact on all specialties, it is the change in RVUs per beneficiary that distinguishes differences across specialties. Across physician specialties, pain management had

Table 1. Medicare Physician Fee Schedule Reimbursement per Medicare Fee-for-Service Beneficiary (in 2021 Dollars) by Broad Provider Type, 2005 to 2021 (Select Years).

	2005	2010	2015	2021	Change, 2005 to 2021	Percent change, 2005 to 2021
Physicians	3144 (71.3%)	3115 (68.7%)	2972 (68.2%)	3073 (63.4%)	−71	−2.3%
LLP	131 (3.0%)	140 (3.1%)	139 (3.2%)	152 (3.1%)	21	16.3%
NPP	178 (4.0%)	226 (5.0%)	310 (7.1%)	545 (11.2%)	367	206.5%
Supplier	495 (11.2%)	590 (13.0%)	583 (13.4%)	715 (14.8%)	220	44.4%
Other	464 (10.5%)	462 (10.2%)	355 (8.1%)	363 (7.5%)	−101	−21.9%
Total	4412	4534	4359	4848	436	9.9%

Note. LLPs include podiatrists, optometrists, chiropractors, and dentists. NPPs include nurse practitioners, physical therapists, physician assistants, certified nurse anesthetists, psychologists, licensed clinical social workers, occupational therapists, and so on. Suppliers include independent diagnostic testing facilities, ambulatory surgery centers, clinical laboratory, and so on. Other includes medical supply company, durable medical equipment regional carriers, and so on.
LLP = limited-license physician; NPP = non-physician practitioner.

Table 2. Medicare Physician Fee Schedule RVUs per Medicare Fee-for-Service Beneficiary by Broad Provider Type, 2005 to 2021 (Select Years).

	2005	2010	2015	2021	Change, 2005 to 2021	Percent change, 2005 to 2021
Physicians	61.3 (89.9%)	69.4 (88.4%)	73.2 (85.5%)	89.2 (79.4%)	27.9	45.5%
LLP	2.5 (3.7%)	3.1 (3.9%)	3.4 (4.0%)	4.4 (3.9%)	1.9	75.2%
NPP	4.4 (6.4%)	6.0 (7.7%)	9.1 (10.6%)	18.8 (16.7%)	14.4	328.2%
Total	68.2	78.5	85.7	112.3	44.2	64.8%

Note. LLPs include podiatrists, optometrists, chiropractors, and dentists. NPPs include nurse practitioners, physical therapists, physician assistants, certified nurse anesthetists, psychologists, licensed clinical social workers, occupational therapists, and so on.
RVU = relative value unit; LLP = limited-license physician; NPP = non-physician practitioner.

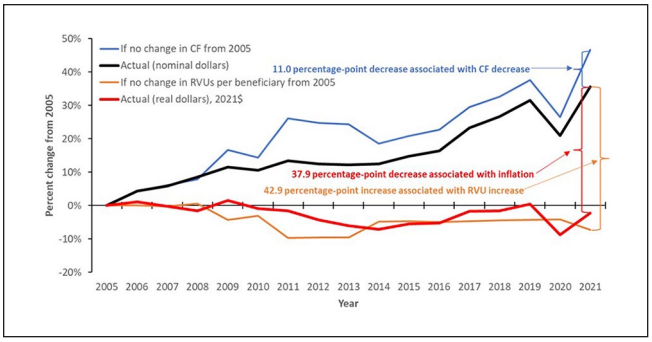

Figure 1. Percentage change in total Medicare physician fee schedule reimbursement per Medicare fee-for-service beneficiary for physicians, 2005 to 2021.
Note. CF = conversion factor; RVU = relative value unit.

the largest increase in RVUs per beneficiary, 335.7% (2005-2021). This resulted in a 189.1% inflation-adjusted increase in reimbursement per beneficiary. Conversely, cardiac surgery had the largest decrease, 36.1%, in RVUs per beneficiary with an inflation-adjusted reimbursement decrease at 57.6% (Figure 2). Hence, for pain management, RVUs increase have more than offset reimbursement declines associated with both the conversation factor and inflation while RVU decreases for cardiac surgery added to these reimbursement declines. Family practice and radiation oncology had inflated-adjusted reimbursement per beneficiary changes between 2005 and 2021 near 0%: 0.9% increase for family practice and 0.7% decrease for radiation oncology. These specialties had RVU increases per beneficiary of 52.0 and 49.7%, respectively. Overall, RVUs per beneficiary needed to increase 50.7% (2005-2021) for a specialty to maintain the same inflation-adjusted reimbursement per beneficiary given the conversion factor and inflationary declines.

