Research Report

Using Claims-Based Estimates of Post-Operative Visits to Revalue Procedures with 10- and 90-Day Global Periods

Updated Results Using Calendar Year 2019 Data

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Preface

Medicare payment for many surgical procedures covers not only the procedure itself but also post-operative care provided by the same practitioner over a fixed period of time (the "global period"). When the Centers for Medicare & Medicaid Services (CMS) sets the payment rate for a given procedure, it assumes that a certain number of post-operative visits will typically occur during the global period. In other research (Kranz et al., 2021; Crespin et al., forthcoming-a; Crespin et al., forthcoming-b), RAND Corporation researchers found that the number of visits actually performed was lower than the number that CMS assumes to occur when setting payment rates. In a prior report (Mulcahy, Liu, et al., 2021), we described how new claims-based data on the number of post-operative visits could be used to adjust the valuation of procedures with 10- and 90-day global periods. In this report, we update our analysis using 2019 claims-based data. These results may inform further policy development around revaluation for global procedures.

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Background

Medicare payment for many surgical procedures covers not only the procedure itself but also most post-operative care provided over a fixed period of time (the "global period").[1] When the Centers for Medicare & Medicaid Services (CMS) sets payment rates, it assumes that a certain number and type of post-operative visits specific to each procedure typically occur. In other RAND Corporation research (Kranz et al., 2021; Crespin et al., forthcoming-a; Crespin et al., forthcoming-b), we found that the number of visits actually performed was lower than CMS's assumptions when setting payment rates.

This report describes how new claims-based data on the number of post-operative visits could be used to adjust valuation for procedures with 10- and 90-day global periods. The idiosyncrasies of the resource-based relative value scale (RBRVS) system used to determine payment for Medicare services result in some ambiguity about how procedures should be revalued to reflect reductions in post-operative visits. We intend for the results presented in the report to be a starting point for further policy development for revaluation.

Current Approach to Collect Information on Post-Operative Visits

Currently, the number of post-operative visits that CMS assumes typically occur during global periods is informed by practitioner surveys administered by the American Medical Association/Specialty Society Relative Value Scale Update Committee (the RUC) and its individual specialty society members. The primary purpose of the surveys is to collect information on the practitioner *work* and *time* associated with individual procedures and other health care services (based on Healthcare Common Procedure Coding System [HCPCS] codes), including an estimate of the total work involved in furnishing the service and related post-operative care.[2] When a procedure has a 10- or 90-day global period, the surveys also ask practitioners to report the number and type of post-operative visits that typically occur during the

[1] Medicare's global service policy bundles (1) related services provided by the practitioner furnishing an initial procedure and (2) related services provided by other practitioners in the same practice and specialty as the practitioner furnishing the initial procedure into the payment for the procedure itself. Practitioners meeting these criteria can bill for unrelated services that are provided to the same patient during the global period by using a payment modifier to indicate that the services are unrelated. Practitioners that are not meeting these criteria can bill normally during a global period. Post-operative visits and most other follow-up care are included. There are some exceptions; for example, follow-up care resulting in a return to the operating room begins a new global period and is paid separately.

[2] In the RBRVS system, work is the product of physician time and intensity, which measures the effort, skill, and stress involved in providing a service, per unit of time. The RUC and specialty societies separately collect information on practitioner work (which is based in part on time) and practitioner time alone.

global period. Respondents use evaluation and management (E&M) visit codes, including codes for office/outpatient and inpatient visits of different levels, discharge visits, and critical care visits, to describe the number and level of these post-operative visits. CMS, when determining the valuation for the procedure, may adjust the counts of visits recommended by the specialty societies. The number of post-operative visits assumed to typically occur during the global period is published by E&M HCPCS code in the Physician Time File (hereafter, the Time File), which is posted annually with the Medicare Physician Fee Schedule. The Time File also includes an estimate of the physician time spent on post-operative visits.[3]

Summary of Prior RAND Studies and Implications for Revaluation

The Medicare Access and CHIP Reauthorization Act of 2015 required CMS to collect information on the *number* and *level* of post-operative visits actually provided and to potentially revalue misvalued procedures using these newly collected data and other information. In response, CMS collected information on the *number* of post-operative visits by requiring select practitioners[4] to report post-operative visits following certain high-volume or high-cost procedures[5] using the no-pay HCPCS code 99024. CMS also collected information on the *level* of visits for three chosen procedures using a provider survey focusing on the time, activities, staff, and work associated with post-operative visits following the three procedures (cataract surgery, hip arthroplasty, and complex wound repair).

RAND researchers analyzed data collected through both of these channels. In the most recent report, RAND researchers' analysis of the *number* of visits reported using HCPCS code 99024 found that only 4 percent of procedures with 10-day global periods had any post-operative visits reported (Crespin et al., forthcoming-b).[6] Although 70 percent of procedures with 90-day global periods had at least one associated post-operative visit, only 38 percent of the total number of expected post-operative visits for these procedures were reported.

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[3] The Time File includes estimates of (1) physician time for the entire global service, including post-operative visits, and (2) physician time for all components of the global service *except* post-operative visits. The difference between these times is the time associated with post-operative visits and is also mathematically the sum of physician time for each E&M HCPCS code assumed to occur during the global period.

[4] Reporting of post-operative visits was required for practitioners in groups with ten or more practitioners in nine randomly selected states (Florida, Kentucky, Louisiana, Nevada, New Jersey, North Dakota, Ohio, Oregon, and Rhode Island). Reporting was required on procedure codes that had a 10- or 90-day global period, were performed by more than 100 practitioners, and either (1) were performed more than 10,000 times or (2) had allowed charges greater than $10 million.

[5] The original 296 selected HCPCS codes accounted for 96.5 percent of all of the procedures furnished with 10-day global periods and 85.3 percent of all procedures with 90-day global periods in 2017. The reporting requirement applied to 291 HCPCS codes in 2019. The net reduction of five codes reflects some discontinued and replaced codes between 2017 and 2019. See CMS, 2020, for a detailed list of code changes from 2017 to 2019.

[6] Nearly all procedures with 10-day global periods have a single visit on the Time File.

These findings imply that procedures with 10- and 90-day global periods are overvalued; that is, they are valued as having too many relative value units (RVUs). Overvaluation of procedures with 10- and 90-day global periods leads to overpayment for these procedures. Because changes to Medicare valuations must be budget neutral, overpayment for services with 10- and 90-day global periods reduces payment for other services paid under Medicare's Physician Fee Schedule.[7] Over- and underpayment for services can distort provider incentives to provide services and affect beneficiary cost-sharing.

Our analysis of information on the *level* of post-operative visits also has implications for revaluation. As noted earlier, our survey effort collected information on the level of post-operative visits following three types of procedures (cataract surgery, hip arthroplasty, and complex wound repair). When post-operative visits were provided following these procedures, we found that the level of work differed between post-operative visits and the E&M codes used by Medicare as approximations for post-operative visits during the valuation process: slightly less in the case of cataract surgery and hip arthroplasty and slightly more for complex wound repair (Gidengil et al., 2019).

The goal of this report is to describe an approach in which these newly collected data—particularly the claims-based data on the number of post-operative visits—could be used to revalue global surgery procedures and determine the impact of this approach.

Valuation Background and Revaluation Approach

Each procedure's overall valuation is in terms of RVUs, with separate work, practice expense (PE), and malpractice RVU components. There are several links between the number of post-operative visits and Physician Fee Schedule valuation. In the current valuation system, the link between these visits and work RVUs is indirect; reducing the number of bundled post-operative visits does not automatically result in a reduction in work RVUs because physician work RVUs are estimated using magnitude estimation, where an entire surgical global package is valued holistically in comparison with similar services, rather than using a building-block approach, where the valuation of individual components sums to a total valuation. (We describe these approaches further next.) Although respondents to RUC surveys reported the number and level of bundled post-operative visits, it is not clear whether the respondents fully incorporate the post-operative visits in their estimates of total work. Furthermore, CMS's final decisions regarding valuation likely are based on multiple factors, including factors other than the number and level of post-operative visits. In contrast, there is a direct link between post-operative visits and direct PE inputs and physician time. Physician work, physician time, and direct PE inputs have

[7] Social Security Act, § 1848, 1965. Changes in valuations that result in a greater-than–$20 million change in Medicare spending must be offset by a change in the conversion factor, which affects all Physician Fee Schedule services.

important impacts in the allocation of indirect PE and malpractice RVUs. Changes in physician work, physician time, and direct PE inputs for an individual procedure will, in turn, affect the allocation of PE and malpractice RVUs to other Physician Fee Schedule services.

The ambiguity associated with changes to work RVUs stems from an intrinsic tension in the RBRVS related to the alignment between information on the discrete "building blocks" that contribute to physician work (such as the number of post-operative visits) and estimates of the total work for the global service. As noted earlier, the RUC/specialty society surveys collect—and CMS publishes—information about most, but not all, of the building blocks required to calculate total physician work, such as the time involved in different components of a procedure and the number of post-operative visits. Each of these building blocks contributes work RVUs to the total work for the procedure, and changes to an individual component that contributes to a global service can be applied through a "reverse building-block" method of adding or subtracting a specific number of RVUs.

However, total work is estimated via surveys using magnitude estimation, in which respondents select an already-valued service that is most similar to the service being valued and then compare them in terms of total work, including post-operative visits that are assumed to be delivered in global periods. It is conceptually possible that a procedure's consensus total work estimate from magnitude estimation would not change even if the number of assumed post-operative visits decreases. Even in such a case, however, the direct PEs and physician time associated with that code would be clearly incorrect, which would have implications for PE RVUs.

To provide estimates to frame the discussion of improving payment for global services, we revalued procedures using the reverse building-block approach by adjusting work RVUs, physician time, and direct PE inputs based on the difference between the number of post-operative visits observed via claims-based reporting and the expected number of post-operative visits used during valuation. These changes led to a different allocation of indirect PE RVUs and malpractice RVUs to codes with and without global periods. As a last step, we applied an updated conversion factor, which is a dollar-per-RVU amount used by Medicare to convert valuations into dollar terms, to determine Medicare payments for different specialties.

Data and Methods

We combined Medicare claims data and the Time File posted with the 2019 Medicare Physician Fee Schedule to calculate the share of post-operative visits that were reported for each procedure for which reporting was required. The data and methods related to our analysis of post-operative visits reported via claims are discussed in prior reports (Crespin et al., forthcoming-a; Crespin et al., forthcoming-b; Kranz et al., 2021). We used regression models to impute the share of reported, relative to assumed, post-operative visits for procedures with 10- and 90-day global periods for which reporting was not required.

For revaluation, our starting point was work, PE, and malpractice RVUs for procedures with 10- and 90-day global periods, as listed in the calendar year (CY) 2019 Medicare Physician Fee Schedule. The baseline CY 2019 valuations were associated with the assumed number of post-operative visits included in the global period, as listed in the Time File. We subtracted a share of work RVUs, direct PE inputs, and physician time based on the percentage of post-operative visits currently included in valuation but not typically reported. For changes in work, we explore how our results change when we use three additional observed visit metrics: the mean, modal, and 75th percentile of reported post-operative visits rather than the median.[8] As a final step, we estimated the impacts of reductions in post-operative visits on work, PE, and malpractice RVUs together, including the allocative implications on indirect PE and malpractice RVUs using updated work RVUs, physician time, and direct PE inputs based on the median of observed post-operative visits.

We report the impacts of revaluation, first on work alone, next for PE alone, and finally adjusting all components together, by applying the status quo and updated valuations to the CY 2019 fee-for-service Medicare volume of procedures with 10- and 90-day global periods. We report results for each of the 291 procedure codes for which reporting was required and results by specialty, reflecting the relative volume of services across all services billed by the specialty. We also report results in terms of aggregated payments across services using an updated conversion factor to offset the change in total RVUs.

Results

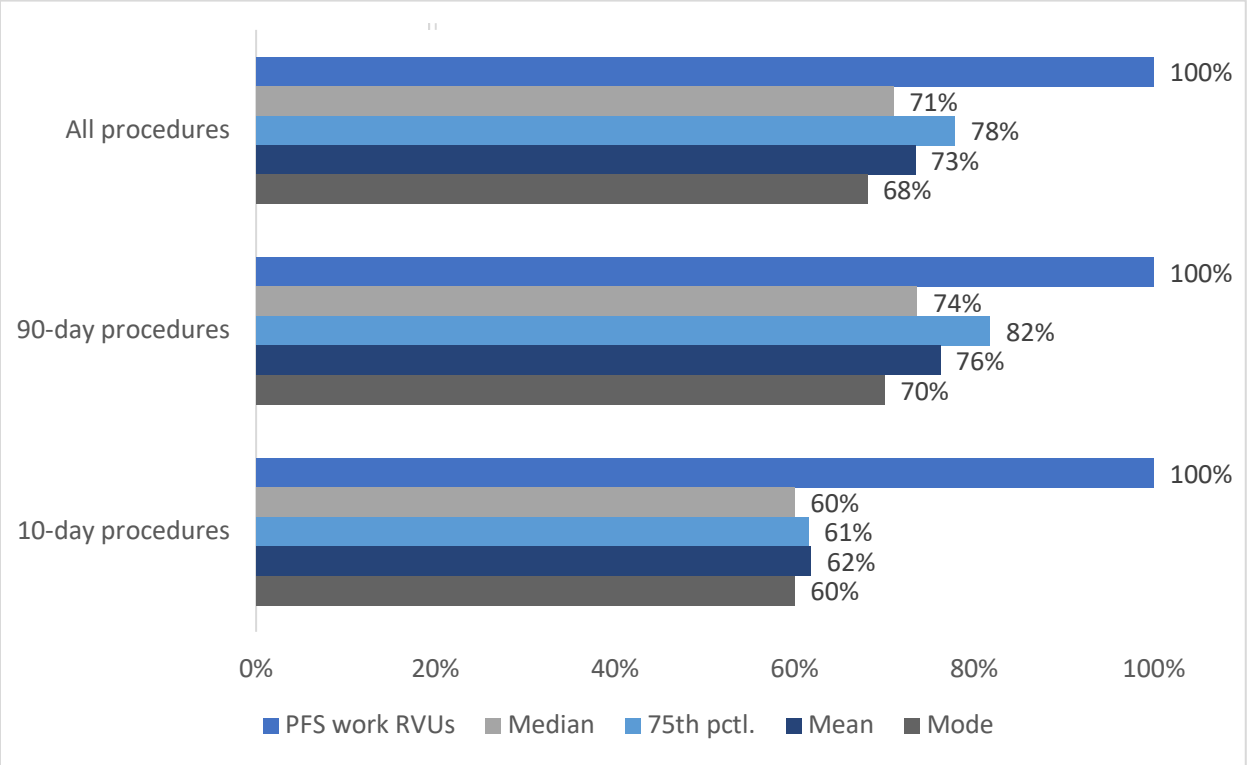
Figure S.1 reports updated work RVUs after removing work RVUs associated with post-operative visits that were assumed but not provided.[9] Depending on which observed visit metric was used as an input in revaluation, the updated work RVUs were between 18 percent and 32 percent lower for procedures with 90-day global periods and between 39 percent and 40 percent lower for procedures with 10-day global periods compared with current work valuations.

Across all Medicare Physician Fee Schedule services, our revaluation steps reduced total work RVUs by 3 percent (result not illustrated).

[8] If the distribution of post-operative visits per global period is skewed to the right—that is, if a relatively small number of procedures have many visits while most have relatively few—then the mean number of visits will be higher than the *median* or *modal* (i.e., most common) number of visits, which are two other statistics that CMS could use to describe the "typical" number of post-operative visits. CMS also could decide to use another summary statistic—for example, the 75th percentile—as a way to gradually implement reductions in post-operative visits or ameliorate the magnitude of the reduction.

[9] Note that changes in RVUs will not translate directly into changes for payment rates because RVUs are multiplied by a conversion factor that is determined in part by the pool of total RVUs. It is therefore possible for a procedure code to have a higher payment rate even if its RVUs are reduced.

Figure S.1. Share of Work RVUs Remaining After Revaluation Using Different Observed Visit Metrics for the 291 Procedures for Which Reporting Was Required



SOURCE: RAND analysis of 2019 claims data for reported post-operative visits and the Medicare CY 2019 Physician Fee Schedule and Time File.
NOTES: Results reflect the 2019 Medicare volume mix across the 291 procedures for which reporting of post-operative visits was required. Pctl. = percentile; PFS = Physician Fee Schedule.

In a separate analysis, we estimated the impact of reducing only direct PE inputs under the rationale that direct PE inputs for visits that are not occurring should not contribute to procedure valuations. We found that this change reduced PE RVUs and total RVUs for procedures with 10- and 90-day global periods by 14 percent and 6 percent, respectively.[10]

Our adjustments to work RVUs, physician time, and direct PE inputs (rather than just work or direct PE inputs individually, as presented in the previous sections) resulted in a 28.5-percent reduction in total RVUs for procedures with 10- and 90-day global periods and a slight increase (0.4 percent) for all other Physician Fee Schedule services. The net reduction in RVUs was 2.6 percent across all Physician Fee Schedule services.[11] The impact on procedure-focused

[10] The changes for all Medicare Physician Fee Schedule procedures were 0 percent in both cases because PE RVUs are allocated from a pool.

[11] This reduction equals $2.5 billion in Medicare-allowed amounts at the 2019 conversion factor. Importantly, as we discuss later, this amount does not represent potential savings to Medicare. If CMS implemented these RVU reductions, the conversion factor would increase because of CMS's budget neutrality requirement, with further redistributive implications for payments.

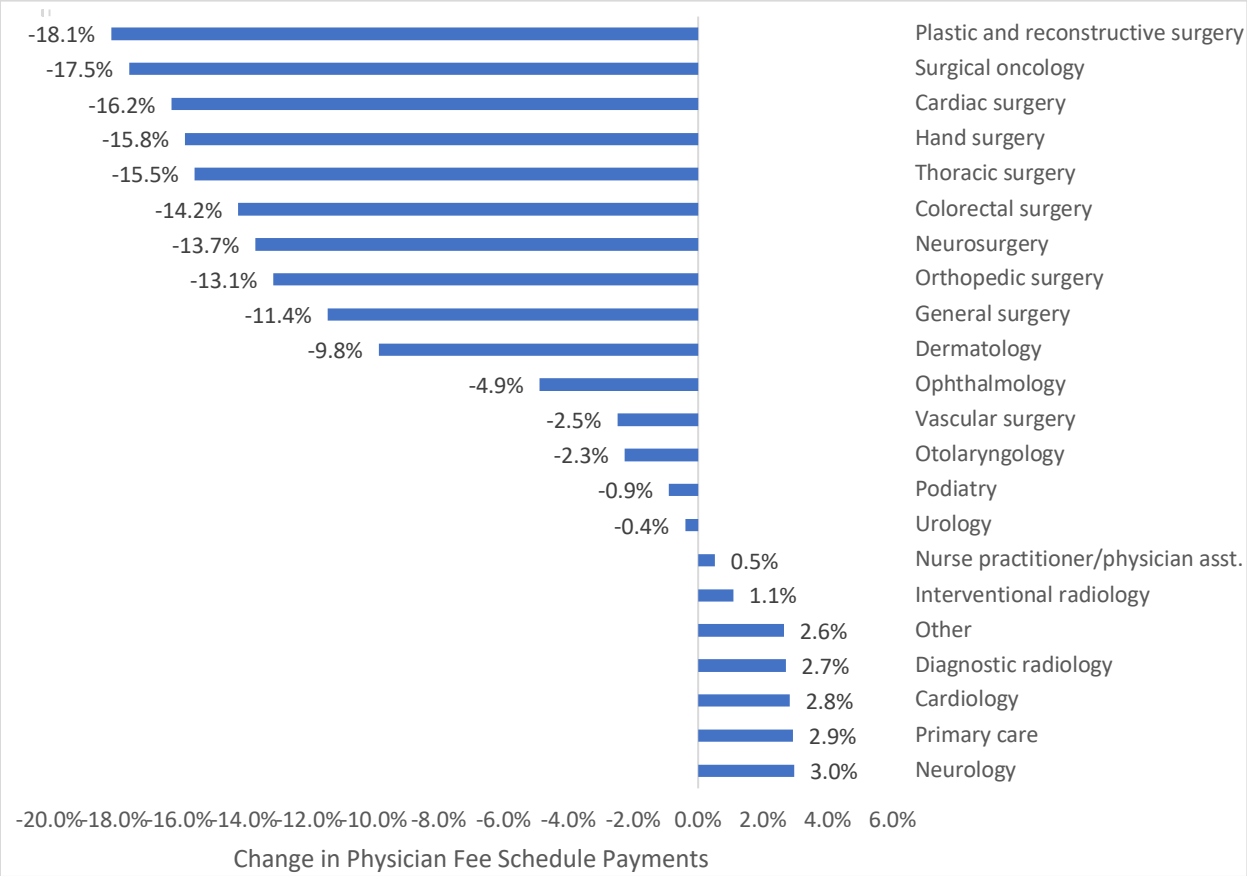
specialties was larger; the largest impact was a 20.3-percent reduction in total RVUs for plastic and reconstructive surgery. We found small increases in RVUs for primary care, neurology, cardiology, and diagnostic radiology, which were caused by increases in allocated PE and malpractice RVUs for services without 10- and 90-day global periods. The net impact for specialties that bill primarily for services without 10- and 90-day global periods (e.g., cardiology) was positive.