As a group, LLPs had increased RVUs per beneficiary of 75.2% between 2005 and 2021 (Table 2), which resulted in an inflation-adjusted reimbursement increase of 16.3% per beneficiary. Among LLPs, dentist, optometrists, and podiatrists had increased inflation-adjusted reimbursement per beneficiary of 113.1, 43.9, and 23.1%, respectively, but it declined for chiropractic care (Figure 3). Across provider types, NPPs had the largest increase in inflation-adjusted reimbursement per beneficiary: 206.5%. This was due to a 328.2% increase in RVUs per beneficiary (Table 2). As previously noted, this is per beneficiary not per clinician; therefore, it reflects changes in the number of clinicians. This overall increase for NPPs was driven by increases in RVUs per beneficiary of 1106% (nurse practitioners) and 677% (physician assistants). Nurse practitioners and physician

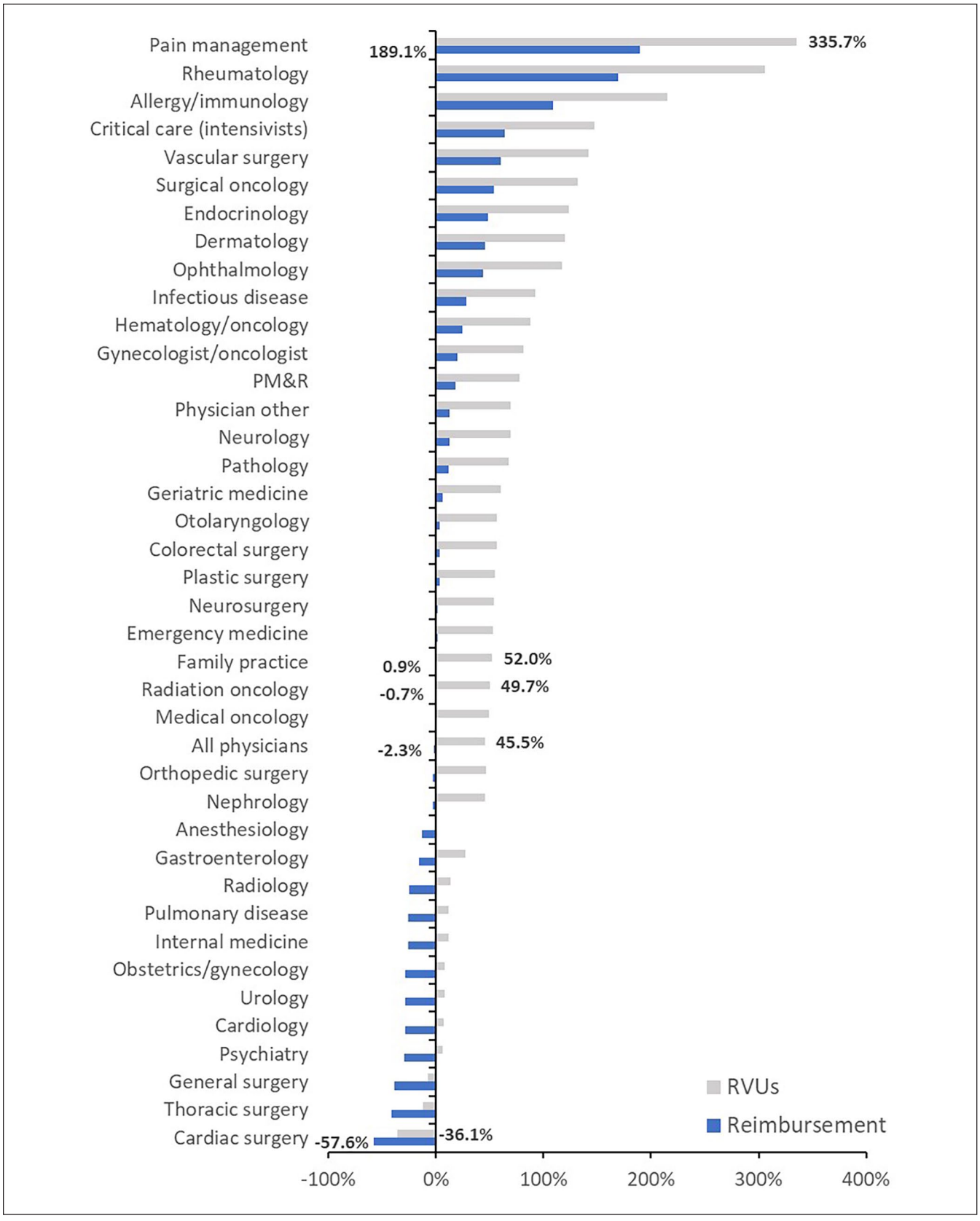

Figure 2. Percentage change in inflation-adjusted Medicare physician fee schedule reimbursement per Medicare fee-for-service beneficiary by physician specialty, 2005 to 2021.
Note. PM&R = physical medicine & rehabilitation; RVU = relative value unit.

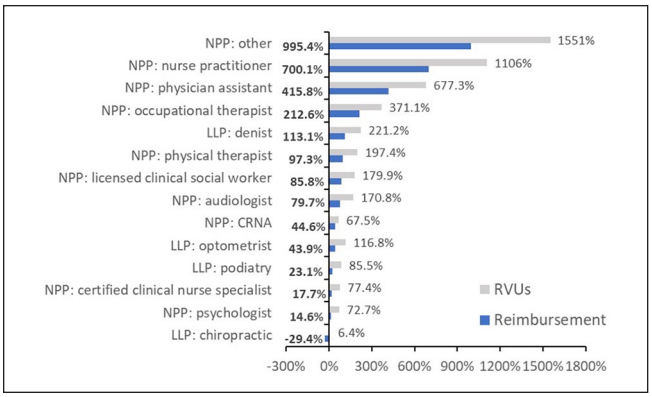

Figure 3. Percentage change in inflation-adjusted Medicare physician fee schedule reimbursement per Medicare fee-for-service beneficiary by LLP and NPP specialties, 2005 to 2021. LLPs include podiatrists, optometrists, chiropractors, and dentists. NPPs include nurse practitioners, physical therapists, physician assistants, certified nurse anesthetists, psychologists, licensed clinical social workers, occupational therapists, and other (ie, certified nurse midwife, registered dietician/nutrition professional, speech language pathologists).
Note. LLP = limited-license physician; NPP non-physician practitioner; RVU = relative value unit.