As a final step, we estimated the change in Medicare payments under the Physician Fee Schedule by calculating an updated conversion factor to preserve budget neutrality.[12] Because the overall number of RVUs decreased, the conversion factor (which is defined as the funds available to pay for Physician Fee Schedule services divided by the sum of RVUs) increased. As a result, the reductions in total RVUs for surgical specialties, such as cardiac surgery, surgical oncology, and thoracic surgery, yielded slightly smaller reductions in payments (Figure S.2).[13] For some specialties (e.g., interventional radiology), a small reduction in total RVUs was offset by a higher conversion factor to yield a small increase in payments. Modest increases in total RVUs for other specialties (e.g., cardiology, neurology, and the specialties that report collectively as primary care) yielded a larger (but still modest) increase in payments.

[12] We did not model CMS's transition policy or caps when estimating changes in payments. The actual changes in payments—both decreases and increases—would be moderated by these policies if CMS were to use our revaluations.

[13] A higher conversion factor would also increase payment for certain nonphysician practitioners and other Medicare suppliers paid under the Physician Fee Schedule.

Figure S.2. Percentage Change in Physician Fee Schedule Payments After Revaluation, by Specialty



SOURCE: RAND analysis of 2019 claims data for reported post-operative visits and the Medicare CY 2019 Physician Fee Schedule and Time File.
NOTES: "Change in Physician Fee Schedule Payments" is the percentage change from status quo total RVU valuations to updated total RVU valuations. Primary care includes family practice, general practice, and internal medicine. Asst. = assistant.

Discussion and Conclusion

This report describes how the reverse building-block approach could be used to adjust valuation of procedures with 10- and 90-day global periods using claims-based data on the number of post-operative visits performed. Total RVUs are driven by several components, including work RVUs and direct PE RVUs. Depending on which statistic describing the number of observed visits we used (e.g., mean, median), updated work RVUs were between 18 percent and 30 percent lower for procedures with 90-day global periods and between 38 percent and 40 percent lower for procedures with 10-day global periods compared with current work RVU levels. Adjusting direct PE inputs for the number of post-operative visits, without adjustment to work RVUs, resulted in relatively modest reductions in PE. In terms of total RVUs, changes ranged from reductions of between 5.1 percent (vascular surgery) and 20.3 percent (plastic and reconstructive surgery) among proceduralist specialties to small increases among some other

specialties (e.g., cardiology, neurology, and primary care specialties). Because the reduction in total RVUs results in a higher conversion factor, reductions in actual payments to surgical specialties were lower than the reduction in total RVUs. Payments to primary care practitioners increased by roughly 3 percent.

In our revaluation approach, we make three key assumptions. First, we assume that the bundled post-operative visits that were not observed did not occur. Our earlier reports address this assumption in depth and conclude that it is unlikely that underreporting by practitioners explains why we observe fewer post-operative visits than expected (Crespin et al., forthcoming-a; Crespin et al., forthcoming-b; Kranz et al., 2021; Mulcahy, Mehrotra, et al., 2021). Second, we assume that the amount of physician work involved in post-operative visits is the same as the amount of work involved in the corresponding E&M visits indicated in the Time File. This assumption is consistent with our earlier survey-based findings (Gidengil et al., 2019). Third, and most importantly, our approach removes all of the work RVUs that are associated with visits that did not occur. As noted earlier, the reverse building-block approach that we used assumes that total work is the sum of work associated with discrete components of the procedure and global package (including post-operative visits). It is impossible to know how the number of post-operative visits from the surveys affected the estimates of total work made by RUC/specialty society respondents and CMS.

There are several potential paths forward for revaluation. Consistent with the approach shown in this report, CMS could simply revalue all procedures with 10- and 90-day global periods using the reverse building-block approach to reflect the actual number of post-operative visits provided during global periods. For specific codes for which there are concerns about the resulting valuation, CMS and the RUC could revalue using the usual survey-based approach. These changes could be phased in over time. A second approach would be to first revalue all procedures using this reverse building-block approach and then convert some or all global procedures to 0-day global procedures. For example, CMS might convert all procedures that currently have 10-day global periods to procedures with 0-day global periods. For these new 0-day global procedures, practitioners would bill separately for post-operative visits than they would for other services. Because bundled payments can incentivize efficient provision of care, one disadvantage of this approach is that it might discourage more-innovative means of delivering post-operative care, such as telemedicine.

In the longer term, CMS may pivot to a valuation system that is consistent with the building-block approach. Such a system would allow for more-direct adjustments to valuation based on changes in the number of empirically observed post-operative visits (or other inputs, such as physician time).

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Abbreviations

CMS	Centers for Medicare & Medicaid Services
CPT	Current Procedural Terminology
CY	calendar year
E&M	evaluation and management
FFS	fee for service
HCPCS	Healthcare Common Procedure Coding System
HHS	U.S. Department of Health and Human Services
IDR	Integrated Data Repository
MACRA	Medicare Access and CHIP Reauthorization Act of 2015
NPI	National Provider Identifier
PE	practice expense
RBRVS	resource-based relative value scale
RUC	American Medical Association/Specialty Society Relative Value Scale Update Committee
RVU	relative value unit

1. Introduction

Medicare payment for many health care procedures covers not only the procedure itself but also most post-operative care provided by the same practice that billed for the procedure over a fixed period of time (the "global period"). The Centers for Medicare & Medicaid Services (CMS) sets payment rates, assuming that a certain number and type of post-operative visits specific to each procedure typically occur. In other research (Crespin et al., forthcoming-a; Crespin et al., forthcoming-b; Kranz et al., 2021), we found that the number of visits actually performed is far lower than the assumptions. This report describes how CMS might use data on the number of post-operative visits actually provided to adjust valuation for procedures with 10- and 90-day global periods. The idiosyncrasies of the resource-based relative value scale (RBRVS) system that is used to determine payment for Medicare services result in some ambiguity about how procedures should be revalued to reflect reductions in post-operative visits. Furthermore, under the RBRVS system, changes in the valuation of procedures with global periods have important spillover effects on other, nonprocedure health care services. We intend the results presented in the report to be a starting point for further policy development for revaluation.

Overview of Global Services

Medicare and most other health insurers pay for surgical procedures at a bundled rate that covers the procedure itself, related visits, and other services from the same practice and specialty within a fixed period of time around the procedure. The duration of this "global period" varies depending on the intensity of the procedure. Medicare uses the following three global period lengths:

- 0-day global periods include the procedure service date only[14]
- 10-day global periods include the procedure service date and the ten subsequent days
- 90-day global periods include the day prior to the procedure, the day of the procedure, and the subsequent 90 days.

[14] Procedures with 0-day global periods do not have bundled post-operative visits, although 0-day global periods do cover additional services and procedures related to the initial procedure on the day of the procedure—for example, services related to complications from the initial procedure that do not require a return to the operating room. CMS generally does not allow providers to bill a separate evaluation and management (E&M) visit on the same date of service that a procedure is furnished to a beneficiary. As is the case for procedures with 10- and 90-day global periods, when a visit is appropriate and separately billable during a global period, the provider must use one of several payment modifiers to acknowledge that the visit is during a global service (on the same day, in the case of procedures with 0-day global periods).

Most surgical procedures covered by Medicare are assigned to a global period of one of these three lengths.[15]

Medicare's global service policy covers services provided by the same practice and specialty as the practitioner furnishing the initial procedure.[16] Practitioners meeting these criteria cannot bill for post-operative care related to the procedure with a global period—for example, post-operative visits and care resulting from complications.[17] They can, however, bill for services that are unrelated to the procedure by using a payment modifier (modifier 25) to indicate that the service is unrelated. CMS also allows for a formal transfer of care using modifiers (modifiers 54 and 55) in which a practitioner bills for the surgical procedure only and another practitioner bills for post-operative care only.[18] These modifiers are not required when there is no formal transfer of care.

When determining payment rates for procedures, CMS assumes that the global period for nearly all procedures with 10- or 90-day global periods includes one or more post-operative visits.[19] The number of visits that CMS assumes typically occur is informed by data collected through practitioner surveys administered by the American Medical Association/Specialty Society Relative Value Scale Update Committee (the RUC) and its individual specialty society members (the RUC surveys). The primary purpose of the RUC surveys is to collect survey data to estimate the physician *time* and *work* associated with procedures and other health care services (based on HCPCS codes).[20] The importance of time and work for valuation is described in the RBRVS section of this chapter.

When a procedure has a 10- or 90-day global period, the RUC surveys ask practitioners to report the number and type of post-operative visits that typically occur during the global period.

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[15] Surgical procedures usually fall within Healthcare Common Procedure Coding System (HCPCS) code range 10000–69999. Surgical procedures in this range accounted for 5,582 of the 7,721 HCPCS codes on the 2019 Physician Fee Schedule. These surgical procedures accounted for $19.9 billion, or 20.4 percent, of Medicare payments under the 2019 Physician Fee Schedule. Most of that spending (92.0 percent) was for a surgical procedure code with a 0-, 10-, or 90-day global period. There are some surgical procedures with global periods outside this code range that are not included in these statistics. Other health care services, including E&M office visits, pathology and laboratory services, and imaging services, are not surgical procedures.

[16] Many post-operative visits may be provided solely by physician assistants and nurse practitioners. If a physician assistant or nurse practitioner is billing under a physician's National Provider Identifier (NPI) incident to a physician's professional services, then the physician's specialty applies and separate billing for post-operative visits included in global periods is not permitted. Separate billing may be possible if the physician assistant or nurse practitioner bills under their own NPI.

[17] One exception is when the follow-up care results in a return to the operating room. In this case, the practitioner can bill for the follow-up procedure, and a new global period is initiated.

[18] According to our analyses of claims data, practitioners rarely bill using modifiers 54 and 55, with the exception of certain eye procedures.

[19] Medicare administrative contractors have some flexibility to define global periods for certain procedures.

[20] In the RBRVS system, work is the product of physician time and the effort, skill, and stress involved in providing a service, per unit of time. The RUC and specialty societies separately collect information on practitioner work (which is based in part on time) and practitioner time alone.

Respondents use E&M visit HCPCS codes, including codes for office and inpatient visits of different levels, discharge visits, and critical care visits, to describe the number and level of these post-operative visits. CMS, when determining the valuation for the procedure, may adjust the visit counts recommended by the RUC through notice and comment rulemaking. For each procedure code, CMS publishes the final number of visits (categorized by E&M HCPCS code) in the Physician Time File (hereafter, the Time File), which is posted annually with the Medicare Physician Fee Schedule. The Time File also includes an estimate of the physician time spent on post-operative visits.[21]

There are several links between the number and level of bundled post-operative visits that are assumed to happen and the valuation of procedures with global periods. These links are described in detail later in this chapter. Conceptually, the more post-operative visits that are assumed to happen during the global period, the higher the valuation for the procedure and, therefore, the higher the payment rate for the procedure.[22]

Medicare fee-for-service (FFS) spending on procedures with 10- or 90-day global periods accounted for nearly 10 percent of total Medicare payments under the Physician Fee Schedule in 2019.[23] Our prior research suggests that post-operative visits account for approximately one-quarter of these payments (Mulcahy et al., 2015).[24] Historically, CMS has not collected data on how many post-operative visits are actually performed. Prior medical chart reviews by the U.S. Department of Health and Human Services (HHS) Office of Inspector General indicated that the number of post-operative visits used for valuation overestimates the number of post-operative visits actually provided in clinical practice for select surgical procedures with global periods (HHS, 2007; HHS, 2012a; HHS, 2012b). Because post-operative visits make up a large percentage of the valuation of surgical global packages, incorrect or inaccurate inputs related to global services may result in misvalued surgical procedures and over- or underpayment—on average—to providers for specific services. It may also lead to, essentially, double paying for

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[21] The Time File includes estimates of (1) physician time for the entire global service, including post-operative visits, and (2) physician time for all components of the global service *except* post-operative visits. The difference between these times is the time associated with post-operative visits, which is also mathematically the sum of physician time for each E&M HCPCS code assumed to occur during the global period.

[22] For example, we identified 11 global procedures that were revalued (defined as a ≥ 10-percent change in work relative value units [RVUs]) between 2017 and 2018. For seven of the 11 procedures, the revaluation was associated with a change in post-operative visits, and, in a few select cases, the change in number or level of visits was quite large. For example, HCPCS code 52601 (prostatectomy) had a reduction in work RVUs from 15.26 to 13.16 RVUs, the total number of expected post-operative visits fell from seven to 2.5 visits, and intraservice time remained unchanged at 75 minutes.

[23] Procedures with 10- and 90-day global periods reflected 2.4 percent and 7.1 percent, respectively, of all Medicare FFS spending in 2019. Percentages were generated using information from the 2021 Proposed Physician Fee Schedule.

[24] Our prior study examined the share of physician work that was associated with post-operative visits. As we describe further in the following sections, total Medicare payment for procedures with 10- and 90-day global periods involves practice expense (PE) and malpractice components, as well as physician work. As a result, the result cited should be viewed as a rough estimate.

post-operative services to the extent that at least some of these services are provided by another provider, such as a hospitalist, who can bill for them even though there is an implicit payment made to the provider of the procedure itself.

Because of concerns that the number of bundled post-operative visits considered when setting payment rates may not reflect the number of visits provided in clinical practice, CMS finalized a policy in the calendar year (CY) 2015 Physician Fee Schedule Final Rule (CMS, 2014) that would have unbundled post-operative visits from payment for procedures. However, Congress, as part of the Medicare Access and CHIP Reauthorization Act of 2015 (MACRA), prohibited CMS from proceeding with this policy change. Instead, Congress mandated that CMS collect the data needed to revalue procedures with 10- and 90-day global periods, including the *number* and *level* of post-operative visits provided in global periods, and use these data along with other available data to improve the accuracy of valuation of surgical services under the Medicare Physician Fee Schedule.

Data Collection and Prior Analysis of Post-Operative Visits

To gather data on the *number* of post-operative visits, CMS required physicians with ten or more practitioners in their practice in nine states to report post-operative visits using no-pay HCPCS code 99024 (CMS, 2017).[25] Visits must be reported only when they follow one of approximately 300 high-volume and/or high-cost procedures.[26] CMS contracted with the RAND Corporation to analyze the data on the number of post-operative visits reported. These results are presented in a series of previous reports that differ in the time frame of FFS claims analyzed (Crespin et al., forthcoming-a; Crespin et al., forthcoming-b; Kranz et al., 2021). In our most recent analysis using 2019 claims data, we found that 96.5 percent of procedures with 10-day global periods did not have an associated post-operative visit (Crespin et al., forthcoming-b). Approximately two-thirds of procedures with 90-day global periods had an associated post-operative visit; however, the ratio of observed to expected post-operative visits provided for 90-day global period procedures was only 0.38 (Table 1.1). These findings are very similar to those from earlier reports analyzing 2018 claims data and mid-2017 to mid-2018 claims data.

[25] The nine states are Florida, Kentucky, Louisiana, Nevada, New Jersey, North Dakota, Ohio, Oregon, and Rhode Island.

[26] The number of procedures for which reporting was required was 296 when claims-based reporting began. The requirement applies to these 296 codes and their successor codes. By 2019, reporting was required for 291 codes.

Table 1.1. Summary of Main Results from Claims-Based Reporting Analyses

	Percentage of Procedures with 10-Day Global Visits		Percentage of Procedures with 90-Day Global Visits	
Report Data Time Frame	Percentage of Procedures with Visits	Ratio of Observed to Expected Visits	Percentage of Procedures with Visits	Ratio of Observed to Expected Visits
CY 2019	3.5%	0.04	70.0%	0.38
CY 2018	3.5%	0.04	69.1%	0.38
July 2017–June 2018	3.7%	0.04	70.9%	0.39

SOURCE: Data from CMS Integrated Data Repository (IDR), downloaded on March 5, 2021. The HCPCS code 99024 claims listed in this table were linked to procedures that were furnished during the indicated time frames.
NOTES: Procedure counts included in the table are limited to the procedure codes for "clean" procedures that were linked to post-operative visits for practitioners in practices with ten or more practitioners in the nine states where reporting of post-operative visits was required. Expected counts of post-operative visits are from the Time File.

Our reports explore potential reasons why so few post-operative visits are reported through sensitivity analyses. Some physician specialty societies have suggested that the low reported visit rates are the result of incomplete reporting (American Medical Association, 2019). However, in analyses that are limited to practitioners who were actively reporting their post-operative visits, the ratio of observed to expected post-operative visits increased only slightly and did not change our main conclusion. Another potential way to explain the low rates of post-operative visits is that post-operative care occurred during E&M visits or was included with appointments for subsequent procedures. In a second set of sensitivity analyses, we used a more expansive definition of post-operative care that included (1) E&M visits during the global period by the same practitioner who performed the original procedure, (2) E&M visits and procedures by the same practitioner who performed the original procedure, and (3) E&M visits and procedures furnished by anyone in the practice with the same specialty as the practitioner who performed the original procedure. These changes increased the ratio of observed to expected post-operative visits only modestly and did not change our main conclusion. Collectively, these findings suggest that a large share of expected post-operative visits are not delivered and that underreporting is unlikely to fully explain the low ratio of observed to expected post-operative visits provided.

To gather information on the *level* of post-operative visits, CMS used two additional channels of data collection: (1) a survey of a representative sample of practitioners about post-operative visits furnished during the global periods and (2) direct observation of post-operative care. The survey was fielded by RAND for CMS during 2018 to collect information about the activities, time, staff, and work involved in delivering post-operative care during the global period for three procedures (cataract surgery, hip arthroplasty, and complex wound repair). We sampled 1,555 physicians billing Medicare above threshold volumes of procedures in these categories. A total of 725 physicians reported on the time, activities, and staff involved in 3,469 visits. We found that the time associated with each post-operative visit for cataract surgery and hip arthroplasty was about the same or slightly less than the corresponding E&M visits currently

in the bundle. For complex wound repair, the time was slightly more than expected. The direct observation task involved ten surgeons at eight sites across six different surgical specialties and documented workflow processes and tasks completed during post-operative visits. Results from RAND's analysis of the practitioner survey and direct observation are described in greater detail in another report (Gidengil et al., 2019).

A third RAND report (Mulcahy, Liu, et al., 2021) describes how the new claims-based data on the number of post-operative visits could be used to adjust the valuation of procedures with 10- and 90-day global periods that are potentially misvalued because of the difference between the number of post-operative visits that CMS assumes and the number of visits that actually occur. In that report, we used the first full year of claims data reported between July 1, 2017, and June 30, 2018, to adjust valuations.

CMS cited the three RAND reports in the CY 2020 Physician Fee Schedule proposed rule (CMS, 2019a) and proposed not to accept the RUC-recommended changes to global surgery codes that would have *increased* payment for global packages based on higher outpatient E&M office visit valuations. CMS also invited comments on our reports, and several organizations expressed concerns about the contents. We published a response to the comments, concluding that none raised substantive doubts about the findings (Mulcahy, Mehrotra, et al., 2021). CMS ultimately opted not to increase payment for global procedures in the CY 2020 Physician Fee Schedule final rule (CMS, 2019b).

This report updates our prior work on revaluing global packages using 2019 claims data. To lay the groundwork, we begin with a brief description of the RBRVS system and how changes to RVUs translate to changes in payment for global codes.

The Resource-Based Relative Value Scale System

CMS uses the RBRVS system to value health care services[27] in terms of the relative resources required to provide the service. Each service is valued under the RBRVS system as having a number of RVUs, a common denominator that is used to estimate the resources involved in furnishing a service. The *total* RVUs for each service is determined by a sum of RVUs in the following three separate components:

1. physician work, which reflects both physician time and the effort, skill, and stress involved in work per unit of time
2. PE, which is the sum of two subcomponents: (1) direct PE costs associated with specific labor and supplies used in furnishing the service and (2) indirect PE costs for rent, utilities, and other costs involved in running a physician practice
3. malpractice expense.

[27] We use *services* to mean health care services broadly, including procedures and other services, such as office visits. Procedures are a subset of services.

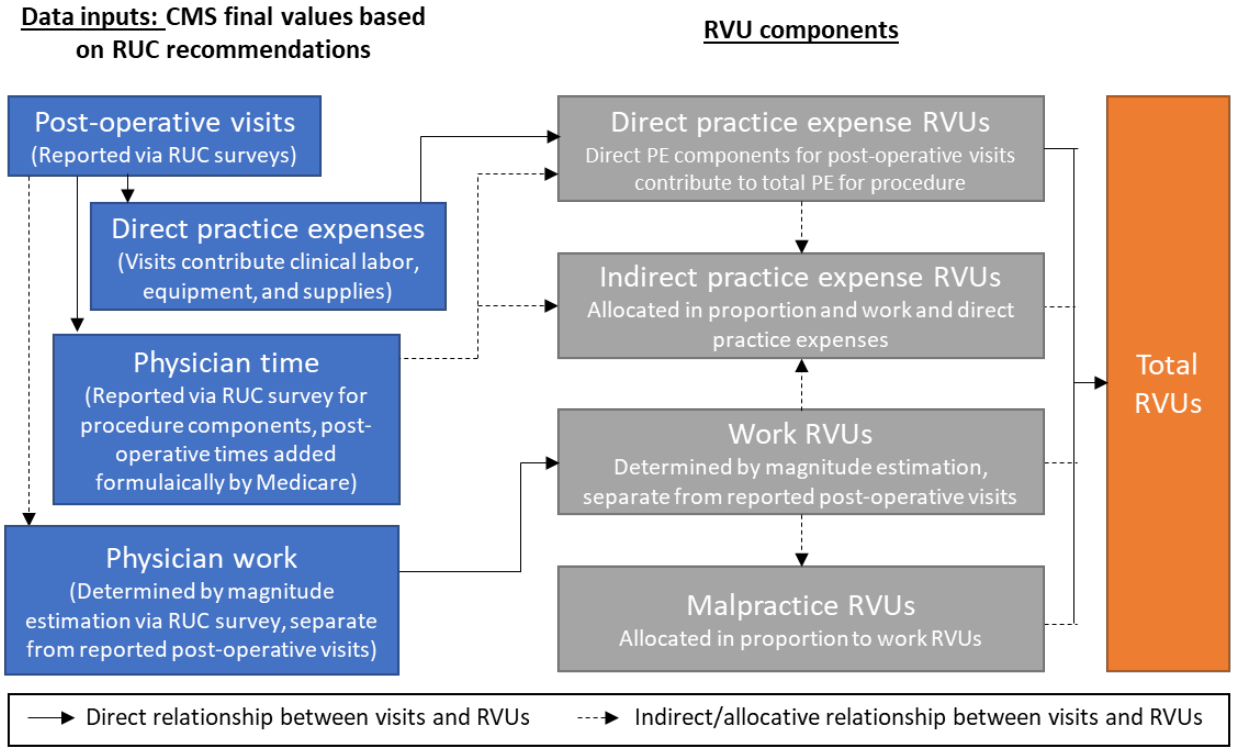
The number of post-operative visits that CMS assumes is part of the global period for a given procedure affects the valuation of each of these three components. Conceptually, as the number of post-operative visits that is assumed to typically occur during the global period increases, total physician *work* also should increase. Additional bundled post-operative visits also presumably increase CMS's estimate of the total physician *time* involved in the global period, and they certainly affect the direct PEs associated with the service. Through higher work and direct costs, the share of a total pool of PE RVUs allocated to the procedure will increase. Through higher time, the share of a total pool of PE RVUs allocated to the specialties that furnish that service will increase. Similarly, higher work RVUs from bundled post-operative visits can result in a larger share of a total pool of malpractice RVUs allocated to the procedure.

Links Between the Number of Post-Operative Visits and Valuation

As described earlier, there are several links between the number of post-operative visits and Physician Fee Schedule valuation. In the current valuation system, the link between these visits and work RVUs is indirect; reducing the number of bundled post-operative visits does not automatically result in a reduction in work RVUs because physician work RVUs are estimated using magnitude estimation rather than a building-block approach, and, although respondents to RUC surveys report the number and level of bundled post-operative visits, it is not clear whether they fully incorporate the post-operative visits in their estimate of total work. It is also not clear how CMS's final decisions regarding valuation reflect the number of post-operative visits that are assumed to typically occur. In contrast, there is a direct link between post-operative visits, and there are direct PE inputs and physician time. Physician work, physician time, and direct PE inputs have important impacts in the allocation of indirect PE and malpractice RVUs.

Figure 1.1 provides an overview of these relationships. In sum, the number of post-operative visits that CMS assumes occur influences all three components. There is a direct effect on direct PE RVUs through the labor, equipment, and supply costs contributed by post-operative visits and indirect influences on work, indirect and total PE, and malpractice RVUs. The specific links between the number of assumed post-operative visits and RVUs in each component are described in the following sections.

Figure 1.1. Overview of Post-Operative Visits' Role in Medicare Valuation for Global Services



Physician Work

Defining Physician Work

In RBRVS, physician work is the product of *physician time* and *intensity per unit time*, where intensity captures the technical skill, mental effort, and psychological stress in furnishing the service. Two procedures with the same typical physician time can therefore have different work RVUs if intensity is different. Medicare Payment Advisory Commission, 2018, found that physician time predicts between 77 percent and 79 percent of the variation in total work across procedures in different categories.

RUC Surveys

CMS uses survey data from the RUC as an initial input when establishing new or revised work RVUs for a service.[28] The RUC surveys are typically completed by practitioners in the specialties that perform the services. These surveys (and the valuation process more generally) focus on the typical case for a given service and are organized to collect information on

[28] There is no fixed time frame for revaluating work RVUs; some low-volume services are rarely revalued (or have never been revalued since the inception of the RBRVS), while higher-volume and higher-payment services are revised more often.

physician time for specific activities, including preservice activities, "skin-to-skin" intraservice activities (i.e., actually performing the procedure), and activities immediately after the service.[29]

As noted earlier, for post-operative visits, the surveys ask the practitioner about the typical number of post-operative visits performed in both the hospital and office settings following the day of surgery. The surveys use HCPCS codes for E&M visits to collect the post-operative visit information. Typical face-to-face times associated with each E&M visit code for hospital visits (noncritical care inpatient visits, subsequent observation care visits, discharge day management) and office or clinic visits are provided in the surveys.

The RUC surveys collect information on nearly all of the individual "building blocks" needed to calculate total work mechanically. The most notable missing component is intraservice work—the work involved in performing the procedure itself. For many procedures, intraservice time (which is collected) is a significant share of total time (Wynn et al., 2015), which suggests that intraservice work should also account for a significant share of total work.

The surveys also elicit information on the *total work* for the entire service, including post-operative visits in the global period, via magnitude estimation. This process requires the respondent to select an already-valued service that they feel is most similar to the service that is being assessed. The respondent is then asked to compare the survey service and reference service on different domains of intensity (mental effort and judgment, technical skill and physical effort, and psychological stress) using a scale of 1 to 5 for preservice, intraservice, and immediate post-operative services; a similar ranking is not requested for the post-operative visits.[30] The final survey question asks the respondent to estimate total work RVUs for the service using magnitude estimation and the work value for the reference service.

Work RVU Valuation Process

The RUC meets three times per year to establish work, time, and direct costs for new and revised Current Procedural Terminology (CPT) codes and potentially misvalued services that were identified either through its Relativity Assessment Workgroup or by CMS. The RUC is supported by an Advisory Committee of 123 specialty societies that collect data and make recommendations on the work RVUs, physician time, and direct PE inputs for the codes that the RUC has referred to them via the surveys described earlier. CMS may adjust the total work, time, or number of post-operative visit recommendations from the RUC. CMS reports the number and type (e.g., inpatient, discharge, outpatient) of post-operative visits that it considered in its valuation of each surgical procedure in the Time File posted with the Physician Fee Schedule each year.

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[29] For more information on the "typical" physician or clinical context, see Appendix B.

[30] In the RBRVS system, physician work is the product of time and intensity, where intensity is measured in terms of work per unit time.

The Relationship Between Post-Operative Visits and Work RVUs

Importantly, the number and level of post-operative visits are not used by the RUC or CMS to directly determine work RVUs. Instead, they are used to inform the discussion. Even though the surveys cover each building block of work that should, when combined, approximate the total valuation, CMS primarily relies on magnitude estimation (i.e., estimates of the *total* work for the services being valued to comparator services).[31] CMS does not necessarily adjust total work when it also adjusts one of the building-block components. For example, if CMS adjusts the number of bundled post-operative visits down by one, it does not necessarily have to reduce total work RVUs, although, in some cases, it appears as though it has.

PE

PE RVUs are designed to capture relative direct and indirect practice costs associated with Physician Fee Schedule services. Data on direct costs—including clinical labor, medical equipment, and medical supplies—have been developed for each service, while indirect expenses are allocated based primarily on physician work, direct expenses, and specialty-specific PEs per hour.[32] For all procedures with 10- and 90-day global periods, the direct costs associated with the number and mix of post-operative visits assumed to occur during the global period are included in the procedure's direct costs. Physician work and time values, which also reflect these post-operative services, affect several aspects of the PE allocation process, primarily the allocation of indirect costs across services. Changes in physician work also result in proportional changes to the size of the overall pool of PE RVUs that is allocated to individual services, while changes in time affect the division of this pool into separate direct and indirect pools.

For new, revised, or misvalued codes, the RUC PE subcommittee reviews estimates put forth by the specialty societies of the direct PE inputs for clinical staff, medical equipment, and supplies associated with each post-operative office visit for a given procedure. For example, the equipment estimate might include a cast cutter, and the supplies estimate might include bandages and dressings. CMS reviews the RUC recommendations, develops refined direct cost inputs, and attaches prices to each input (e.g., by attaching current hourly rates to the estimated time for a nurse). For surgical procedures performed in an office setting, a similar step is taken for the direct PE inputs for the intraservice time. No direct costs are associated with intraservice time for procedures performed in a facility setting or for hospital inpatient post-operative visits because the facility assumes those costs.

Indirect PE costs are allocated to services according to the direct PE costs specifically associated with a code and with work RVUs. In general, the direct PE costs for post-operative visits are small in comparison with the indirect PE costs associated with the visit.

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[31] For a discussion of the challenges with the reverse building-block and magnitude-estimation approaches, see Wynn et al., 2015.

[32] For a detailed overview of PE methodology, see Zuckerman et al., 2015, and Burgette et al., 2018.

Post-operative visits therefore contribute to PE RVUs through the following four channels:

1. to the extent that changes in post-operative visits contribute to changes in work RVUs (as described earlier), they influence the size of the overall pool of PE RVUs
2. they contribute to direct costs for the service, which affect PE RVUs directly and via the indirect cost allocation
3. they contribute to physician time that determines the relative magnitudes of the direct and indirect PE pools that are allocated across services
4. they contribute to work RVUs that are used as part of the basis of allocating indirect PE RVUs to individual services.[33]

Malpractice Expense

Both work RVUs and specialty-specific premium risk factors determine the allocation of a pool of malpractice RVUs to each service. Post-operative visits contribute to higher work RVUs and therefore result in higher allocated malpractice RVUs. As with PE, changes in work RVUs (because of changes in post-operative visits and other factors) result in proportional changes in the size of the malpractice RVU pool that is allocated across services.

From Valuation to Payment Rates

Before they are combined to create a payment rate, each of the three components is adjusted for geographic variation in prices. A separate geographic practice cost index (GPCI) is applied for each of the three relative value scales defined in each of the Physician Fee Schedule payment areas. Work, PE, and malpractice RVUs are each multiplied by their respective GPCIs, and these three products are summed to create a total RVU in each payment area for each service. These geographically adjusted total RVUs are multiplied by the national conversion factor ($36.04 in 2019) to determine the actual payment rates in each locality.

The only way that the number of total RVUs across all Physician Fee Schedule services can change over time is through changes in work RVUs (which are not constrained to a fixed pool) or in the volume and mix of services. The direction and magnitude of changes to work RVUs for a specific service do not directly translate into changes in payment because the conversion factor is updated simultaneously.[34] Updates to Physician Fee Schedule valuations that cause Medicare expenditures to change by more than $20 million must be offset by changes in the conversion factor to be budget-neutral as required by law (Social Security Act, § 1848, 1965).

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[33] Because work is a function of both time and intensity, physician time influences PE RVUs through two separate channels.

[34] It is possible for a slight increase or decrease in work RVUs to lead to a payment change in the opposite direction because of simultaneous changes in the conversion factor.

Organization of This Report

In Chapter 2, we describe the data and methods we used for our analysis. In Chapter 3, we present potential changes to work, PE, and total RVUs for procedures with 10- and 90-day global periods according to the observed number of visits. In Chapter 4, we present potential next steps for CMS to consider. Details about the data and methods we used are included in Appendix A. Appendix B reports results from supplemental analyses on the variation in the number of post-operative visits reported within HCPCS codes. Finally, Appendix C lists detailed revaluation results for individual HCPCS codes.

2. Revaluation Approach Overview

Our analysis of the *number* of visits reported using HCPCS code 99024 found that fewer visits were provided than are assumed by CMS during the valuation process. These findings suggest that the total work RVUs and direct PE RVUs for procedures with 10- and 90-day global periods are too high. As described in Chapter 1, inflated work RVUs can translate into inflated shares of indirect PE and malpractice RVUs. Overvaluation of procedures with 10- and 90-day global periods leads to overpayment by Medicare, inflated beneficiary cost-sharing burden, and distorted incentives for practitioners to overprovide these services, with further implications for Medicare payments and beneficiary costs and health.

There are also important distributional implications because the conversion factor applied to all services is determined by the ratio of total funding to the sum of work RVUs across all services. The denominator in this calculation is inflated to the extent that work RVUs are inflated for procedures with 10- and 90-day global periods. The resulting conversion factor applied to all Physician Fee Schedule services is smaller than it would be with accurate valuation of procedures with 10- and 90-day global periods, leading to smaller payments to specialties that do not provide a large volume of procedures with 10- and 90-day global periods (such as family practice physicians).

Revaluation Overview

Our revaluation approach focuses on the difference between the number of observed post-operative visits via claims-based reporting and the expected number of post-operative visits used during valuation. The approach has been called the reverse building-block approach.

As described earlier, there are links between the number of bundled post-operative visits and physician work, direct PE, indirect PE, and malpractice RVUs. There is some ambiguity regarding how a change in post-operative visits translates to a change in total work RVUs depending on the decision to rely on the reverse building-block or magnitude-estimation approach. In contrast, a change in post-operative visits clearly affects physician time and direct PE inputs. As described in Chapter 1, changes in work RVUs, physician time, and direct PE inputs will affect the allocation of indirect PE and malpractice RVUs to all services, regardless of whether the service has a 10- or 90-day global period.

To provide CMS and a broader policy audience with estimates to frame a discussion, we revalued procedures by adjusting work RVUs, physician time, and direct PE inputs based on the difference between the number of post-operative visits observed via claims-based reporting and the expected number of post-operative visits used during valuation. There are three steps in our reverse building-block approach:

1. *Calculate updated work RVUs* and physician time values by adjusting (that is, in all cases in our report, subtracting) work RVUs and minutes to reflect the number of observed rather than assumed post-operative visits.
2. *Calculate updated PE RVUs* by adjusting (again, in all cases in our report, subtracting) direct PE (clinical labor, equipment, and supply) inputs to reflect the number of observed rather than assumed post-operative visits and subsequently allocating indirect PE. Note that updated work RVUs do not contribute to the results from this step.
3. *Calculate updated total RVUs*, including allocated indirect PE and malpractice RVUs, using updated physician work RVUs and physician time from the first step and updated direct PE inputs from the second step.

Details about the data and methods we used for each step are included in Appendix A.

We modeled changes to work RVUs and changes to PE RVUs because of reductions in direct PE inputs separately for two reasons. First, CMS may be interested in making more-targeted changes to valuation using just one of these components. For example, CMS may opt to revalue direct PE RVUs based only on post-operative visits that do not occur because there is a very direct link between the number of assumed visits and direct PE inputs (in contrast to work, where the link is more ambiguous). Second, we report work results separately because work RVUs, unlike PE and malpractice RVUs, are assumed to be exogenous in the RBRVS system—that is, they enter into valuation directly based on RUC recommendations and CMS decisions rather than being calculated or allocated by the RBRVS machinery. Assessing changes to work RVUs alone also avoids spillover effects from adjusted to unadjusted services under RBRVS (which occur with the allocation of PE and malpractice RVUs across services) that can obfuscate the effect of our modeled changes.

Revaluation Approach Assumptions

Our revaluation approach makes four key assumptions. First, it assumes that the bundled post-operative visits that were not observed did not occur. As described earlier, the findings from sensitivity analyses in our prior studies on claims-based reporting of post-operative visits suggest that underreporting of post-operative visits was not a major driver of the small share of expected visits that was reported to CMS.

Second, our approach assumes that the amount of physician work included in the total value for post-operative visits aligns with the average work for corresponding E&M visits, as indicated in the Time File.

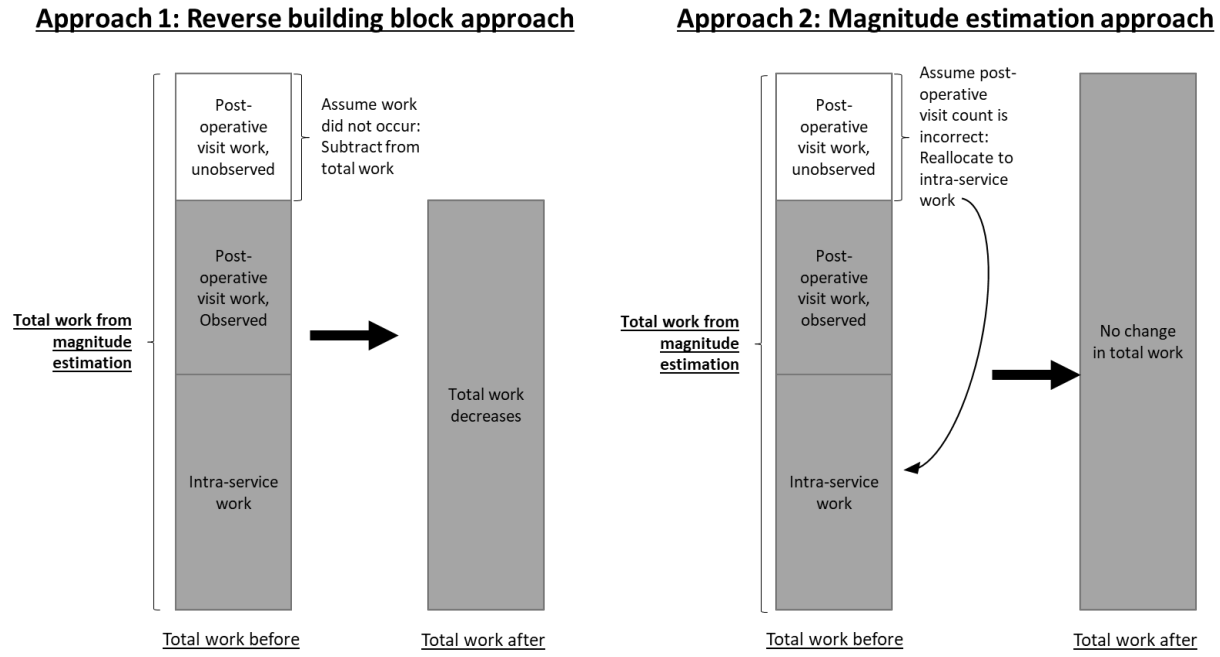
Third, we chose among multiple metrics to capture the typical number of post-operative visits actually provided. We used the median observed visits as a primary approach because medians are used elsewhere in the valuation process—for example, as the approach to estimate typical physician time. We considered other estimates of the number of visits when updating work RVUs, including the modal and mean reported visits as other potential approaches to

define the typical case that is relevant for valuation and the 75th percentile, which may be of interest to CMS as a policy alternative.

Fourth, and most importantly, our approach removes all of the work RVUs associated with visits that did not occur. There is an underlying tension between two approaches to calculating the total work associated with a procedure. The reverse building-block approach that we used assumes that total work is the sum of work contributed by different components of the procedure and global package (including post-operative visits). The approach that is the most different from the one that we used would be to assume that the total work from magnitude estimation is accurate and to not adjust work RVUs at all. See Figure 2.1 for a comparison of the reverse building-block and magnitude-estimation approaches. It is impossible to know whether RUC survey respondents and the RUC itself arrived at their estimates of total work via magnitude estimation considering an accurate or inflated number of post-operative visits. Likewise, it is impossible to know whether CMS's final valuation decisions reflect the number of assumed or actual post-operative visits. Again, we know that the assumptions regarding the number of visits are generally available to the RUC when it determines its final recommendations and to CMS when it proposes and finalizes values through notice and comment rulemaking.

Although our current analyses cannot provide insight on how the RUC and CMS incorporated these data, hybrids of the reverse building-block and magnitude-estimation approaches are feasible. Under a hybrid approach, observing fewer-than-expected post-operative visits could result in a smaller reduction in total work compared with the reduction under the reverse building-block approach result (i.e., the result in terms of total work would be in between the two extremes depicted in Figure 2.1).

Figure 2.1. Reverse Building-Block Versus Magnitude-Estimation Approach



Adjusting Work RVUs Only

We first calculated the average work RVU for the number and mix of visits assumed to occur during the global period for each individual HCPCS procedure code. The reverse building-block approach involves calculating new work RVUs that remove the work associated with this average visit for the number of visits that do not appear to be provided based on the difference between the number of assumed and observed post-operative visits:

$$WorkRVU_{new} = WorkRVU_{PFS} - \overline{VisitRVU_{TF}}(VisitCount_{TF} - VisitCount_{claims}). \quad (2.1)$$

In equation 2.1, $WorkRVU_{PFS}$ is the status quo work RVUs from the Physician Fee Schedule; $\overline{VisitRVU_{TF}}$ is the mean of status quo E&M visit work RVUs listed in the CY 2019 Time File;[35] $\overline{VisitCount_{TF}}$ is the count of assumed visits in the Time File; and $\overline{VisitCount_{claims}}$ is a count of visits reported via claims.