assistants realized a 700% and 416% inflation-adjusted increase in reimbursement per beneficiary, respectively, over the study.

For primary care physicians, inflation-adjusted reimbursement per beneficiary increased 0.9% for family practice and decreased 25.9% for internal medicine over the study. While most, but not all, nurse practitioners and physician assistants are primary care providers, we cannot distinguish in the Medicare data the specialty area of these clinicians. Similarly, inflation-adjusted reimbursement per beneficiary for anesthesia services increased 2.1% between 2005 and 2021. This was driven by a 44.6% reimbursement per beneficiary increase for certified registered nurse anesthetists given the 13.4% decrease for anesthesiologists.

Discussion

We found that aggregate, inflation-adjusted MPFS reimbursement was essentially flat between 2005 and 2021, declining 0.3% from 2005 to 2021. On a per beneficiary basis, inflation-adjusted reimbursement increased 9.9% over this period. This increase was driven not by increased reimbursement per service, but by a 64.8% increase in volume (RVUs) per beneficiary.

Conversely, reimbursement per service declined substantially. Over the study, the unadjusted conversion factor declined 7.9%, but when adjusted for inflation, it declined 33.6%. Consistently, numerous studies have estimated the average decline in reimbursement for specific, common services. For example, for an array of services across various specialties, service-specific inflation-adjusted reimbursement declined 19 to 43% over a 20-year period, 2000 to 2020;[13-16] 14 to 39% over a 19-year period, 2000 to 2019;[17-19,21] and 5 to 44% over 9- to 18-year periods.[20,22-29] Hence, service-specific reimbursement has been widely explored, but beneficiary-level reimbursement has not.

MPFS reimbursement changes are driven by a combination of changes in 3 factors: service volume, RVUs per service, and the conversion factor. Budget neutrality requires that if one of these factors increases, another factor must decrease to compensate. Accordingly, the 64.8% increase in RVUs per beneficiary over this study period necessitated a conversion factor decline. For instance, in 2009 and 2021, CMS increased the RVUs for evaluation and management services, which are common and unequally distributed across specialties. These increases resulted in a 3.3 and 5.3% conversion factor reductions that applies equally to all specialties.[8,9,33] Similarly, the conversion factor was reduced 7.9% in 2011 due to Affordable Care Act provisions that eliminated deductibles and co-insurance for most preventive services, among other changes.[10,11] This reduction in beneficiary out-of-pocket costs shifted payment of these costs to the funds subject to budget neutrality; hence, the conversion factor was reduced to compensate.[10,11]

Total reimbursement for a specialty may be maintained when reductions in per service reimbursement are offset by concomitant productivity gains. Prior research has not separately explored these factors for their individual contribution to reimbursement, perhaps because in aggregate these factors are affected by differential changes in both the number of providers and the number of beneficiaries. Accordingly, this study employed a beneficiary-centric approach to determine whether a specialty's past reimbursement level per beneficiary has been maintained via increased volumes per beneficiary.

Given the decrease in the conversion factor (2005-2021), we found that a 50.7% increase in RVUs was necessary to maintain inflation-adjusted reimbursement per beneficiary. Among the 39 physician specialties, there was wide variation in the change in RVUs and resulting reimbursement per beneficiary. While all but three physician specialties (ie, cardiac surgery, thoracic surgery, and general surgery) performed more RVUs per beneficiary, 16 specialties experienced a decline in reimbursement. Generally, procedural specialties were more likely to experience a decrease in reimbursement per beneficiary with cardiac surgery, thoracic surgery, and general surgery having the largest declines: 57.6, 41.5, and 38.8%, respectively. In contrast, cognitive specialties generally experienced increased reimbursement per beneficiary, with pain management, rheumatology, and allergy/immunology having the largest increases: 189.1, 169.2, and 109.1%, respectively.

Across provider types, NPPs had the largest overall growth in volume per beneficiary. All types of NPP experienced RVU growth. We found that aggregate reimbursement per beneficiary for NPPs was 3 times (206.5% increase) in

2021 what it was in 2005. Given the substantial growth in the number of nurse practitioners and physician assistants in recent years,[34,35] this growth is the likely driver of the overall growth in reimbursement per beneficiary for primary care services. Likewise, the overall 2.1% revenue growth for anesthesia services was driven by certified registered nurse anesthetists, which offset a decline among anesthesiologists. Future research should determine if practices are employing more NPPs as a strategy to increase capacity/volume to maintain aggregate reimbursement. Given the growth in the number of NPPs, that they account for an increasing share of workload is not surprising. Some studies have found that NPPs have been associated with ordering more imaging and prescribing more opioids than physicians, which increases RVUs and associated health care costs beyond what NPPs directly provide.[36-39] Such volume increases further drive down the conversion factor to maintain budget neutrality.

While statutory freezes in physician payments and budget neutrality achieves its statutory requirement to contain Medicare expenditures, it is not without consequences. It is estimated that the Medicare-to-commercial payment ratio is 0.56 to 0.85.[40,41] To the degree that Medicare reimbursement continues to decline relative to commercial reimbursement, such relative declines incentivize providers to increasingly favor commercial patients over Medicare patients. For example, access to new medical technology has been shown to be first available in locations with advantageous payor mixes,[42,43] which has resulted in race-based technology access disparities.[44] The Boards of Trustees of the Medicare Hospital Insurance and Supplement Medical Insurance Trust Funds have noted the substantial uncertainty in the adequacy of Medicare payments given current law.[7] Specifically, their long-range projections are a Medicare-to-commercial ratio of 0.35. As such, they anticipate significant future access issues.[7]

This study had limitations. First, reimbursement per Medicare fee-for-service beneficiary was estimated by dividing aggregate reimbursement by the number of Medicare beneficiaries. Changes in beneficiary characteristics over time due to factors such as increased enrollment in Medicare Advantage were not assessed in this analysis, although a 2021 study found Medicare fee-for-service beneficiaries do not differ significant from Medicare Advantage beneficiaries.[45] Additionally, RVUs and reimbursement per beneficiary do not directly relate to the experience of individual clinicians in a given specialty, as the proportion of services provided to Medicare fee-for-service beneficiaries compared to their entire patient base is not static. Such an individual clinician-focused analysis was out of scope. Second, the PSPS data do not explicitly include RVUs. For each year, RVUs have been proxied as reimbursement divided by the conversion factor. Third, to the degree that increasing hospital employment of clinicians over time has resulted in a shift in reimbursement of the technical component away from clinicians to hospitals, we have not accounted for this shift in our analysis.