If the distribution of post-operative visits per global period is skewed to the right—that is, if a relatively small number of procedures have many visits, while most have relatively few—then the mean number of visits will be higher than the median or modal (i.e., most common) number of visits, which are two other statistics that CMS could use to describe the typical number of

[35] As noted earlier, E&M visit codes were revalued in the CY 2021 rule. We used earlier visit valuations from before this change. CMS decided not to include the higher E&M visit valuations in global packages, citing findings from earlier analyses of claims-based reporting that found that fewer visits were provided than expected.

post-operative visits. CMS also could decide to use another summary statistic—for example, the 75th percentile—as a way to gradually implement reductions in post-operative visits or to ameliorate the magnitude of the reduction. Because CMS may want to consider different alternatives, we use several different values of $\overline{VisitCount_{claims}}$, including using the median, 75th percentile, mean, and mode of observed visits (see Appendix B for information about the distribution of reported post-operative visits). We present the net results in terms of changes in total RVUs (including work, PE, and malpractice RVUs) after applying both steps. The next chapter describes our methods in more detail.

The revaluation approach for work RVUs outlined in this section relies on empirical estimates of the *number* of post-operative visits from claims-based analyses but *not* information about the *level* of visits, which is collected via the survey.

Adjusting Direct PE Inputs Only

In contrast to physician work, there is an unambiguous link between the number of bundled post-operative visits and direct PE inputs for procedures with 10- and 90-day global periods. Our broad approach is to remove the share of clinical time, equipment, and supplies associated with post-operative visits that were not delivered, as determined by the difference between the assumed and the median observed visits. We calculated changes to PE RVUs making only this change—and not changes to work RVUs. The resulting changes to PE RVUs could be implemented by CMS without adjusting work RVUs at all.

Adjusting Work, PE, and Malpractice RVUs Together

As a final step, we updated physician work using the reverse building-block approach described earlier; adjusted direct PE inputs as described earlier; allocated PE RVUs using updated direct PE inputs, physician time, and physician work; and allocated malpractice RVUs using updated physician work. We used the median observed visits to make adjustments to physician work RVUs, physician time, and direct PE inputs.[36] This final step describes the fullest extent to which CMS could use the newly collected data to revalue procedures with 10- and 90-day global periods to reflect the number of delivered visits.

[36] Our earlier report (Mulcahy, Liu, et al., 2021) compared results using the mean rather than median observed visits for revaluation. We found that results were generally similar, with slightly smaller reductions when using the mean observed visits because means tended to be larger than medians.

3. Revaluation Results

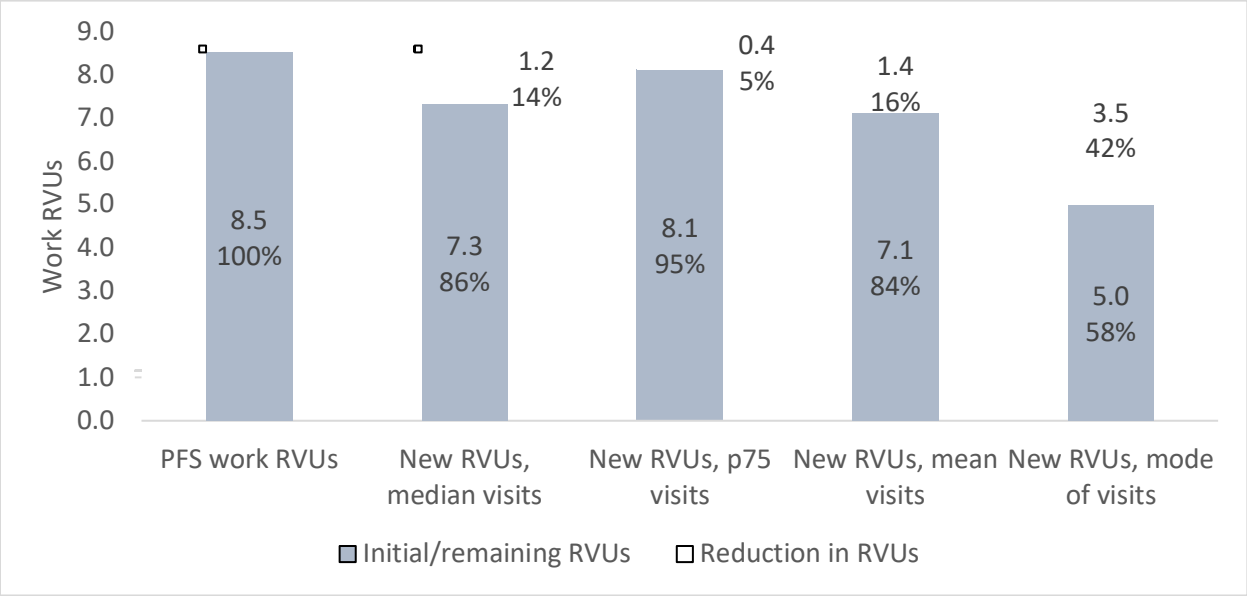
We present results in the following three sections:

1. updated work RVUs based on the observed number of post-operative visits measured in four ways (median, 75th percentile, mean, and modal observed visits)
2. allocated PE RVUs reflecting direct PE inputs and updated to reflect the median number of reported post-operative visits
3. modeled total RVUs reflecting updated work RVUs, updated physician time, and updated direct PE inputs, and including allocated PE and malpractice RVUs. We updated work RVUs, physician time, and direct PE inputs using the median number of reported post-operative visits.

Updated Work RVUs

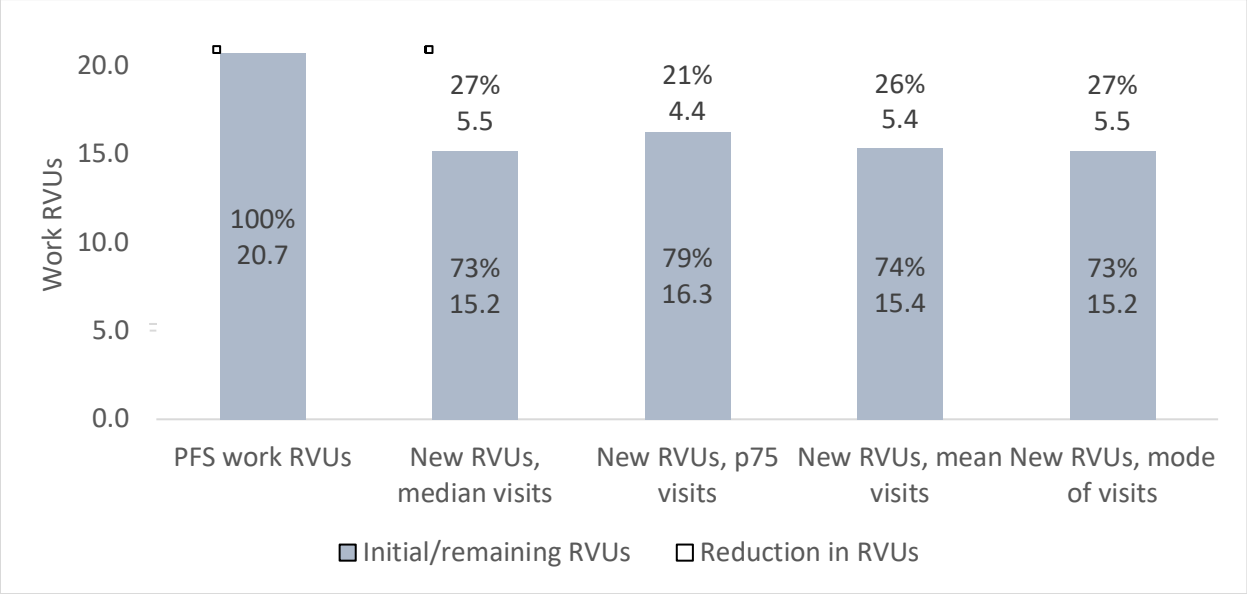
Figures 3.1–3.3 report physician work RVUs after removing work RVUs that are associated with the difference between expected and observed post-operative visits for three high-volume procedures: cataract surgery (HCPCS code 66984, 90-day global period), hip arthroplasty (HCPCS code 27130, 90-day global period), and destruction of premalignant lesion (HCPCS code 17000, 10-day global period). The reduction in work RVUs compared with the status quo is most apparent for HCPCS 17000, for which (1) visits very rarely occur and (2) the work RVUs associated with the single bundled visit are large in comparison with the status quo total work RVUs.

Figure 3.1. Updated Work RVUs Using Different Visit Metrics, Cataract Surgery (HCPCS code 66984)



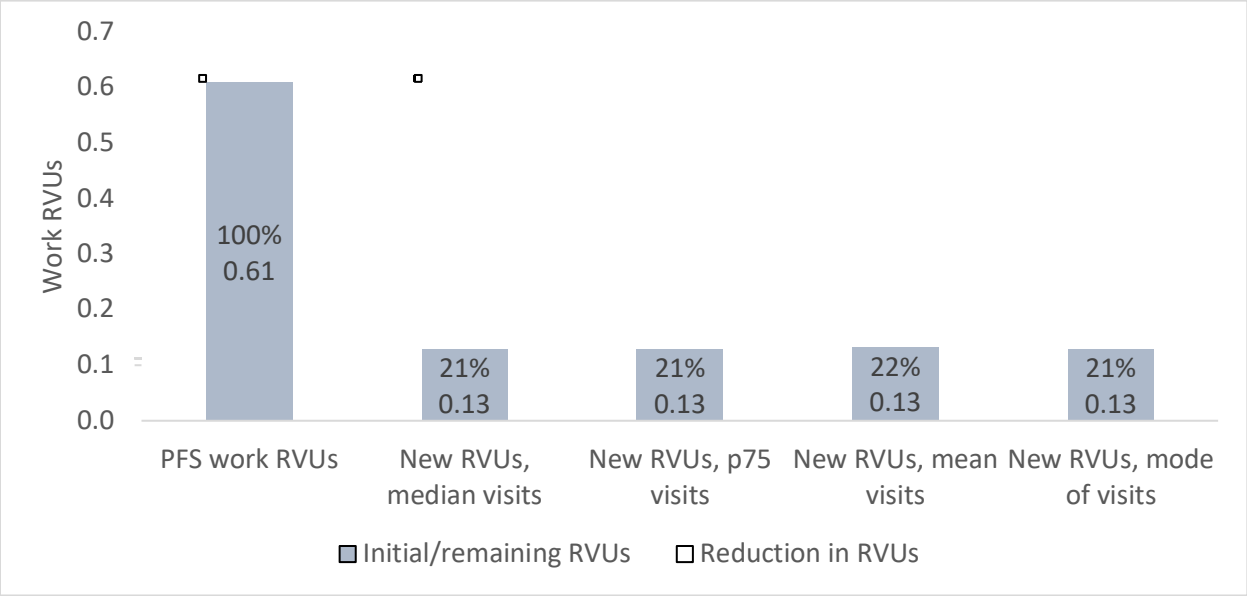
NOTE: PFS = Physician Fee Schedule. p75 = 75th percentile.

Figure 3.2. Updated Work RVUs Using Different Visit Metrics, Hip Arthroplasty (HCPCS code 27130)



NOTE: PFS = Physician Fee Schedule. p75 = 75th percentile.

Figure 3.3. Updated Work RVUs Using Different Visit Metrics, Remove Premalignant Lesion (HCPCS code 17000)



NOTE: PFS = Physician Fee Schedule. p75 = 75th percentile.

Tables 3.1 and 3.2 report status quo work RVUs and the proportional change in work RVUs for the top ten procedures with 10-day and 90-day global periods by volume, respectively. Although there is substantial variation in *relative* reductions across individual procedures with 10-day global periods (e.g., a 79-percent reduction for HCPCS code 17000, destruction of premalignant lesion, versus a 10-percent reduction for HCPCS code 13132, complex wound repair, when using the median of reported visits), the absolute magnitude of the reduction is usually the work RVUs for a single E&M visit. The variation in reductions across 90-day procedures, although more similar in relative terms, is substantial in terms of the number of RVUs involved (e.g., a reduction of more than five RVUs for HCPCS code 27130, total hip arthroplasty, versus a reduction of about one RVU for HCPCS code 66821, after cataract laser surgery). Work RVU results for all 291 procedure codes for which reporting of post-operative visits was required are in Appendix C, Table C.2.

Table 3.1. Change in Work RVUs from Different Revaluation Approaches, Top Ten Procedures with 10-Day Global Periods, by 2018 Medicare Volume

HCPCS Code	CPT Short Descriptors	PFS Work RVUs	Reduction in Work RVUs, Median Visits	Reduction in Work RVUs, 75th Pctl. Visits	Reduction in Work RVUs, Mean Visits	Reduction in Work RVUs, Mode of Visits	Medicare Volume
17000	Destruct premalg lesion	0.61	–78.7%	–78.7%	–78.1%	–78.7%	4,588,227
17110	Destruct [benign] lesion 1–14	0.70	–68.6%	–68.6%	–68.0%	–68.6%	2,049,227
17004	Destroy premal lesions 15/ >	1.37	–35.0%	–35.0%	–34.8%	–35.0%	861,245
10060	Drainage of skin abscess	1.22	–39.3%	–39.3%	–33.6%	–39.3%	413,247
68761	Close tear duct opening	1.41	–34.0%	–34.0%	–33.1%	–34.0%	341,423
64635	Destroy lumb/sac facet jnt	3.78	–42.6%	–42.6%	–42.1%	–42.6%	252,467
17262	Destruction of skin lesions	1.63	–29.4%	–29.4%	–28.7%	–29.4%	239,408
12032	Intmd rpr s/a/t/ext 2.6–7.5	2.52	–19.0%	–19.0%	–17.2%	–19.0%	224,558
11750	Removal of nail bed	1.58	–30.4%	–30.4%	–26.4%	–30.4%	194,732
13132	Cmplx rpr f/c/c/m/n/ax/g/h/f	4.78	–10.0%	0.0%	–7.1%	–10.0%	173,065

SOURCE: PFS work RVUs are from Medicare's Physician Fee Schedule. Reductions in work RVUs are calculated by subtracting RVUs associated with post-operative visits included in the Physician Fee Schedule valuation but not reported. Medicare volume is 2018 discounted units of service from aggregate Medicare utilization data.
NOTES: The CPT short descriptors are the same as those available in the Physician Fee Schedule. Pctl. = percentile. PFS = Physician Fee Schedule.

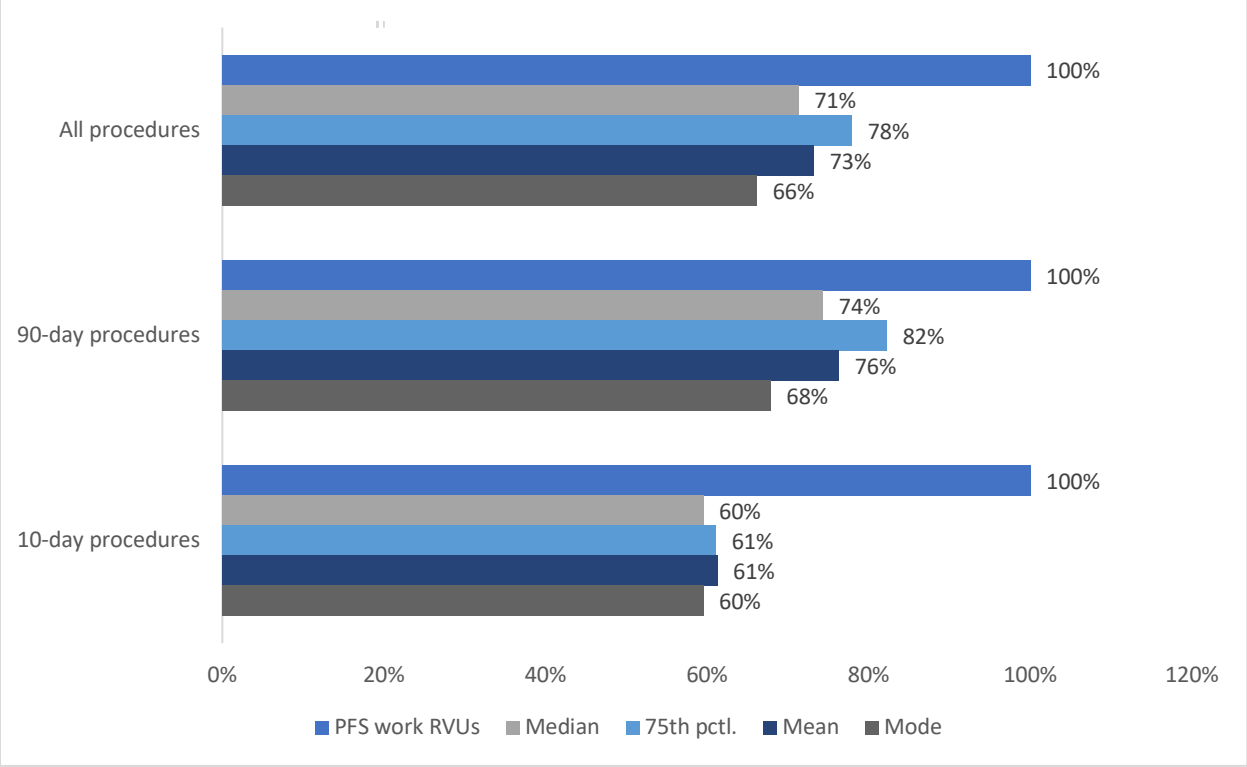
Table 3.2. Change in Work RVUs from Different Revaluation Approaches, Top Ten Procedures with 90-Day Global Periods, by 2018 Medicare Volume

HCPCS Code	CPT Short Descriptors	PFS Work RVUs	Reduction in Work RVUs, Median Visits	Reduction in Work RVUs, 75th Pctl. Visits	Reduction in Work RVUs, Mean Visits	Reduction in Work RVUs, Mode of Visits	Medicare Volume
66984	Cataract surg w/iol 1 stage	8.52	–13.8%	–4.6%	–16.4%	–41.5%	1,680,887
66821	After cataract laser surgery	3.42	–28.4%	–28.4%	–37.0%	–56.7%	637,157
27447	Total knee arthroplasty	20.72	–26.6%	–21.3%	–25.1%	–26.6%	319,995
27130	Total hip arthroplasty	20.72	–26.6%	–21.3%	–25.8%	–26.6%	163,089
66982	Cataract surgery complex	11.08	–10.6%	–3.5%	–12.9%	–31.9%	162,580
47562	Laparoscopic cholecystectomy	10.47	–20.9%	–12.5%	–18.2%	–20.9%	109,328
64721	Carpal tunnel surgery	4.97	–44.0%	–26.4%	–37.0%	–44.0%	104,552
33208	Insrt heart pm atrial & vent	8.52	–28.5%	–14.2%	–27.2%	–42.7%	99,957
29827	Arthroscop rotator cuff repr	15.59	–12.4%	–8.9%	–11.8%	–8.9%	94,671
63047	Remove spine lamina 1 lmbr	15.37	–27.5%	–20.6%	–27.7%	–27.5%	89,093

SOURCE: PFS work RVUs are from Medicare's Physician Fee Schedule. Reductions in work RVUs are calculated by subtracting RVUs associated with post-operative visits included in the Physician Fee Schedule valuation but not reported. Medicare volume is 2018 discounted units of service from aggregate Medicare utilization data.
NOTES: The CPT short descriptors are the same as those available in the Physician Fee Schedule. Pctl. = percentile. PFS = Physician Fee Schedule.

Figure 3.4 reports aggregated updated work RVUs after removing the work RVUs associated with post-operative visits that were not provided, first aggregated in proportion to Medicare volume across all 291 procedures for which data were available and then separately by global period.[37] Depending on which observed visit metric is used as an input in revaluation, the updated work RVUs are between 18 percent and 32 percent lower for procedures with 90-day global periods and between 39 percent and 40 percent lower for procedures with 10-day global periods compared with current work valuations. The choice of using the median, 75th percentile, mean, or modal count of post-operative visits has more of an impact for procedures with 90-day global periods, where there is more variation within each procedure code in terms of the number of observed visits. This choice has less of an impact for procedures with 10-day global periods, where visits rarely occur.

Figure 3.4. Share of Work RVUs Remaining After Revaluation Using Different Post-Operative Visit Metrics, 291 Surgical Procedures for Which Reporting Was Required



SOURCE: RAND analysis of 2019 claims data for reported post-operative visits and the Medicare CY 2019 Physician Fee Schedule and Time File.
NOTES: Results reflect the 2019 Medicare volume mix across the 291 procedures with Time File visits for which reporting of post-operative visits was required. Pctl. = percentile. PFS = Physician Fee Schedule.

[37] CMS required reporting of post-operative visits following 291 procedure codes in 2019. Three of these procedure codes did not have visits listed in the Time File.

Table 3.3 reports the change in work RVUs for the 291 codes for which reporting of post-operative visits was required overall and by specialty (i.e., based on the volume-weighted mix of services furnished by each specialty listed in Table 3.3). Appendix Tables C.3a and C.3b report results by specialty separately for procedures with 10- and 90-day global periods. We observed the following three general patterns:

1. *specialties focusing on procedures with highly variable visits per procedure*: Reductions tended to be significantly smaller when using the 75th percentile compared with the median or mean for such specialties as cardiac surgery, cardiology, neurosurgery, and thoracic surgery, which focus on procedures with a higher variance regarding the number of post-operative visits per procedure.
2. *specialties with large across-the-board reductions*: Dermatology, primary care, and nurse practitioner or physician assistant specialties had the largest reductions across the board for the procedures that they perform. These specialties perform very few procedures with 90-day global periods. The large reductions are not surprising, given the very few post-operative visits observed following procedures with 10-day global periods.
3. *all other specialties*: Most other specialties had reductions in the 20–30 percent range, with broadly similar reductions, regardless of whether the median, 75th percentile, mean, or mode of observed visits was used as the basis for revaluation.