Conclusion

In conclusion, the statutory requirement for budget neutrality requires that the factors used to calculate reimbursement for Medicare fee-for-service beneficiaries must be balanced against one another. Between 2005 and 2021, there has been a redistribution of reimbursement across provider types with reimbursement declining 2.3% for physicians while it increased over 3 times for NPPs. Policymakers should consider the degree to which cumulative reimbursement declines may impact access to care, particularly for procedural specialties. Policies that favor one group of clinicians have to come from other clinicians due to budget neutrality's zero-sum nature, particularly in an environment with statutorily frozen Medicare physician payments or with payment increases below inflation. Further, it is not realistic to assume that access to care for Medicare beneficiaries will be unaffected if Medicare reimbursement continues to not keep pace with inflation and relative to commercial reimbursement.

Acknowledgments

None

Data Availability Statement

The aggregated PSPS data that support the findings of this study are available from the corresponding author upon reasonable request.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Research Ethics and Patient Consent

NA. Study data (PSPS) are aggregated data without PHI.

Informed Consent/Patient Consent

NA. Study data (PSPS) are aggregated data without PHI.

Trial Registration Number/Date

NA

Grant Number

NA

Reporting Guidelines

This study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline.

ORCID iD

Eric W. Christensen https://orcid.org/0000-0003-1377-0787

References

1. Department of Health & Human Services. *2005 CMS Statistics*. 2005. Accessed June 7, 2023. https://www.cms.gov/research-statistics-data-and-systems/statistics-trends-and-reports/medicaremedicaidstatsupp/downloads/2005_cms_statisticspdf
2. Centers for Medicare & Medicaid Services. CMS Program Statistics. Accessed June 7, 2023. https://data.cms.gov/collection/cms-program-statistics
3. Medina L, Sabo S, Vespa J. *Living Longer: Historical and Projected Life Expectancy in the United States, 1960 to 2060*. 2020. Accessed June 7, 2023. https://www.census.gov/content/dam/Census/library/publications/2020/demo/p25-1145.pdf
4. Ansah JP, Chiu C. Projecting the chronic disease burden among the adult population in the United States using a multi-state population model. *Front Public Heal*. 2023;10:1082183.
5. American Medical Association. The Medicare Economic Index. Published 2023. Accessed December 13, 2023. https://www.ama-assn.org/system/files/medicare-basics-medicare-economic-index.pdf
6. Congressional Budget Office. *Physician Payment Reform Under Medicare*. 1990. Accessed June 7, 2023. https://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/79xx/doc7952/90-cbo-049.pdf
7. The Boards of Trustees. *2023 Annual Report of The Boards of Trustees of the Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds*. 2023. Accessed June 7, 2023. https://www.cms.gov/oact/tr/2023
8. Goodson JD, Shahbazi S, Song Z. Medicare's 2021 Physician Fee Schedule: A Redistribution That Requires Further Refinement. *Health Affairs Forefront*. doi:10.7326/M20-2684. Accessed June 28, 2023. https://www.healthaffairs.org/content/forefront/medicare-s-2021-physician-fee-schedule-redistribution-requires-further-refinement
9. Medical Group Management Association. Restoring balance: 2021 E/M changes and the elephant in the room for medical practices. Published 2021. Accessed June 27, 2023. https://www.mgma.com/resources/financial-management/restoring-balance-2021-e-m-changes-and-the-elephan
10. Centers for Medicare and Medicaid Services. Final 2011 Policy, Pay Changes in Medicare Physician Fee Schedule. Published 2010. Accessed June 28, 2023. https://www.cms.gov/newsroom/fact-sheets/final-2011-policy-pay-changes-medicare-physician-fee-schedule