Table 3.3. Percentage Change from Status Quo to Updated Work RVUs, 291 Procedures for Which Reporting Was Required

Specialty	Median of Reported Visits (%)	75th Percentile of Reported Visits (%)	Mean of Reported Visits (%)	Modal Reported Visits (%)
Total	–29	–22	–27	–34
Cardiac surgery	–30	–16	–24	–40
Cardiology	–25	–14	–21	–34
Colorectal surgery	–28	–18	–23	–32
Dermatology	–41	–37	–39	–42
Diagnostic radiology	–24	–24	–22	–24
General surgery	–24	–15	–19	–26
Hand surgery	–38	–25	–35	–40
Interventional radiology	–24	–23	–22	–24
Neurology	–33	–31	–32	–33
Neurosurgery	–26	–20	–24	–27
Nurse practitioner/physician assistant	–55	–54	–54	–56
Ophthalmology	–18	–11	–20	–38
Orthopedic surgery	–29	–22	–27	–30
Other specialty	–31	–26	–29	–35
Otolaryngology	–30	–25	–28	–33
Plastic and reconstructive surgery	–28	–20	–24	–32
Podiatry	–39	–30	–34	–47
Primary care	–44	–41	–41	–46
Surgical oncology	–23	–16	–19	–25
Thoracic surgery	–29	–15	–23	–39
Urology	–17	–11	–14	–24
Vascular surgery	–23	–16	–19	–27

We next broadened the scope of the analysis beyond the procedures for which reporting was required to include all procedures with 10- and 90-day global periods, including lower-volume procedures for which claims-based reporting was not required. As we describe in Appendix A, we imputed changes in post-operative visits for these other procedures using coefficients estimated in linear regression models using data from the 291 codes for which reporting was required. We calculated new work RVUs in the same way for procedures with and without reported data. The first two columns of Table 3.4 compare specialty-level aggregate changes in work RVUs relative to status quo Physician Fee Schedule work RVUs for the procedures for which reporting was required and for all procedures with 10- and 90-day global periods. We used the median count of reported visits to calculate updated work RVUs for both sets of results.

Table 3.4. Change in Aggregate Work RVUs from Different Revaluation Approaches by Specialty, All Procedures

Specialty	Reduction in Work RVUs for 291 Codes for Which Reporting Was Required (%)	Reduction in Work RVUs for All Procedures with 10- and 90-Day Global Periods (%)	Reduction in Work RVUs for All Physician Fee Schedule Services* (%)
Total	–27	–27	–3
Cardiac surgery	–30	–30	–19
Cardiology	–25	–26	0
Colorectal surgery	–29	–31	–16
Dermatology	–41	–40	–13
Diagnostic radiology	–24	–24	0
General surgery	–25	–27	–14
Hand surgery	–36	–32	–16
Interventional radiology	–24	–24	–3
Neurology	–10	–12	0
Neurosurgery	–27	–27	–14
Nurse practitioner/physician assistant	–34	–33	–2
Ophthalmology	–18	–19	–7
Orthopedic surgery	–28	–28	–15
Other specialty	–29	–28	0
Otolaryngology	–29	–28	–5
Plastic and reconstructive surgery	–29	–28	–18
Podiatry	–34	–32	–4
Primary care	–43	–41	0
Surgical oncology	–24	–30	–19
Thoracic surgery	–29	–29	–18
Urology	–17	–21	–4
Vascular surgery	–24	–25	–9

SOURCE: RAND analysis of 2019 claims data for reported post-operative visits and the Medicare CY 2019 Physician Fee Schedule and Time File.
NOTES: All updated work RVUs were calculated using the median of observed post-operative visits. Primary care includes family practice, general practice, and internal medicine.
* Indicates that the results (1) update work RVUs only for procedures with 10- and 90-day global periods and (2) express the reduction in work RVUs relative to work RVUs for all services under the Physician Fee Schedule.

We expected that results for all procedures with 10- and 90-day global periods would be broadly similar to results for just the 291 codes for which reporting was required for two reasons. First, the 291 codes account for a large share of total Medicare and by-specialty volume and payments among procedures with 10- and 90-day global periods.[38] Second, our methods used observed relationships between procedure characteristics and the share of visits that were observed for the 291 codes to impute values for codes for which reporting was not required.

[38] As noted earlier, the selected HCPCS codes accounted for 96.5 percent of all of the procedures furnished with 10-day global periods and 84.6 percent of all procedures with 90-day global periods in 2019.

Overall, we found a 27-percent reduction for procedures in both categories. Results for individual specialties were generally close.

The rightmost column in Table 3.4 expresses the reduction in work RVUs relative to total RVUs for all Physician Fee Schedule services, including procedures with 0-day global periods and all other services, such as E&M visits without any global period.[39] For example, for cardiac surgery, the overall reduction in work RVUs is 19 percent, which, although it is smaller than the 30-percent reduction for procedures with 10- and 90-day global periods, is still substantial because a large share of total work for cardiac surgeons is from procedures. Other procedure-focused specialties had relatively large reductions (greater than a 10-percent reduction) in work RVUs, including colorectal surgery, dermatology, general surgery, hand surgery, neurosurgery, orthopedic surgery, plastic and reconstructive surgery, surgical oncology, thoracic surgery, and vascular surgery. In contrast, the net change in work RVUs is very small for specialties for which the amount of work associated with procedures with 10- and 90-day global periods is small relative to total work (e.g., cardiology, diagnostic radiology, interventional radiology, neurology, nurse practitioner or physician assistant, podiatry, primary care, and urology).

These results reflect changes *only* to work RVUs. Changes in work RVUs would directly change PE and malpractice RVUs, so the change in total RVUs by specialty would differ from that reported in Table 3.4. The Physician Fee Schedule conversion factor would increase to offset any overall change in total RVUs so that total spending would remain unchanged and payments would change differently from RVUs. The impacts of changes to work and other inputs on total RVUs are explored in later analyses.

Effect on PE RVUs of Updated Direct Practice Costs

Tables 3.5 and 3.6 report procedure-level changes in RVUs resulting from updated direct PE inputs for the top ten procedures with 10- and 90-day global periods by Medicare volume, respectively. The proportional reductions in PE and total RVUs for 10-day procedures were relatively large compared with those for 90-day procedures. Across all 90-day procedures, PE and total RVUs declined by 12.4 percent and 5.0 percent, respectively, compared with reductions of 16.2 percent and 9.8 percent across all 10-day procedures.

[39] Our revaluation approach did not adjust the number of work RVUs for any services on the Physician Fee Schedule that did *not* have a 10- or 90-day global period.

Table 3.5. Change in Direct PE and Total RVUs, Top Ten Procedures by Medicare Volume and All Procedures with 10-Day Global Periods, Facility Valuation

HCPCS Code	CPT Short Descriptors	PFS PE RVUs	Updated PE RVUs	Percentage Change, PE RVUs	PFS Total RVUs	Updated Total RVUs	Percentage Change, Total RVUs
17000	Destruct premalg lesion	0.9	0.4	–56.5	1.5	1.1	–31.2
17110	Destruct b9 lesion 1–14	1.2	0.8	–32.2	2.0	1.6	–19.3
17004	Destroy premal lesions 15/ >	1.3	0.8	–35.4	2.9	2.4	–16.1
10060	Drainage of skin abscess	1.5	1.0	–34.7	2.8	2.3	–18.1
68761	Close tear duct opening	1.9	1.3	–28.3	3.4	2.8	–15.7
64635	Destroy lumb/sac facet jnt	2.3	1.8	–21.9	6.4	5.9	–8.0
17262	Destruction of skin lesions	1.5	1.1	–24.1	3.3	3.0	–10.6
12032	Intmd rpr s/a/t/ext 2.6–7.5	2.7	2.1	–24.1	5.6	4.9	–11.8
11750	Removal of nail bed	1.2	0.6	–48.0	2.9	2.3	–20.1
13132	Cmplx rpr f/c/c/m/n/ax/g/h/f	3.6	2.9	–17.6	9.1	8.4	–6.8
N/A	All 10-day procedures	N/A	N/A	–16.2	N/A	N/A	–9.8

NOTES: The CPT short descriptors are those available in the Physician Fee Schedule. N/A = not applicable. PFS = Physician Fee Schedule.

Table 3.6. Change in Direct PE and Total RVUs, Top Ten Procedures by Medicare Volume and All Procedures with 90-Day Global Periods, Facility Valuation

HCPCS Code	CPT Short Descriptors	PFS PE RVUs	Updated PE RVUs	Percentage Change, PE RVUs	PFS Total RVUs	Updated Total RVUs	Percentage Change, Total RVUs
66984	Cataract surg w/iol 1 stage	9.1	8.4	–7.9	18.2	17.5	–3.9
66821*	After cataract laser surgery	5.2	4.3	–17.2	8.9	8.0	–10.1
27447	Total knee arthroplasty	14.4	13.2	–8.5	39.2	38.0	–3.1
27130	Total hip arthroplasty	14.4	13.2	–8.4	39.2	38.0	–3.1
66982	Cataract surgery complex	10.8	10.1	–6.4	22.6	22.0	–3.0
47562	Laparoscopic cholecystectomy	6.2	5.4	–12.1	19.1	18.4	–3.9
64721*	Carpal tunnel surgery	6.4	4.9	–23.9	12.4	10.8	–12.4
33208	Insrt heart pm atrial & vent	4.7	4.3	–8.1	15.2	14.8	–2.4
29827	Arthroscop rotator cuff repr	12.3	10.8	–12.7	30.4	28.9	–5.2
63047	Remove spine lamina 1 lmbr	12.0	10.6	–12.0	32.1	30.6	–4.4
N/A	All 90-day procedures	N/A	N/A	–12.4	N/A	N/A	–5.0

NOTES: The CPT short descriptors are those available in the Physician Fee Schedule. N/A = not applicable. PFS = Physician Fee Schedule.
* Indicates that the procedure code has both facility and nonfacility valuation. All other procedures have only facility valuation. In cases in which a procedure has both, this table reports the facility valuation only.

We found that changes to direct PE inputs led to relatively modest changes in allocated PE RVUs (Table 3.7) by specialty. Reductions in direct PE inputs resulted in a 14-percent reduction in PE RVUs and a 6-percent reduction in total RVUs for procedures with 10- and 90-day global periods. Because a fixed pool of PE RVUs is allocated across all services under the Physician Fee Schedule, the reductions in PE RVUs for procedures with 10- and 90-day global periods were offset by *increases* in PE RVUs for other Physician Fee Schedule services for a net change of 0 percent for all services by design.[40] The net impacts by specialty were modest when considering all services, ranging from 4-percent reductions in total RVUs for hand surgery and plastic and reconstructive surgery to 1-percent increases for cardiology, interventional radiology, and vascular surgery.

[40] Because we did not use updated work RVUs, the total pool of PE RVUs remains the same as the status quo pool.

Table 3.7. Change in PE RVUs Because of Updated Direct PE Inputs, by Specialty

	Procedures with 10- and 90-Day Global Periods			All Services		
Specialty	Status Quo PE RVUs from 10- and 90-Day Procedures as a Share of Total RVUs	%Δ, PE RVUs	%Δ, Total RVUs	Status Quo PE RVUs from 10- and 90-Day Procedures as a Share of Total RVUs	%Δ, PE RVUs	%Δ, Total RVUs
Total	45%	–14	–6	5%	0	0
Cardiac surgery	24%	–7	–2	14%	–2	–1
Cardiology	30%	–12	–4	0%	1	1
Colorectal surgery	36%	–16	–6	18%	–6	–2
Dermatology	62%	–17	–10	21%	–3	–2
Diagnostic radiology	45%	–11	–5	1%	1	0
General surgery	33%	–13	–4	16%	–4	–2
Hand surgery	51%	–20	–10	26%	–9	–4
Interventional radiology	49%	–8	–4	4%	1	1
Neurology	45%	–8	–4	1%	1	0
Neurosurgery	36%	–10	–4	20%	–4	–1
Nurse practitioner/physician assistant	49%	–17	–8	4%	0	0
Ophthalmology	52%	–12	–6	19%	–2	–1
Orthopedic surgery	40%	–12	–5	21%	–4	–2
Other specialty	49%	–11	–5	1%	1	0
Otolaryngology	48%	–24	–12	8%	–1	–1
Plastic and reconstructive surgery	48%	–15	–7	33%	–9	–4
Podiatry	54%	–18	–10	7%	0	0
Primary care	58%	–20	–12	0%	1	0
Surgical oncology	33%	–13	–4	21%	–7	–2
Thoracic surgery	24%	–7	–2	15%	–3	–1
Urology	35%	–12	–4	5%	0	0
Vascular surgery	26%	–12	–3	5%	1	1

SOURCE: RAND analysis of 2019 claims data for reported post-operative visits and the Medicare CY 2019 Physician Fee Schedule and Time File.
NOTES: "%Δ, PE RVUs" is the percentage change from status quo PE RVU valuations to updated PE RVU valuations. "%Δ, Total RVUs" is the percentage change from status quo total RVU valuations to updated total RVU valuations when adjusting only PE RVUs. Primary care includes family practice, general practice, and internal medicine.

Summary of Total RVUs Based on Updated Work, Time, and Direct Practice Costs

Table 3.8 reports volume-weighted changes in work, PE, malpractice, and total RVUs overall and at the specialty level when work, time, and direct costs are all reduced for global services. The table includes results for (1) procedures with 10- and 90-day global periods and (2) all services. All estimates use the median observed count of post-operative visits. Our adjustments to work RVUs, physician time, and direct PE inputs resulted in a 28.5-percent reduction in total RVUs for procedures with 10- and 90-day global periods and a slight

increase (0.4 percent, not reported) for all other Physician Fee Schedule services. The net reduction in RVUs was 2.6 percent across all Physician Fee Schedule services or $2.5 billion at the 2019 conversion factor.[41] The impact on procedure-focused specialties was larger; the largest impact was a 20.3-percent reduction in total RVUs for plastic and reconstructive surgery. The small increases in RVUs for primary care, neurology, cardiology, and diagnostic radiology are attributable to increases in allocated PE and malpractice RVUs for services without 10- and 90-day global periods. The net impact for specialties that bill primarily for services without 10- and 90-day global periods (e.g., cardiology) was positive.

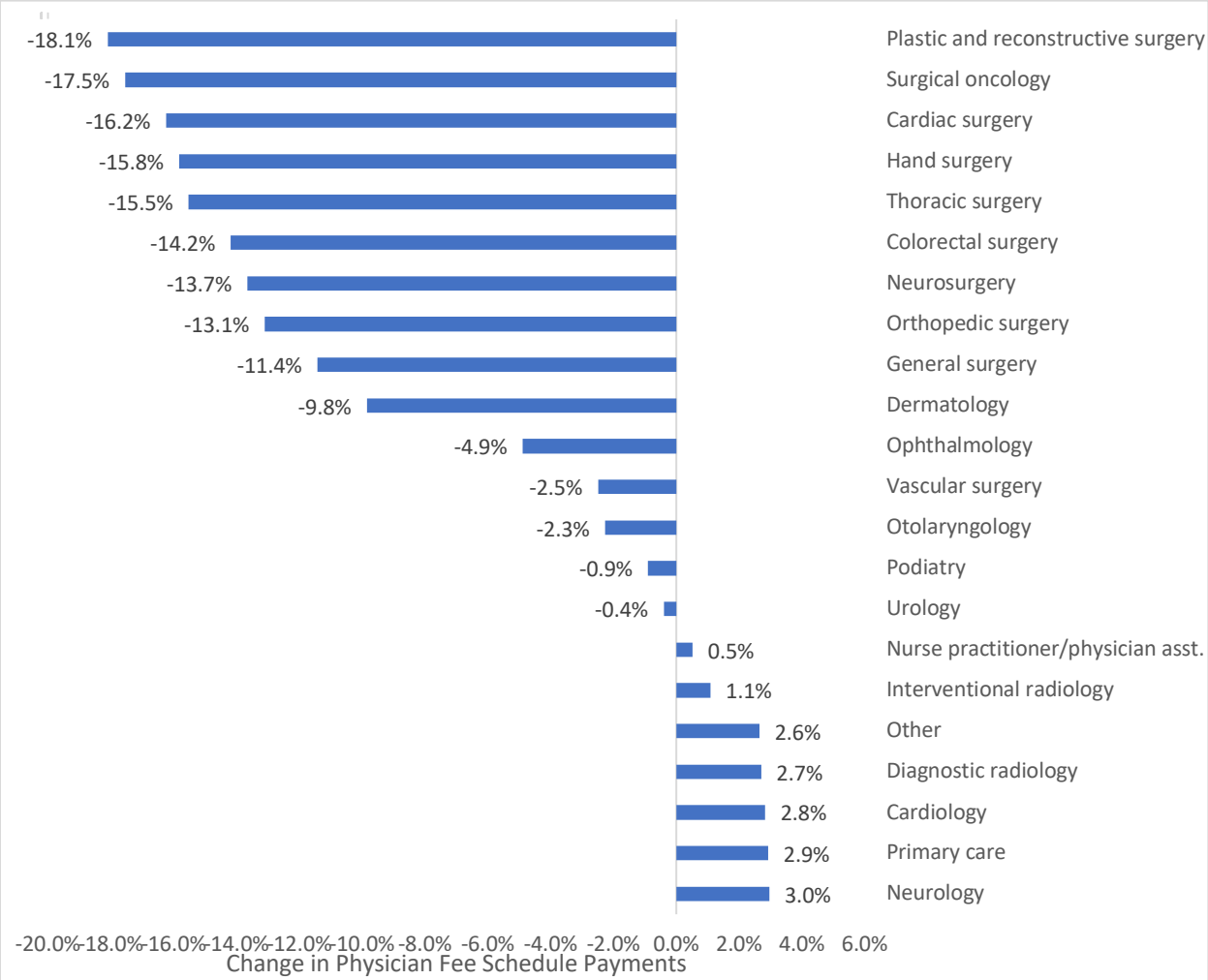
As a final step in our main analysis, we estimated the change in Medicare payments under the Physician Fee Schedule by calculating an updated conversion factor to preserve budget neutrality.[42] Because the overall number of RVUs decreased, the conversion factor (defined as funds available to pay for Physician Fee Schedule services divided by the sum of RVUs) increased. As a result, the reductions in total RVUs for surgical specialties, such as cardiac surgery, surgical oncology, and thoracic surgery, yielded slightly smaller reductions in payments (Figure 3.5). For some specialties (e.g., interventional radiology), a small reduction in total RVUs was offset by a higher conversion factor to yield a small increase in payments. Modest increases in total RVUs for other specialties (e.g., cardiology, neurology, and the specialties that report collectively as primary care) yielded a larger (but still modest) increase in payments.

[41] Importantly, as we address later, this amount does not represent potential savings to Medicare. If CMS implemented these RVU reductions, the conversion factor would increase because of CMS's budget neutrality requirement with further redistributive implications for payments.

PE and malpractice RVUs declined by the same percentage as work RVUs, by design. The reductions were not exactly the same because of rounding and floors on allocated malpractice RVUs.

[42] We did not model CMS's transition policy or Outpatient Prospective Payment System caps when estimating changes in payments. The actual changes in payments—both decreases and increases—would be moderated by these policies if CMS were to use this approach to revalue global services.

Figure 3.5. Percentage Change in Physician Fee Schedule Payments After Revaluation, by Specialty



SOURCE: RAND analysis of 2019 claims data for reported post-operative visits and the Medicare CY 2019 Physician Fee Schedule and Time File.
NOTES: "Change in Physician Fee Schedule Payments" is the percentage change from status quo total RVU valuations to updated total RVU valuations. Primary care includes family practice, general practice, and internal medicine. Asst. = assistant.