11. Centers for Medicare and Medicaid Services. CMS Manual System, Transmittal 833. Published 2011. Accessed June 28, 2023. https://www.cms.gov/Regulations-and-Guidance/Guidance/Transmittals/downloads/R833OTN.pdf
12. American Medical Association. History of Medicare Conversion Factors. Published 2023. Accessed June 7, 2023. https://www.ama-assn.org/system/files/2021-01/cf-history.pdf
13. Quereshy HA, Quinton BA, Cabrera CI, Li S, Tamaki A, Fowler N. Medicare reimbursement trends from 2000 to 2020 in head and neck surgical oncology. *Head Neck*. 2022;44(7):1616–1622. doi:10.1002/hed.27064
14. Schartz DA, McCool RR. Trends in Medicare reimbursement for otology procedures from 2000 to 2020. *Otol Neurotol*. 2021;42(4):505–509. doi:10.1097/MAO.0000000000003010
15. Haglin JM, Lott A, Kugelman DN, Konda SR, Egol KA. Declining Medicare reimbursement in orthopaedic trauma surgery: 2000-2020. *J Orthop Trauma*. 2021;35(2):79–85. doi:10.1097/BOT.0000000000001947
16. Pollock JR, Richman EH, Estipona BI, et al. Inflation-adjusted Medicare reimbursement has decreased for orthopaedic sports medicine procedures: Analysis from 2000 to 2020. *Orthop J Sport Med*. 2022;10(2):1–11. doi:10.1177/23259671211073722
17. Gupta N, Haglin JM, Marostica CW, Thornburg DA, Casey WJ. Trends in Medicare reimbursement for reconstructive plastic surgery procedures: 2000 to 2019. *Plast Reconstr Surg*. 2020;146(1):1541–1551. doi:10.1097/PRS.0000000000006914
18. Singh R, Moore ML, Hallak H, et al. Recent trends in Medicare utilization and reimbursement for lumbar fusion procedures: 2000–2019. *World Neurosurg*. 2022;165:e191–e196. doi:10.1016/j.wneu.2022.05.131
19. Dominguez JL, Ederaine SA, Haglin JM, Aragon Sierra AM, Barrs DM, Lott DG. Medicare reimbursement trends for facility performed otolaryngology procedures: 2000–2019. *Laryngoscope*. 2021;131(3):496–501. doi:10.1002/lary.28749
20. Mazmudar RS, Sheth A, Tripathi R, Bordeaux JS, Scott JF. Inflation-adjusted trends in Medicare reimbursement for common dermatologic procedures, 2007-2021. *JAMA Dermatol*. 2021;157(11):1355–1358. doi:10.1001/jamadermatol.2021.3453
21. Haglin JM, Arthur JR, Deckey DG, Makovicka JL, Pollock JR, Spangehl MJ. Temporal analysis of Medicare physician reimbursement and procedural volume for all hip and knee arthroplasty procedures billed to medicare part B from 2000 to 2019. *J Arthroplasty*. 2021;36(7):S121–S127. doi:10.1016/j.arth.2021.02.006
22. Haglin JM, Eltorai AEM, Richter KR, Jogerst K, Daniels AH. Medicare reimbursement for general surgery procedures: 2000 to 2018. *Ann Surg*. 2020;271(1):17–22. doi:10.1097/SLA.0000000000003289
23. Zahiri K, Khurana A, Scrimgeour L, Eltorai AEM. Trends in medicare reimbursement for adult cardiothoracic surgery procedures: 2007 to 2020. *J Card Surg*. 2023;2023:1–7. doi:10.1155/2023/2790790
24. Malik AT, Khan SN, Goyal KS. Declining trend in Medicare physician reimbursements for hand surgery from 2002 to 2018. *J Hand Surg Am*. 2020;45(11):1003–1011. doi:10.1016/j.jhsa.2020.08.010
25. Haglin JM, Richter KR, Patel NP. Trends in Medicare reimbursement for neurosurgical procedures: 2000 to 2018. *J Neurosurg*. 2020;132(2):649–655. doi:10.3171/2018.8.JNS181949
26. Schartz D, Young E. Medicare reimbursement trends for interventional radiology procedures: 2012 to 2020. *J Vasc Interv Radiol*. 2021;32(3):447–452. doi:10.1016/j.jvir.2020.12.007
27. Schartz E, Manganaro M, Schartz D. Declining Medicare reimbursement for diagnostic radiology: a 10-year analysis across 50 imaging studies. *Curr Probl Diagn Radiol*. 2022;51(5):693–698. doi:10.1067/j.cpradiol.2022.01.007
28. Khunte M, Dang N, Zhong A, Kumar S, Kamp K, Shah SA. Changes in Medicare reimbursement for common gastroenterology services over 15 years: 2007-2022. *Am J Gastroenterol*. 2022;117(12):2079–2082. doi:10.14309/ajg.0000000000002010