Table 3.8. Change in Work, PE, and Malpractice Payments, Median Observed Post-Operative Visits, by Specialty

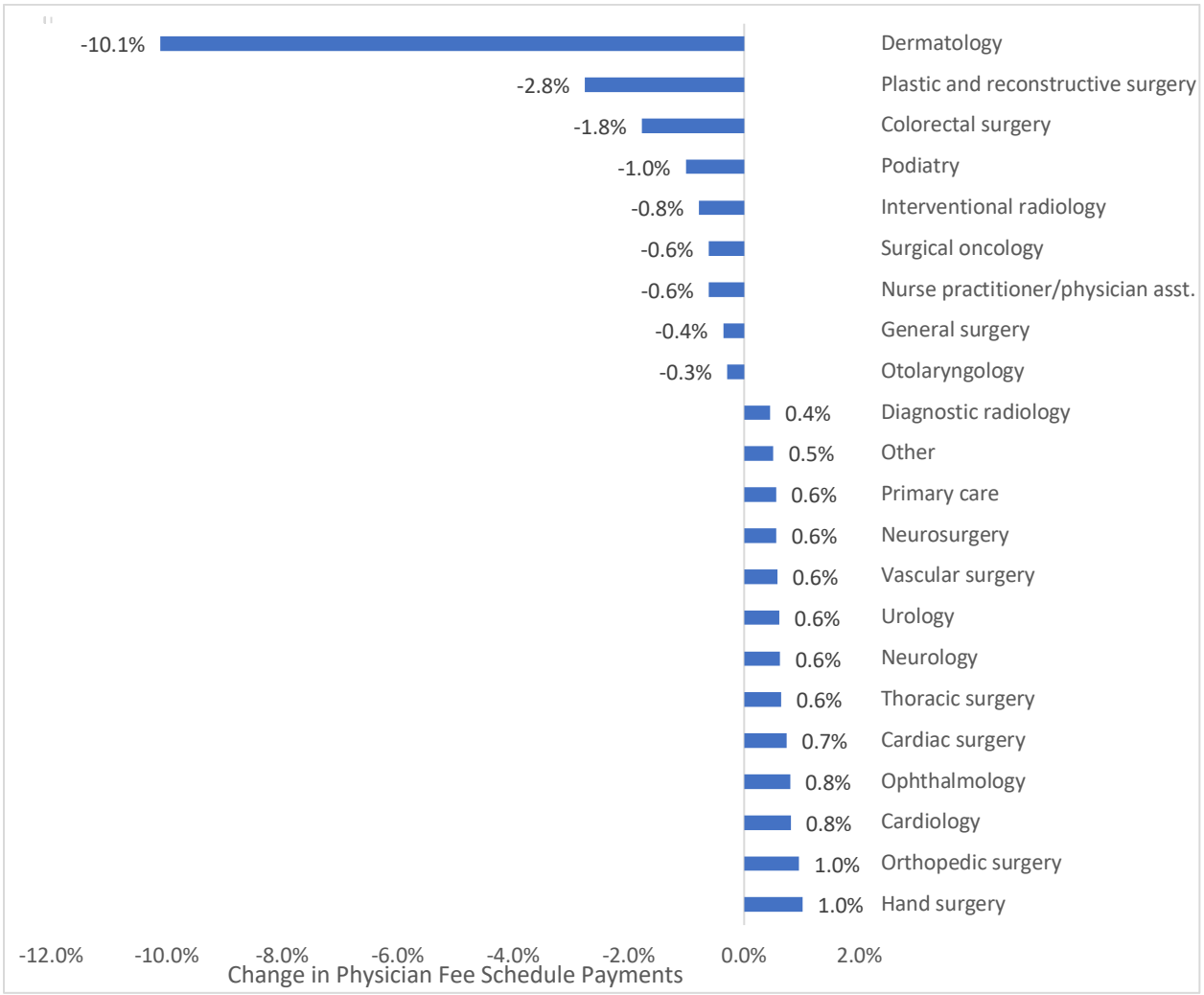
Specialty	Share of Current RVUs from 10- or 90-Day Global Periods	%Δ Work RVUs, All Services	%Δ Work RVUs, Services with 10- or 90-Day Global Periods	%Δ PE RVUs, All Services	%Δ PE RVUs, Services with 10- or 90-Day Global Periods	%Δ Malpractice RVUs, All Services	%Δ Malpractice RVUs, Services with 10- or 90-Day Global Periods	%Δ Total RVUs, All Services	%Δ Total RVUs, Services with 10- or 90-Day Global Periods
Total	10.5	–2.6	–27.3	–2.7	–30.4	–2.6	–25.0	–2.6	–28.5
Cardiac surgery	60.5	–19.4	–29.8	–16.4	–34.7	–19.2	–27.5	–18.5	–30.6
Cardiology	1.4	–0.4	–26.2	0.3	–30.0	3.5	–23.2	0.1	–26.9
Colorectal surgery	50.5	–16.4	–31.2	–16.2	–37.0	–18.0	–28.6	–16.5	–33.0
Dermatology	34.0	–13.1	–40.4	–11.7	–33.0	–13.2	–36.1	–12.2	–35.6
Diagnostic radiology	1.5	–0.3	–24.0	0.3	–21.5	0.5	–20.0	0.0	–22.6
General surgery	48.1	–13.7	–27.3	–13.4	–33.6	–15.8	–24.3	–13.8	–29.0
Hand surgery	51.7	–16.4	–32.4	–19.3	–38.4	–19.5	–29.8	–18.0	–35.2
Interventional radiology	8.8	–2.7	–23.9	–1.0	–17.4	–0.5	–20.3	–1.6	–20.4
Neurology	2.3	–0.2	–12.4	0.5	–14.9	3.3	–6.1	0.2	–12.7
Neurosurgery	55.8	–14.5	–27.4	–18.2	–32.4	–15.3	–25.5	–15.9	–28.9
Nurse practitioner/physician assistant	7.3	–1.9	–32.6	–2.5	–35.1	–2.0	–27.7	–2.1	–33.4
Ophthalmology	35.8	–7.1	–18.6	–7.7	–23.9	–6.6	–15.6	–7.4	–21.3
Orthopedic surgery	51.7	–15.1	–27.6	–15.5	–34.2	–16.2	–24.9	–15.4	–30.0
Other specialty	1.9	–0.4	–28.1	0.2	–23.3	2.1	–23.7	–0.1	–25.5
Otolaryngology	15.8	–5.2	–28.4	–4.7	–38.8	–4.3	–25.5	–4.8	–33.2
Plastic and reconstructive surgery	67.2	–18.2	–28.2	–22.5	–33.0	–18.2	–25.4	–20.3	–30.3
Podiatry	12.3	–3.9	–31.7	–3.2	–29.5	–3.4	–30.7	–3.5	–30.5
Primary care	0.7	–0.2	–41.5	0.5	–35.8	2.7	–37.0	0.2	–37.9
Surgical oncology	62.3	–19.2	–30.2	–20.1	–36.5	–21.3	–27.7	–19.7	–31.9
Thoracic surgery	60.1	–18.5	–28.9	–16.1	–33.5	–18.6	–26.5	–17.8	–29.7
Urology	14.9	–4.0	–21.4	–2.3	–24.9	–1.1	–18.2	–3.0	–22.4
Vascular surgery	19.7	–9.5	–25.0	–2.5	–31.7	–9.9	–21.8	–5.1	–26.3

SOURCE: RAND analysis of 2019 claims data for reported post-operative visits and the Medicare CY 2019 Physician Fee Schedule and Time File.
NOTES: "%Δ, PE RVUs" is the percentage change from status quo PE RVU valuations to updated PE RVU valuations. "%Δ, Total RVUs" is the percentage change from status quo total RVU valuations to updated total RVU valuations when adjusting only PE RVUs. Primary care includes family practice, general practice, and internal medicine.

Revaluing Procedures with 10-Day Global Periods Only

Figure 3.6 reports changes in Medicare Physician Fee Schedule payments by specialty when only procedures with 10-day global periods are revalued. Nearly all dermatology procedures have 10-day global periods. As a result, the reduction in RVUs and payments is largest for dermatologists. Slightly more surgical specialties have increases in payments because of the reallocation of PE and malpractice RVUs than those with decreases.

Figure 3.6. Percentage Change in Physician Fee Schedule Payments After Revaluation, by Specialty, 10-Day Global Periods



SOURCE: RAND analysis of 2019 claims data for reported post-operative visits and the Medicare CY 2019 Physician Fee Schedule and Time File.
NOTES: "Change in Physician Fee Schedule Payments" is the percentage change from status quo total RVU valuations to updated total RVU valuations. Primary care includes family practice, general practice, and internal medicine. Asst. = assistant.

4. Discussion

Congress requires CMS to both collect information on how many post-operative visits occur and "use [this] information . . . and other available data for the purpose of improving the accuracy of valuation of surgical services under the physician fee schedule under this section" (Public Law 114-10, 2015). Throughout three years of claims data–based collection, we found that post-operative visits following procedures with 10-day global periods occur only very rarely and that fewer than half of expected post-operative visits occur after major surgeries with 90-day global periods.

In this report, we provide updated analyses describing how CMS could use the number of post-operative visits observed in claims and the reverse building-block approach to adjust the valuation of procedures with 10- and 90-day global periods. We describe the impact on work RVUs, PE RVUs, and total RVUs. Depending on which statistic describing the number of observed visits we used (e.g., mean, median), we found that the approach reduced work RVUs by 18–30 percent for procedures with 90-day global periods and by 39–40 percent for procedures with 10-day global periods.[43] Adjusting direct PE inputs according to the observed number of post-operative visits resulted in relatively modest reductions in PE and total RVUs for procedures with 10- and 90-day global periods. In terms of total RVUs, the approach resulted in large reductions among proceduralist specialties (e.g., 20.3 percent for plastic and reconstructive surgery) and small increases for some other specialties (e.g., cardiology). In general, and not surprisingly, the greatest reductions in payments would be for specialties that perform a large number of procedures with 10- and 90-day global periods.

Tensions Between the Reverse Building-Block Approach and Magnitude Estimation

The revaluation approach that we modeled in this report relies on the reverse building-block framework to remove work RVUs from total work to reflect visits that are not delivered to patients. In the introduction, we highlighted the tension between the reverse building-block approach and magnitude estimation in the RBRVS system. The RUC survey respondents, the RUC, and CMS consider the full number of post-operative visits listed in the Time File when estimating total work. This would suggest that it is appropriate to remove the corresponding work RVUs from the valuation for the procedure if the post-operative visits are not typically provided. The reverse building-block approach seems to have been applied in at least some cases

[43] The revised work RVUs would lead to changes in PE and malpractice RVUs, so the effect on total RVUs would be different from the effect on work only.

in which the number of post-operative visits included in a global period was reduced without simultaneous changes in intraservice work.[44]

However, there are also concerns with the reverse building-block approach. For some procedures, the sum of building-block components does not align with the total work estimates from magnitude estimation. At the extreme, for a small number of procedures, the total work associated with the sum of post-operative visits is actually greater than the total work for the procedure, and, in other cases, post-operative visits account for such a large share of total work that an impossibly small amount of physician work is left to account for the procedure itself (Wynn et al., 2015). In these cases, it may be that the number of post-operative visits (or the work per post-operative visit) being inflated does not necessarily indicate that the total work estimate is similarly inflated. Although we recognize this tension, the reverse building-block approach provides an important starting point for further policy development around revaluation.

Revaluation Recommendation and Alternatives

We recommend that CMS revalue procedures with 10- and 90-day global periods using the reverse building-block approach by removing work RVUs, direct PEs, and physician time to reflect the actual number of post-operative visits, as we describe earlier. As required by MACRA, this approach uses the recently collected claims-based data on post-operative visits to improve the valuation of procedures. In general, using these new claims-based data for the purposes of revaluation should improve transparency, objectivity, and accuracy. The RUC could revalue procedures for which the change or resulting work RVUs appear incorrect. We expect that, given the opportunity, the RUC would revisit the valuation for some procedures with inappropriately large reductions in work RVUs.

There are several alternatives or adjustments to our main recommendation that CMS could pursue, which we discuss in the following sections.

Phasing In New Procedure Valuations

CMS could apply reverse building-block reductions gradually, allowing time for the RUC, specialty societies, and CMS to revalue codes as necessary. For example, reductions in years 1, 2, and 3 could reflect 25, 50, and 100 percent of the reverse building-block changes, respectively. This approach allows some time for the survey-based revaluation processes to play out, which could shield practitioners from major immediate reductions in revenue. The RUC and specialty societies likely would focus on high-volume, high-revenue codes, for which there was judged to be an inappropriately large reduction. The concern is that practitioners might continue to be paid for more work than they actually furnished as the reductions are phased in.

[44] As noted in Chapter 1, the 2017–2018 revaluation of HCPCS code 52601 (prostatectomy) reduced work RVUs from 15.26 to 13.16, while the total number of expected post-operative visits fell from seven to 2.5 visits and intraservice time remained unchanged at 75 minutes.

Using Hybrid Reverse Building-Block Approaches

Hybrids of the reverse building-block and magnitude-estimation approaches are feasible. Under a hybrid approach, one would weight the reverse building-block and magnitude-estimation approaches (e.g., 75 percent reverse building-block / 25 percent magnitude estimation) to calculate the valuation. For example, if a procedure's work RVU valuation were reduced by 20 percent because of post-operative visits that did not occur under the reverse building-block approach, a 75-percent / 25-percent hybrid approach would reduce work RVUs by 15 percent (i.e., 0.75 × 0.20, or 75 percent of the full reverse building-block reduction). Hybrid revaluation approaches of this type assume that both approaches have some validity. It is perhaps more likely that post-operative visit counts listed in the Time File are inflated to some extent relative to what was actually considered under the magnitude-estimation approach to work RVU valuation, and, to some extent, magnitude estimation results in total work RVU valuations that are too high, given the number of post-operative visits that are actually provided. A concern with this approach is that there are no data to support the relative weights; therefore, it may be seen as an arbitrary choice.

Applying the Reverse Building-Block Approach Using Alternatives to the Median of Observed Visits

As an alternative to partially applying reverse building-block reductions, CMS could revalue global procedures based on the 75th percentile, 60th percentile, or some other threshold of reported post-operative visits that is greater than the median number we used in our analysis. This approach would recognize the potential for some underreporting of post-operative visits. A criticism of this approach is that it is not aligned with the typical procedure, which is the norm used in the valuation process.

Adjusting Direct PEs Only

Direct PEs could be adjusted, as outlined in this report, using only updated direct PEs and time. Because a large share of assumed visits are not actually provided, physician time and direct PEs should be lower. This adjustment would address a clear case in which Medicare has been overpaying for global services without needing to resolve the tension between the reverse building-block and magnitude-estimation approaches. These reductions have implications both for PE RVUs allocated to procedures with 10- and 90-day global periods and—because of the allocation of a fixed pool of PE RVUs across all Physician Fee Schedule services—for all Physician Fee Schedule services.

The concern with applying only this change (and not also adjusting work RVUs downward) is that CMS could continue to overpay for services with global periods. CMS could pursue a variant of the hybrid approach described in the previous section by applying 100 percent of the direct PE adjustment and a percentage (e.g., half) of the work RVU adjustment.

Potential Transition to 0-Day Global Periods

In CMS's decisions regarding revaluation, CMS also might decide to revisit its earlier proposal to convert some or all services with 10- and 90-day global periods to services with 0-day global periods, with providers simply billing separately for E&M visits after the day of the procedure, as they do for other services. The revaluation approach laid out in this report provides CMS with a road map to develop new work RVUs for the 0-day global procedures. The resulting reductions in work RVUs will be similar to those modeled in this report, given that procedures with 10-day global periods had so few reported post-operative visits. Work RVU reductions would be more substantial than the estimates in this report for procedures with 90-day global periods if CMS were to remove all work RVUs associated with post-operative visits. In our earlier studies (Crespin et al., forthcoming-a; Crespin et al., forthcoming-b; Kranz et al., 2021), we found that 38 percent to 39 percent of expected post-operative visits were provided.

Given the paucity of reported post-operative visits for procedures with 10-day global periods, we believe that it is very reasonable for CMS to transition all current 10-day global periods to 0-day global periods, revaluing procedures using the reverse building-block approach, as described earlier. Because no procedure with a 10-day global period has a median (or mode) of more than zero reported visits, the reverse building-block revaluation results that we describe in Chapter 3 for procedures with 10-day global periods are also estimates of transitioning 10-day global periods to 0-day global periods.

Importantly, transitioning procedures to 0-day global periods allows practitioners to bill separately for post-operative visits when they do occur. Providers would not be able to bill separately for post-operative visits if CMS revalued procedures with 10-day global periods downward to reflect the fact that post-operative visits are not typically provided while retaining the 10-day global period itself. There are several potential concerns with converting some or all procedures with 10- and 90-day global periods to procedures with 0-day global periods. First, it is difficult to predict the behavioral response to unbundling post-operative visits by practitioners and the broader health care delivery system. It is possible that separate billing for E&M visits will result in relatively more post-operative visits than visits reported using HCPCS code 99024 to date, which could lead to higher Medicare payments and patient cost-sharing even if payments for procedures themselves are lower. We think that the increase in billing of post-operative E&M visits would be modest beyond the number of already-reported HCPCS code 99024 procedures because of the high opportunity cost of post-operative care relative to performing additional procedures. To address concerns related to increased billing, CMS could require that a modifier be used, at least temporarily, to report separately billed post-operative visits for procedures that are converted to 0-day global periods. This would allow CMS to better track the quantity of post-operative care over time.

A second concern with transitioning to 0-day global periods is that it might inhibit innovation. Global payments and bundled payments generally encourage more-innovative ways

of delivering post-operative care (e.g., post-operation check-ins via a smartphone app), and unbundling may discourage some care that otherwise would not be separately paid. There may be forms of telehealth (e.g., remote patient monitoring) that are relatively more difficult for practitioners to bill for post-operative care. The bundled payment concept underlying global periods simplifies an approach for CMS to pay for these services. For these reasons, it may make sense to transition only procedures with 10-day global periods to procedures with 0-day global periods.

Broader Options CMS Might Consider

The focus of our analyses was on how to revalue procedures according to the number of post-operative visits reported. We did not model other global period–related policies that CMS might consider in the future. These include, for example, using other sources of intraservice time to revalue procedures, changing the duration of global periods, transitioning to more-standardized post-operative visit "packages" that may or may not be billable separately from the procedure, or narrowing the scope of bundled services.

For example, to address concerns that post-operative care is being provided by practitioners who are billing independently (Crespin et al., forthcoming-b), CMS could extend the scope of global periods to cover a broader set of providers within a practice (beyond the specialty performing the initial procedure) to avoid Medicare double-paying for post-operative care. Relatedly, Medicare could expand the use of transfer-of-care modifiers to better understand when practitioners who are not members of the practice furnishing a procedure provide post-operative care. In both cases, one practical challenge is to differentiate between care that is related to a procedure and other care (e.g., unrelated care from a primary care provider billing under the same or a different taxpayer identification number).

Another important issue with the valuation of global procedures for CMS is the rapid shift to telehealth. To the degree that telehealth visits replace some in-person visits, this could affect PE.[45] Although Medicare continues to pay higher parity rates for telehealth services at the time of the writing of this report (March 2021), because of the coronavirus disease 2019 (COVID-19) public health emergency, rates for telehealth services may be lower than those for in-person visits after the pandemic is over. In this case, substituting at least some in-person post-operative visits for telehealth visits may result in further reductions to global procedure valuation.

Conclusion

Revaluing global services to reflect the actual number of post-operative visits provided to patients as part of global periods would lower Medicare payments to surgical specialties by up to

[45] Because no-pay code 99024 is not a Medicare telehealth-eligible code, virtually no claim lines with HCPCS code 99024 and a telehealth place of service code or modifier appear in the claims data throughout 2020.

20 percent while increasing payments to primary care and other nonsurgical specialties. The reverse building-block approach to revaluation is a promising starting point for revaluation that takes advantage of newly collected data.

Appendix A. Data and Methods

In this appendix, we describe detailed methods for our revaluation analyses.

Overview

We combined Medicare claims data and the Time File posted with the CY 2019 Medicare Physician Fee Schedule to calculate the share of post-operative visits that were reported for each of the 291 procedures for which reporting was required. The data and methods related to our analysis of post-operative visits reported via claims are discussed in a prior report (Kranz et al., 2021).

To include all procedures with 10- and 90-day global periods in our analysis, and not just the 291 procedures for which reporting was required, we imputed the share of reported, relative to assumed, post-operative visits for procedures with 10- and 90-day global periods for which reporting was not required. To do so, we estimated regression models expressing the observed post-operative visit share as a function of several HCPCS code–level characteristics.

For revaluation, our starting point was work, PE, and malpractice RVUs for procedures with 10- and 90-day global periods listed in the CY 2019 Medicare Physician Fee Schedule. The baseline CY 2019 valuations were associated with an assumed number of post-operative visits included in the global period as listed in the Time File.

We first calculated updated physician work RVUs by subtracting RVUs equal to the product of the difference between assumed and reported visits and a procedure-specific average work RVU per visit. We used four different observed post-operative visit metrics: the median, 75th percentile, mean, and modal counts of observed visits. Next, we calculated updated PE RVUs after reducing direct PE inputs to reflect assumed visits that were not provided. Finally, we used updated estimates of physician work, physician time, and direct PE inputs to estimate the impacts of reductions in post-operative visits on work, allocated PE, and allocated malpractice RVUs together.

We report the impacts of revaluation, first on work RVUs alone, next on PE RVUs after modifying direct PE inputs only, and, finally, for total RVUs, by applying the old and new valuations to CY 2019 FFS Medicare volumes of procedures with 10- and 90-day global periods. We report updated work RVU estimates for each of the 291 procedure codes for which reporting was required in 2019 and results by specialty, reflecting the relative volume of services across all services billed by the specialty. We report PE and total RVU results overall and by specialty.

Data Sources

Medicare Physician Fee Schedule and Time File Data

Baseline valuations for procedures with 10- and 90-day global periods are from the CY 2019 Medicare Physician Fee Schedule Final Rule (CMS, 2018). The fee schedule lists the number of work, PE, and malpractice RVUs for each HCPCS code. We restricted our analysis to HCPCS codes with 10- and 90-day global periods as indicated in Addendum B to the fee schedule final rule. The baseline number of post-operative visits and physician time for each procedure are from the Time File posted with the CY 2019 Final Rule, which lists the number of visits assumed to be provided to the typical patient for each HCPCS code. Visits are reported in the Time File according to E&M code analogues (Table A.1).