29. Patel S, Glasser D, Repka MX, Berkowitz S, Sternberg P. Changes in Medicare reimbursement for commonly performed ophthalmic procedures. *Ophthalmology*. 2021;128(10):1485–1487. doi:10.1016/j.ophtha.2021.02.026
30. Smith JF, Moore ML, Pollock JR, et al. National and geographic trends in Medicare reimbursement rates for orthopedic shoulder and upper extremity surgery from 2000 to 2020. *J Shoulder Elb Surg*. 2022;31(4):860–867. doi:10.1016/j.jse.2021.09.001
31. Christensen EW, Nicola GN, Rula EY, Nicola LP, Hemingway J, Hirsch JA. Budget neutrality and medicare physician fee schedule reimbursement trends for radiologists, 2005-2021. *J Am Coll Radiol*. 2023;20(10):947–953.
32. Centers for Medicare & Medicaid Services. *How to Use the MPFS Look-Up Tool*. 2021. Accessed June 28, 2023. https://www.cms.gov/files/document/physician-fee-schedule-guide.pdf
33. Bohney P, Hesselink D, Hanscom C. Navigating change: implications of CMS's 2021 Physician Fee Schedule. 2021. Accessed June 28, 2023 https://www.hfma.org/cost-effectiveness-of-health/financial-sustainability/navigating-change-implications-of-cms-s-2021-physician-fee-sch/
34. Auerbach BDI, Buerhaus PI, Staiger DO. Implications of the rapid growth of the nurse practitioner workforce in the US. *Health Aff*. 2020;39(2):273–279. doi:10.1377/hlthaff.2019.00686
35. National Commission on Certification of PAs. *Statistical Profile of Certified PAs*. 2021. https://www.nccpa.net/wp-content/uploads/2022/04/Statistical-Profile-of-Certified-PAs-2020.pdf
36. Hughes DR, Jiang M, Duszak R. A comparison of diagnostic imaging ordering patterns between advanced practice clinicians and primary care physicians following office-based evaluation and management visits. *JAMA Intern Med*. 2015;175(1):101–107. doi:10.1001/jamainternmed.2014.6349
37. Christensen EW, Liu CM, Duszak R, Hirsch JA, Swan TL, Rula EY. Association of state share of nonphysician practitioners with diagnostic imaging ordering among emergency department visits for Medicare beneficiaries. *JAMA Netw Open*. 2022;5(11):E2241297. doi:10.1001/jamanetworkopen.2022.41297
38. Christensen EW, Rosenkrantz AB, Rula EY. Association of nonphysician practitioners and contrast media utilization: an exploratory study of national medicare claims for CT examinations from 2011 to 2020. *J Am Coll Radiol*. 2023;20(2):146–150. doi:10.1016/j.jacr.2022.10.006
39. Ellenbogen MI, Segal JB. Differences in opioid prescribing among generalist physicians, nurse practitioners, and physician assistants. *Pain Med (United States)*. 2020;21(1):76–83. doi:10.1093/pm/pnz005
40. Congressional Budget Office. The prices that commercial health insurers and medicare pay for hospitals' and physicians' services at a glance. Published online 2022. Accessed June 28, 2023. https://www.cbo.gov/system/files/2022-01/57422-medical-prices.pdf
41. Lopez E, Neuman T. How much more than Medicare do private insurers pay? A review of the literature. Published online 2020. https://www.kff.org/medicare/issue-brief/how-much-more-than-medicare-do-private-insurers-pay-a-review-of-the-literature/
42. Lee CI, Zhu W, Onega T, et al. Comparative access to and use of digital breast tomosynthesis screening by women's race/ethnicity and socioeconomic status. *JAMA Netw Open*. 2021;4(2):2–13.
43. Boscoe FP, Zhang X. Visualizing the diffusion of digital mammography in New York state. *Cancer Epidemiol Biomarkers Prev*. 2017;26(4):490–494.
44. Christensen EW, Waid M, Scott J, Patel BK, Bello JA, Rula EY. Relationship between race and access to newer mammographic technology in women with Medicare insurance. *Radiology*. 2022;306(2):e221153.
45. Jacobson G, Cicchiello A, Sutton JP, Shah A. Medicare Advantage vs. traditional Medicare: How do beneficiaries' characteristics and experiences differ? The commonwealth fund, 2021. Accessed February 28, 2024. https://www.commonwealthfund.org/publications/issue-briefs/2021/oct/medicare-advantage-vs-traditional-medicare-beneficiaries-differ