Table A.1. Time File E&M Visit Codes

HCPCS	Description	Physician Time	Work RVUs
99204	Office/outpatient visit new, level 4	45	2.43
99211	Office/outpatient visit est., level 1	7	0.18
99212	Office/outpatient visit est., level 2	16	0.48
99213	Office/outpatient visit est., level 3	23	0.97
99214	Office/outpatient visit est., level 4	40	1.50
99215	Office/outpatient visit est., level 5	55	2.11
99231	Subsequent hospital care, level 1	20	0.76
99232	Subsequent hospital care, level 2	40	1.39
99233	Subsequent hospital care, level 3	55	2.00
99238	Hospital discharge day	38	1.28
99239	Hospital discharge day	55	1.90
99291	Critical care first hour	70	4.50
99292	Critical care addl. 30 min	30	2.25

The Time File usually lists integer counts of visits. It occasionally includes half visits, especially for discharge visits, when the procedure typically occurs in an outpatient facility setting. The half visit in this case represents some, but potentially less, work compared with a discharge visit in an inpatient facility setting.

The Time File also lists the total physician time for the global period, including the time associated with post-operative visits. Physician time for post-operative visits is not reported separately, but the difference between total time and other reported times (preservice, intraservice, and immediate postservice) is equal to the sum of minutes across post-operative visits listed in the Time File by E&M code.

Aggregate Medicare Utilization Data

Aggregated Medicare CY 2019 procedure volume is from the utilization crosswalk file posted with the CY 2017 Physician Fee Schedule. These data include the total count of services by combination of HCPCS code, modifier, facility, and specialty.

Claims Data

We used the same analytic file using FFS Medicare claims accessed via CMS's IDR structure described in our prior report (Crespin et al., forthcoming-b).[46] The file was at the claim-line level and included a single record for each clean procedure with 10- or 90-day global periods for which claims-based reporting was required, specifically when

- the HCPCS code was one of 291 for which claims-based reporting was required[47]
- the rendering practitioner was in one of nine states where claims-based reporting was required (Florida, Kentucky, Louisiana, Nevada, New Jersey, North Dakota, Ohio, Oregon, and Rhode Island)
- the rendering provider was associated with at least one practice (defined by tax identification number) with more than ten practitioners (defined by rendering NPIs) in 2019.

We further limited the file to final action claims and to dates of service between January 1, 2019, and December 31, 2019. We excluded claims with the modifiers listed in Table A.2 because post-operative visits were not expected in these cases.

Table A.2. Excluded Modifiers

Exclusion Category	Specification
Ambulatory surgery center facility charges	HCPCS_x_MDFR_CD not = 'SG' and CLM_RNDRG_FED_PRVDR_SPCLTY_CD not = '49'
Demonstration claim (DM)	HCPCS_x_MDFR_CD not = 'DM'
Clinical research trial (00,01)	HCPCS_x_MDFR_CD not = '00', '01'
Assisted at surgery (AS,80,81,82)	HCPCS_x_MDFR_CD not = 'AS', '80', '81', '82'
Unrelated E&M (24,25)	HCPCS_x_MDFR_CD not = '24', '25'
Discontinued procedure (53)	HCPCS_x_MDFR_CD not = '53'
Surgery only (54)	HCPCS_x_MDFR_CD not = '54'
Post-operative only (55)	HCPCS_x_MDFR_CD not = '55'
Pre-operative only (56)	HCPCS_x_MDFR_CD not = '56'
Decision for surgery (57)	HCPCS_x_MDFR_CD not = '57'

[46] The run date for the file used in this report was March 5, 2021.

[47] Although reporting was required for 291 procedure codes in 2019, we excluded three codes without any post-operative visits listed in the Time File, for a total of 288 contributing to the analysis.

Finally, claims were limited to clean procedures that do not occur within the global period of another procedure with a 10- or 90-day global period. The resulting 1.5 million clean procedures reported by practitioners who were expected to report given their practice size were then linked to any HCPCS code 99024 procedures that occurred during the global period for the same beneficiary. From this file, for each of the 1.5 million clean procedures, we used the HCPCS code and the total number of reported post-operative visits.

Methods

Calculating Average Work RVUs and Average Physician Time per Time File Visit

Claims-based reporting of post-operative visits used a single HCPCS code (code 99024), while the visits listed in the Time File are differentiated by E&M HCPCS codes, each of which is associated with different physician work and time values. Because the place of service is reported on HCPCS code 99024 claim lines, it is possible to categorize reported visits as ambulatory or inpatient. However, beyond this distinction, it is impossible to infer which level of visit was provided when HCPCS code 99024 is reported.[48]

We calculated the weighted average work RVUs and average minutes per Time File visit using the work RVU and minutes listed in Table A.1 and the number of Time File visits for each E&M code. For example, if two visits were listed for a procedure, one HCPCS code 99212 with 0.48 RVUs and one HCPCS code 99213 with 0.97 RVUs, we calculated a mean of 0.73 RVUs and used this mean for revaluation. A half visit contributed half as many RVUs and a half visit to the numerator and denominator, respectively, when calculating the mean across visits.

Adjusting Work RVUs for Procedures with Required Claims-Based Reporting

We calculated the differences between the number of Time File visits and the median, 75th percentile, mean, and modal numbers of visits reported using HCPCS code 99024 for the 291 procedures for which claims-based reporting was required in CY 2019. The median reported number of visits was less than or equal to the number of Time File visits for each of the 291 procedures.

To calculate new work RVU values, we

1. calculated the differences between the Time File and the median, 75th percentile, mean, and modal reported visit counts
2. multiplied these differences by the procedure-specific average work RVUs per post-operative visit described earlier

[48] We ultimately did not use the place of service reported on HCPCS code 99024 claim lines because of challenges in measuring the typical inpatient and ambulatory number of visits. It was common for the median and modal counts of inpatient and ambulatory visits to be lower than the median and modal counts of total visits (e.g., a procedure could have medians of zero inpatient visits, zero ambulatory visits, and one total visit). The resulting revaluations resulted in even larger reductions in RVUs than we report here.

3. subtracted the results from baseline CY 2019 work RVUs.

We report new work RVU values using each of the four observed visit metrics (median, 75th percentile, mean, and mode) to describe the typical number of post-operative visits.

Adjusting Physician Time for Procedures with Required Claims-Based Reporting

Implementing PE RVU allocation requires updated physician times and work RVUs. We used the following steps to calculate updated physician time. We

1. computed the total post-operative visit time by subtracting preservice, intraservice, and immediate postservice time from the total physician time
2. calculated the ratio of the median number of reported visits over the expected number of visits, according to the Time File
3. multiplied the ratio with the total post-operative visit time
4. subtracted the result in step 3 from the total baseline physician time.[49]

Imputing Post-Operative Visits and Physician Time for Other 10- or 90-Day Global Procedures Without Claims-Based Reporting

The reverse building-block approach can be used to adjust work RVUs for individual procedure codes without spillover effects on the work RVUs for other procedures. PE and malpractice RVUs are allocated according to work RVUs for an individual procedure code relative to *all* work RVUs. As a result, adjusting work RVUs downward for only those procedures for which the reporting of post-operative visits was required would result in the allocation of more PE and malpractice RVUs to the procedure codes with 10- and 90-day global periods but for which reporting was not required. The net effect of revaluation on a specialty might be mitigated; while most high-volume procedures would face RVU reductions, other lower-volume procedures might experience PE increases.

To ensure the appropriate revaluation of global services, we imputed the number of post-operative visits for global procedure codes without claims-based reporting. To do so, we first conducted a regression analysis using the 291 high-volume and/or high-spending procedures for which reporting was required.[50] After excluding three codes with zero expected post-operative visits, the final analytic sample comprised 288 procedure codes with 10- or 90-day global periods. We modeled the ratio of the median number of reported HCPCS code 99024 visits over the expected number of visits in the Time File at the procedure code level. The regression takes the form of a fractional logit model with a log link function and a binomial family to account for the fact that the dependent variable is a percentage (Papke and Wooldridge, 1993). Specifically,

[49] This list was corrected in November 2019 to include immediate postservice time.

[50] These procedures accounted for 96.4 percent of Medicare fee-for-service claim lines for 10-day global procedures and 74.4 percent of Medicare fee-for-service claim lines for 90-day global procedures in 2019.

$$g(\mu_i) = \alpha + \beta_1 \times Global90_i + \beta_2 \times IntraTime_i + \beta_3 \times PostTime_i + \beta_4 \times FacilityShare_i + \beta_5 \times SpecialtyShare_i,$$

where *g(.)* is a log link function; μ_i is the ratio of the median number of reported visits over the expected number of post-operative visits for procedure code *i*; $Global90$ is an indicator for a 90-day global period; $IntraTime$ represents the intraprocedure time in minutes (e.g., the summation of pre-position time, preservice scrub dressing and waiting time, median intraservice time, and immediate postservice time); $PostTime$ is the total postservice visit time in minutes; $FacilityShare$ represents the share of procedures performed in a facility setting; and $SpecialtyShare$ is a vector that contains the share of procedures performed by each of 25 different specialties. We included the total postservice visit time to reflect the expected intensity of post-operative care. To ensure that there were ten or more observations in the regression for each specialty category, we included only those specialties for which the number of procedures with reporting performed by a provider from the specialty accounted for at least 0.5 percent of all procedures with reporting.

We then used the estimated coefficients to predict the number of post-operative visits for the 3,913 procedure codes with 10- and 90-day global periods for which reporting was not required.[51] The predicted ratios for the 3,913 procedures with 10- or 90-day global periods for which reporting was not required were then used to adjust work RVUs and physician time.

Adjusting Direct PE Inputs

We adjusted PE RVUs by proportionally reducing certain direct PE costs in the facility setting for each procedure code by the ratio of the median observed to expected post-operative visits. Because facilities bill separately for procedures (e.g., under the Outpatient Prospective Payment System fee schedule), the only direct PE costs that contribute to facility payment rates under the Physician Fee Schedule are for pre- and post-operative services. We used CMS's Direct PE Inputs workbook posted with the Physician Fee Schedule as a starting point and adjusted postservice labor, supply, and equipment downward to calculate updated direct PE RVUs in the facility setting.[52] We applied the same reductions (in terms of the magnitude of the RVU reduction) to the nonfacility direct PE RVUs for each procedure.

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[51] We did not impute post-operative visits for 31 procedures with zero post-operative visits in the Time File. Although there were many more procedure codes for which reporting was not required (nearly 4,000) than for which reporting was required (291), as stated earlier, the high-volume and high-cost codes for which reporting was required accounted for 96.4 percent of Medicare fee-for-service claim lines for 10-day global procedures and 74.4 percent of Medicare fee-for-service claim lines for 90-day global procedures in 2019.

[52] We assumed that all listed postservice labor, supplies, and equipment were associated with post-operative visits.

Estimating Changes to PE and Malpractice RVUs

As described earlier, both physician work and service time values affect PE RVUs in several ways, and physician work is one of the main inputs to calculating malpractice RVUs. Therefore, we recalculated PE and malpractice RVUs according to updated physician work, updated physician time, and updated direct PE inputs for procedures with 10- and 90-day global periods to estimate the direct effect of these changes on PE and malpractice RVUs. The resulting RVU estimates are based on the process that CMS uses for annual Physician Fee Schedule rate-setting and reflect the same direct cost and other inputs used to create the Physician Fee Schedule RVUs that we use as a baseline for describing the changes because of revaluation; only work and service time values were modified. For this analysis, we have not applied the transition policy that limits the total drop in total RVUs to 20 percent in a year, which is reflected in the Addendum B values published by CMS with each Physician Fee Schedule rule; nor have we applied the Outpatient Prospective Payment System caps that are reflected in the specialty impact table that accompanies each rule because we want to analyze the effect on the RVUs derived directly from the PE and malpractice algorithms and not these ancillary policies.

Reporting Results

We report the impacts of revaluation, first on work RVUs alone, next on PE RVUs after modifying direct PE inputs only, and, finally, for total RVUs, by applying the old and new valuations to CY 2019 FFS Medicare volumes of procedures with 10- and 90-day global periods. We report updated work RVU estimates for each of the 291 procedure codes for which reporting was required and results by specialty, reflecting the relative volume of services across all services billed by the specialty. We report PE and total RVU results overall and by specialty.

Appendix B. Variation in Reported Post-Operative Visits

CMS's valuation of surgical procedures and other services under the Physician Fee Schedule focuses on the typical patient and clinical context. There is some room for interpretation in deciding what constitutes a typical course of post-operative visits. Our previous studies discuss the *mean* number of post-operative visits reported using HCPCS code 99024 for each of the procedures for which claims-based reporting was required (see Crespin et al., forthcoming-a; Crespin et al., forthcoming-b; and Kranz et al., 2021). If the distribution of post-operative visits per global period is skewed to the right—that is, if a relatively small number of procedures have many visits while most have relatively few—then the mean number of visits will be higher than the *median* or *modal* (i.e., most common) number of visits, which are two other statistics that CMS could use to describe the typical number of post-operative visits. CMS could also decide to use another summary statistic—for example, the 75th percentile—as a way to gradually implement reductions in post-operative visits or to ameliorate the magnitude of the reduction.

We explored the distribution of the number of reported post-operative visits for each of the 291 procedure codes for which reporting was required with the goal of informing subsequent decisions on which summary statistics should be considered for use in valuation. We calculated the median, 75th percentile, mean, and mode of the distribution of the count of post-operative visits reported using HCPCS code 99024 for each of the HCPCS codes for which reporting was required.

Figures B.1 and B.2 illustrate the distribution of reported post-operative visits for two high-volume procedure codes for cataract surgery (HCPCS code 66984) and hip arthroplasty (HCPCS code 27130). In both cases, the Time File count of visits was higher than the observed mean, median, 75th percentile, and mode. We report summary statistics describing the distribution of the count of reported post-operative visits for the top ten procedures with 10-day global periods (Table B.1) and procedures with 90-day global periods (Table B.2) by Medicare volume. Results for all codes for which reporting was required are shown in Table C.1 in Appendix C.

Figure B.1. Distribution of Reported Post-Operative Visits, HCPCS Code 66984 (cataract surgery)

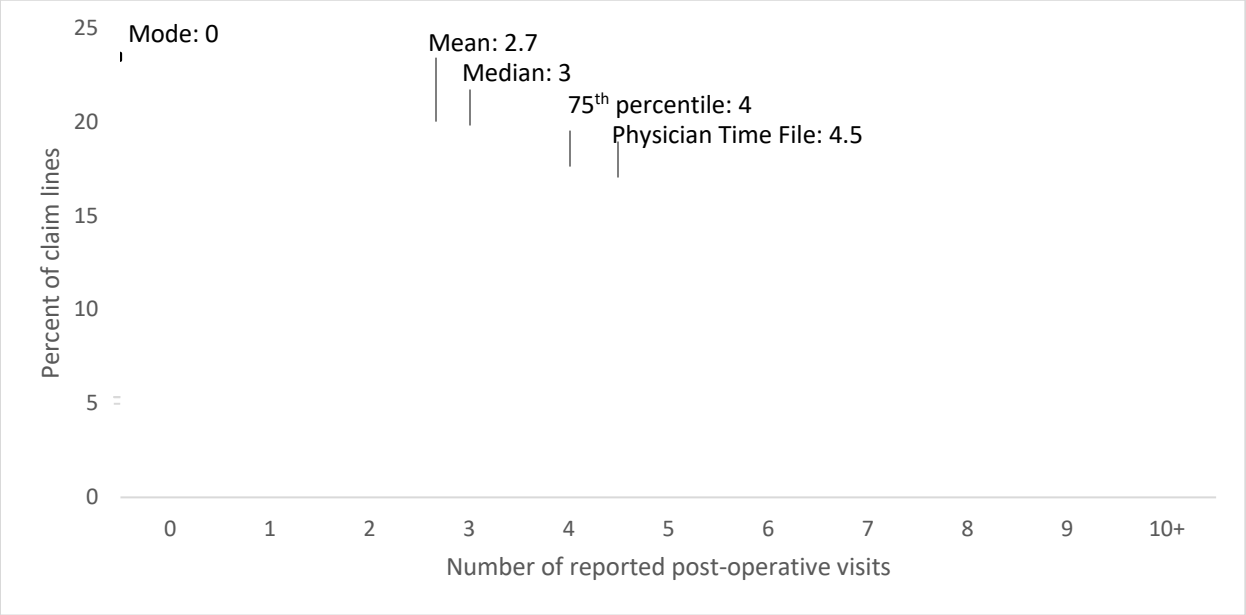
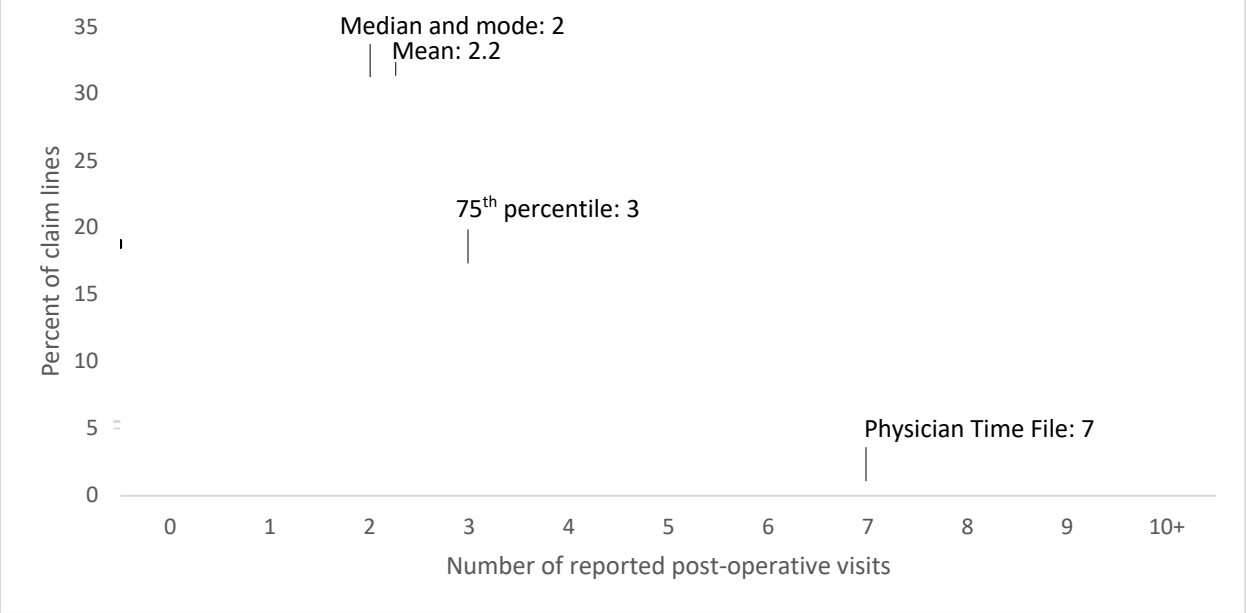


Figure B.2. Distribution of Reported Post-Operative Visits, HCPCS Code 27130 (hip arthroplasty)



There were some similarities across all procedures with 90-day global periods. First, the means and medians were relatively similar. Although there was a small number of each procedure with many visits (i.e., a long right tail to the distribution of visits), there was also often a share of procedures without any reported post-operative visits. This resulted in roughly aligned means and medians. The mean was greater than the median by more than a single visit for only

14 percent of 90-day procedures for which reporting was required. Second, the median, mean, and modal reported visits were never greater than expected visits from the Time File. The 75th percentile of reported visits was greater than expected visits from the Time File for only four procedure codes with 90-day global periods.[53] Finally, for the procedures with 90-day global periods, the percentage of procedures with zero reported follow-up visits ranged from 18.4 percent to 47.2 percent among procedures with the highest volume.

Table B.1. Reported Post-Operative Visit Counts for the Top Ten Procedures with 10-Day Global Periods, by Volume

HCPCS Code	CPT Short Descriptors	Time File Visits	Reported Visits, Median	Reported visits, 75th Pctl.	Reported Visits, Mean	Reported Visits, Mode	Reported Visits, Percentage of Procedures with Zero Visits	Medicare Volume
17000	Destruct premalg lesion	1	0	0	0.01	0	99.3%	4,588,227
17110	Destruct b9 lesion 1–14	1	0	0	0.01	0	99.3%	2,049,227
17004	Destroy premal lesions 15/ >	1	0	0	0.01	0	99.4%	861,245
10060	Drainage of skin abscess	1	0	0	0.15	0	90.0%	413,247
68761	Close tear duct opening	1	0	0	0.03	0	97.5%	341,423
64635	Destroy lumb/sac facet jnt	1.5	0	0	0.02	0	98.5%	252,467
17262	Destruction of skin lesions	1	0	0	0.03	0	97.8%	239,408
12032	Intmd rpr s/a/t/ext 2.6–7.5	1	0	0	0.10	0	91.9%	224,558
11750	Removal of nail bed	1	0	0	0.13	0	87.5%	194,732
13132	Cmplx rpr f/c/c/m/n/ax/g/h/f	1	0	1	0.29	0	72.3%	173,065

SOURCE: Time File visits are from the CY 2019 Time Files posted with Medicare's Physician Fee Schedule. Reported visits are from RAND analysis of Medicare FFS claims data from CMS IDR, downloaded on March 5, 2021. Medicare volume is 2018 discounted units of service from aggregate Medicare utilization data.
NOTES: Descriptive statistics for reported post-operative visits are from claims data collected from practitioners expected to report and for procedures without overlapping global periods. Medicare volume reflects total Medicare program volume adjusted for payment modifiers. The CPT short descriptors are those available in the Physician Fee Schedule. Pctl. = percentile.

[53] These four HCPCS codes are 15731, "forehead flap w/vasc pedicle"; 19303, "mast simple complete"; 36819, "av fuse uppr arm basilic"; and 64581, "implant neuroelectrodes."

Table B.2. Reported Post-Operative Visit Counts for the Top Ten Procedures with 90-Day Global Periods, by Volume

HCPCS Code	CPT Short Descriptors	Time File Visits	Reported Visits, Median	Reported Visits, 75th Pctl.	Reported Visits, Mean	Reported Visits, Mode	Reported Visits, Percentage of Procedures with Zero Visits	Medicare Volume
66984	Cataract surg w/iol 1 stage	4.5	3	4	2.72	0	23.3%	1,680,887
66821	After cataract laser surgery	2	1	1	0.69	0	47.2%	637,157
27447	Total knee arthroplasty	7	2	3	2.30	2	18.4%	319,995
27130	Total hip arthroplasty	7	2	3	2.15	2	18.6%	163,089
66982	Cataract surgery complex	4.5	3	4	2.68	0	23.2%	162,580
47562	Laparoscopic cholecystectomy	3.5	1	2	1.32	1	28.7%	109,328
64721	Carpal tunnel surgery	3.5	1	2	1.40	1	24.9%	104,552
33208	Insrt heart pm atrial & vent	3	1	2	1.09	0	46.4%	99,957
29827	Arthroscop rotator cuff repr	5.5	2	3	2.18	3	19.8%	94,671
63047	Remove spine lamina 1 lmbr	6	2	3	1.97	2	21.7%	89,093

SOURCE: Time File visits are from the CY 2019 Time Files posted with Medicare's Physician Fee Schedule. Reported visits are from RAND analysis of Medicare FFS claims data from CMS IDR, downloaded on March 5, 2021. Medicare volume is 2018 discounted units of service from aggregate Medicare utilization data.
NOTES: Descriptive statistics for reported post-operative visits are from claims data collected from practitioners expected to report and for procedures without overlapping global periods. Medicare volume reflects total Medicare program volume adjusted for payment modifiers. The CPT short descriptors are those available in the Physician Fee Schedule. Pctl. = percentile.

There were also commonalities across procedures with 10-day global periods. Nearly all 10-day global procedures had median, 75th percentile, and mode reported visits of zero and mean reported visits very close to zero. Eighteen procedures had a 75th percentile of one visit. More than three-quarters of procedures had a mean of less than 0.25 visits, and only three had a mean above 0.5 visits.[54] Overall, post-operative visits for most procedures with 10-day global periods rarely occurred. For the 10-day global procedures with the highest Medicare volume, the percentage of procedures with zero follow-up visits ranged from 72.3 percent to 99.4 percent.

We calculated the share of visits that would have been expected for each specialty if the number of visits in the Time File were replaced with the observed median, 75th percentile, mean, and mode of visits for each HCPCS code (Table B.3 for all procedures, Table B.4 for 10-day procedures, and Table B.5 for 90-day procedures). The "share[s] of expected visits observed within specialty" in these tables are similar to those reported in our CY 2019 claims-based report (Crespin et al., forthcoming-b). As we described in that report, the ratio of observed to expected post-operative visits is generally low across specialties, particularly for specialties performing procedures with primarily 10-day global periods and for specialties furnishing relatively few procedures for which reporting was required on a per-practitioner basis (such as neurology and

[54] These three HCPCS codes are 10180, "complex drainage wound"; 38571, "laparoscopy lymphadenectomy"; and 64561, "implant neuroelectrodes."

cardiology). In the latter case, practitioners in these specialties may have been less aware of the reporting requirement.

The other columns in the tables indicate the reduction in the number of visits aggregated at the specialty level if CMS were to switch to our visit estimates based on claims data. Across all specialties, using median reported visit counts would result in a 77-percent reduction in the number of visits compared with the visit counts currently listed in the Time File, while using average reported visits would yield a 73-percent reduction. At the specialty level, decreases in the number of visits were larger when using the median versus the mean for nearly all specialties. We report separate by-specialty results for procedures with 10-day and 90-day global periods in Tables B.4 and B.5, respectively.

Table B.3. Observed and New Visit Counts by Specialty, All Procedures

Specialty	Number of procedures	Expected Number of Visits	Share of Expected Visits Observed Within Specialty (%)	Reduction in Visit Counts When Using Median Observed Visit Counts (%)	Reduction in Visit Counts When Using 75th Pctl. Observed Visit Counts (%)	Reduction in Visit Counts When Using Average Observed Visit Counts (%)	Reduction in Visit Counts When Using Modal Observed Visit Counts (%)
Cardiac surgery	5,348	43,842	50	–68	–36	–54	–89
Cardiology	8,865	24,801	38	–74	–43	–63	–99
Colorectal surgery	6,626	24,025	30	–79	–54	–66	–92
Dermatology	522,864	582,529	6	–98	–90	–94	–100
Diagnostic radiology	23,572	33,977	3	–100	–100	–94	–100
General surgery	74,406	252,695	41	–74	–50	–61	–82
Hand surgery	11,140	45,786	40	–70	–45	–63	–75
Interventional radiology	8,151	11,856	4	–100	–99	–93	–100
Neurology	3,553	4,606	10	–94	–91	–93	–95
Neurosurgery	16,554	101,858	30	–74	–58	–70	–78
Nurse practitioner/physician assistant	282,885	299,481	4	–98	–96	–96	–100
Ophthalmology	151,568	485,903	50	–46	–29	–50	–94
Orthopedic surgery	154,935	998,073	32	–72	–55	–68	–77
Other specialty	94,581	169,938	18	–88	–75	–81	–98
Otolaryngology	13,546	26,856	24	–85	–72	–78	–95
Plastic and reconstructive surgery	8,956	24,235	29	–81	–57	–72	–93
Podiatry	30,057	44,806	26	–84	–68	–74	–96
Primary care	39,886	45,213	10	–97	–93	–91	–99
Surgical oncology	2,767	8,850	36	–75	–54	–64	–81
Thoracic surgery	7,971	62,941	45	–67	–35	–54	–90
Urology	18,767	53,774	41	–69	–48	–59	–96
Vascular surgery	16,867	61,912	34	–80	–55	–65	–91
Total	1,503,865	3,407,954	27	–77	–62	–73	–89

SOURCE: Time File visits are from the CY 2019 Time Files posted with Medicare's Physician Fee Schedule. Reported visits are from RAND analysis of Medicare FFS claims data from CMS IDR, downloaded on March 5, 2021.

NOTES: Descriptive statistics for reported post-operative visits are from claims data collected from practitioners expected to report and for procedures without overlapping global periods. Pctl. = percentile.

Table B.4. Observed and New Visit Counts by Specialty, Procedures with 10-Day Global Periods

Specialty	Number of Procedures	Expected Number of Visits	Share Observed Within Specialty (%)	Reduction in Visit Counts When Using Median Observed Visit Counts (%)	Reduction in Visit Counts When Using 75th Pctl. Observed Visit Counts (%)	Reduction in Visit Counts When Using Average Observed Visit Counts (%)	Reduction in Visit Counts When Using Modal Observed Visit Counts (%)
Cardiac surgery	146	201	29	–100	–91	–87	–100
Cardiology	126	160	10	–100	–99	–89	–100
Colorectal surgery	3,918	4,113	5	–100	–99	–97	–100
Dermatology	505,065	505,770	3	–100	–93	–97	–100
Diagnostic radiology	23,524	33,817	3	–100	–100	–94	–100
General surgery	22,125	28,500	21	–100	–97	–90	–100
Hand surgery	273	303	40	–100	–94	–85	–100
Interventional radiology	8,059	11,581	4	–100	–100	–94	–100
Neurology	3,418	3,693	1	–100	–99	–99	–100
Neurosurgery	2,303	3,422	21	–100	–97	–87	–100
Nurse practitioner/physician assistant	279,058	284,380	2	–100	–99	–98	–100
Ophthalmology	33,755	37,111	8	–100	–100	–92	–100
Orthopedic surgery	3,884	5,330	19	–100	–97	–88	–100
Other specialty	70,782	97,452	3	–100	–97	–96	–100
Otolaryngology	9,416	9,542	10	–100	–92	–92	–100
Plastic and reconstructive surgery	4,368	4,440	26	–100	–55	–79	–100
Podiatry	25,276	26,542	6	–100	–100	–93	–100
Primary care	38,599	40,116	5	–100	–99	–95	–100
Surgical oncology	1,041	1,378	9	–100	–96	–91	–100
Thoracic surgery	453	650	21	–100	–96	–92	–100
Urology	2,378	2,447	31	–100	–62	–70	–100
Vascular surgery	5,197	7,630	12	–100	–99	–93	–100
Total	1,043,164	1,108,574	4	–100	–96	–96	–100

SOURCE: Time File visits are from the CY 2019 Time File posted with Medicare's Physician Fee Schedule. Reported visits are from RAND analysis of Medicare FFS claims data from CMS IDR, downloaded on March 5, 2021.
NOTES: Descriptive statistics for reported post-operative visits are from claims data collected from practitioners expected to report and for procedures without overlapping global periods. Pctl. = percentile.

Table B.5. Observed and New Visit Counts by Specialty, Procedures with 90-Day Global Periods

Specialty	Number of Procedures	Expected Number of Visits	Share Observed Within Specialty	Reduction in Visit Counts When Using Median Observed Visit Counts (%)	Reduction in Visit Counts When Using 75th Pctl. Observed Visit Counts (%)	Reduction in Visit Counts When Using Average Observed Visit Counts (%)	Reduction in Visit Counts When Using Modal Observed Visit Counts (%)
Cardiac surgery	5,202	43,641	50	–68	–36	–54	–89
Cardiology	8,739	24,642	39	–74	–43	–62	–99
Colorectal surgery	2,708	19,912	35	–75	–45	–60	–91
Dermatology	17,799	76,759	20	–82	–67	–77	–100
Diagnostic radiology	48	160	12	–88	–59	–68	–96
General surgery	52,281	224,195	43	–71	–43	–57	–80
Hand surgery	10,867	45,483	40	–69	–45	–63	–75
Interventional radiology	92	275	15	–93	–60	–69	–98
Neurology	135	913	47	–72	–57	–70	–76
Neurosurgery	14,251	98,436	30	–73	–56	–69	–77
Nurse practitioner/physician assistant	3,827	15,101	40	–66	–41	–62	–100
Ophthalmology	117,813	448,793	53	–41	–23	–47	–94
Orthopedic surgery	151,051	992,743	32	–72	–55	–68	–77
Other specialty	23,799	72,487	37	–72	–44	–62	–95
Otolaryngology	4,130	17,314	32	–77	–61	–71	–93
Plastic and reconstructive surgery	4,588	19,796	30	–77	–57	–70	–91
Podiatry	4,781	18,264	54	–60	–22	–47	–90
Primary care	1,287	5,098	48	–71	–43	–61	–90
Surgical oncology	1,726	7,472	41	–71	–46	–59	–78
Thoracic surgery	7,518	62,291	45	–67	–35	–53	–90
Urology	16,389	51,327	42	–67	–47	–58	–96
Vascular surgery	11,670	54,282	37	–77	–48	–61	–90
Total	460,701	2,299,380	39	–66	–46	–61	–84

SOURCE: Time File visits are from the CY 2019 Time File posted with Medicare's Physician Fee Schedule. Reported visits are from RAND analysis of Medicare FFS claims data from CMS IDR, downloaded on March 5, 2021.
NOTES: Descriptive statistics for reported post-operative visits are from claims data collected from practitioners expected to report and for procedures without overlapping global periods. Pctl. = percentile.

Appendix C. Detailed Results Tables

This appendix includes supplemental results tables presented in Table C.1a through Table C.3b.

Table C.1a. Distributional Statistics, Reported Visits, Procedures with 90-Day Global Periods

HCPCS Code	CPT Short Descriptors	Time File Visits	Reported Visits, 25th Pctl.	Reported Visits, Median	Reported Visits, 75th Pctl.	Reported Visits, Mean	Reported Visits, Mode	2018 Medicare Volume
13160	Late closure of wound	7.5	0	2	4	2.39	0	14,889
14020	Tis trnfr s/a/l 10 sq cm/<	4	0	0.5	1	0.88	0	18,388
14021	Tis trnfr s/a/l 10.1-30 sqcm	4	0	0	1	0.76	0	17,797
14040	Tis trnfr f/c/c/m/n/a/g/h/f	4	0	1	1	0.82	0	65,508
14041	Tis trnfr f/c/c/m/n/a/g/h/f	4	0	0	1	0.69	0	42,255
14060	Tis trnfr e/n/e/l 10 sq cm/<	4	0	1	1	0.88	0	88,731
14061	Tis trnfr e/n/e/l10.1-30sqcm	4.5	0	1	2	1.01	0	28,338
14301	Tis trnfr any 30.1-60 sq cm	4.5	0	1	2	1.20	0	30,102
15100	Skin splt grft trnk/arm/leg	6	0	2.5	5	3.63	0	13,760
15120	Skn splt a-grft fac/nck/hf/g	3.5	0	1	3	1.99	0	8,850
15240	Skin full grft face/genit/hf	6.5	0	1	3	1.58	0	12,374
15260	Skin full graft een & lips	5	0	1	2	1.25	0	54,521
15730	Mdfc flap w/prsrv vasc pedcl	4.5	0	1.5	4	2.07	0	9,069
15731	Forehead flap w/vasc pedicle	5.5	2	3	6	4.16	0	2,162
15734	Muscle-skin graft trunk	10	0	2	4	3.58	0	20,170
15823	Revision of upper eyelid	4.5	1	1	2	1.51	1	68,767
19120	Removal of breast lesion	2	0	1	1	1.20	1	11,181
19125	Excision breast lesion	2	1	1	1	1.25	1	15,892
19301	Partial mastectomy	3.5	1	1	2	1.30	1	53,842
19303	Mast simple complete	3.5	1	2	4	2.74	2	21,078
19307	Mast mod rad	10.5	2	3	5	3.44	3	7,895
19357	Breast reconstruction	12	2	4	8	4.74	0	6,131
20680	Removal of support implant	2.5	1	1	2	1.74	1	47,605
20926	Removal of tissue for graft	5	0	1	1	0.92	0	10,658
22551	Neck spine fuse&remov bel c2	5	0	2	3	1.96	2	41,660
22558	Lumbar spine fusion	8	1	2	4	2.73	2	16,484
22600	Neck spine fusion	11	1	2	4	2.71	0	8,606
22612	Lumbar spine fusion	7	0	2	3	2.13	0	47,864
22630	Lumbar spine fusion	8	2	2	4	2.97	2	7,079
22633	Lumbar spine fusion combined	7	1	2	4	2.66	2	38,790
22830	Exploration of spinal fusion	6	2	3	6	3.45	3	5,337

HCPCS Code	CPT Short Descriptors	Time File Visits	Reported Visits, 25th Pctl.	Reported Visits, Median	Reported Visits, 75th Pctl.	Reported Visits, Mean	Reported Visits, Mode	2018 Medicare Volume
23120	Partial removal collar bone	4.5	1	1	2	1.76	1	5,369
23412	Repair rotator cuff chronic	4.5	1	2	3	2.28	3	15,753
23430	Repair biceps tendon	4.5	0	2.5	3	2.46	3	12,093
23472	Reconstruct shoulder joint	8	2	2	3	2.51	3	53,040
23500	Treat clavicle fracture	2.5	0	1	2	1.21	0	12,367
23600	Treat humerus fracture	4	0	2	3	1.85	0	32,563
23615	Treat humerus fracture	6	1	3	4	2.74	3	8,133
23650	Treat shoulder dislocation	3	0	0	1	0.82	0	12,075
25447	Repair wrist joints	5.5	0	2	3	2.22	3	18,066
25600	Treat fracture radius/ulna	5	0	2	3	1.93	0	41,444
25605	Treat fracture radius/ulna	5.5	1	3	4	2.61	0	18,058
25607	Treat fx rad extra-articul	5.5	1	2	3	2.28	3	9,013
25609	Treat fx radial 3+ frag	6.5	1	2	3	2.34	3	16,238
26055	Incise finger tendon sheath	3.5	1	1	2	1.23	1	71,862
26160	Remove tendon sheath lesion	3.5	0	1	2	1.20	1	13,825
26600	Treat metacarpal fracture	4	0	1	2	1.34	0	14,903
26720	Treat finger fracture each	2	0	1	2	1.23	0	9,979
27125	Partial hip replacement	11.5	0	2	3	2.09	0	10,074
27130	Total hip arthroplasty	7	1	2	3	2.15	2	163,089
27132	Total hip arthroplasty	14.5	1	2	4	2.84	2	6,517
27134	Revise hip joint replacement	11	1	2	4	2.93	2	11,066
27235	Treat thigh fracture	10.5	0	2	4	2.41	0	15,954
27236	Treat thigh fracture	8	0	2	3	2.20	0	61,128
27244	Treat thigh fracture	9	0	2	3	2.26	0	10,680
27245	Treat thigh fracture	9	0	2	4	2.34	0	83,528
27446	Revision of knee joint	6	1	2	3	2.03	2	18,088
27447	Total knee arthroplasty	7	1	2	3	2.30	2	319,995
27486	Revise/replace knee joint	10	1	2	4	2.66	2	10,293
27487	Revise/replace knee joint	10	1	2	4	2.78	2	15,955
27506	Treatment of thigh fracture	12	0	2	4	2.55	0	7,696
27590	Amputate leg at thigh	15.5	0	1	4	2.74	0	12,566
27786	Treatment of ankle fracture	3.5	0	1	3	1.69	0	23,093
27814	Treatment of ankle fracture	6	1	3	4	3.27	3	11,557
27880	Amputation of lower leg	10	0	2	5	3.60	0	14,483
28122	Partial removal of foot bone	4.5	0	2	4	2.78	0	11,198
28124	Partial removal of toe	4	0	2	3	2.44	0	9,066
28232	Incision of toe tendon	2.5	0	1	2	1.25	0	12,387
28270	Release of foot contracture	3.5	0	0	1	0.66	0	15,524
28285	Repair of hammertoe	4.5	1	3	4	2.75	3	53,295
28296	Correction hallux valgus	5.5	0	3	4	2.51	0	12,399
28308	Incision of metatarsal	4	0.5	3	4	2.67	3	9,757
28470	Treat metatarsal fracture	3	0	1	2	1.25	0	31,309

HCPCS Code	CPT Short Descriptors	Time File Visits	Reported Visits, 25th Pctl.	Reported Visits, Median	Reported Visits, 75th Pctl.	Reported Visits, Mean	Reported Visits, Mode	2018 Medicare Volume
28510	Treatment of toe fracture	1.5	0	0	1	0.61	0	13,373
28810	Amputation toe & metatarsal	7	0	2	5	3.48	0	15,623
28820	Amputation of toe	4.5	0	2	4	2.70	0	24,207
28825	Partial amputation of toe	4.5	1	2	4	2.86	0	11,452
29822	Shoulder arthroscopy/surgery	4	1	2	3	1.90	2	13,601
29823	Shoulder arthroscopy/surgery	4.5	1	2	3	1.80	2	32,736
29824	Shoulder arthroscopy/surgery	4.5	0	2	2	1.60	2	40,433
29827	Arthroscop rotator cuff repr	5.5	1	2	3	2.18	3	94,671
29828	Arthroscopy biceps tenodesis	4.5	1	2	3	1.89	2	14,752
29848	Wrist endoscopy/surgery	3	1	1	2	1.32	1	28,133
29876	Knee arthroscopy/surgery	3.5	0	1	2	1.58	0	11,307
29879	Knee arthroscopy/surgery	3.5	1	1	2	1.51	1	9,859
29880	Knee arthroscopy/surgery	3.5	1	2	2	1.65	2	44,401
29881	Knee arthroscopy/surgery	3.5	1	1	2	1.52	2	58,701
30520	Repair of nasal septum	4.5	0	1	2	1.33	0	21,245
32480	Partial removal of lung	10	1	3	6	4.43	0	6,871
32663	Thoracoscopy w/lobectomy	7	1	3	5	3.74	1	7,859
33207	Insert heart pm ventricular	3	0	0	1	0.97	0	15,633
33208	Insrt heart pm atrial & vent	3	0	1	2	1.09	0	99,957
33228	Remv&replc pm gen dual lead	1.5	0	0	1	0.65	0	37,772
33249	Insj/rplcmt defib w/lead(s)	3	0	1	1	1.01	0	48,716
33263	Rmvl & rplcmt dfb gen 2 lead	1.5	0	0	1	0.64	0	11,338
33264	Rmvl & rplcmt dfb gen mlt ld	1.5	0	0	1	0.86	0	17,760
33405	Replacement aortic valve opn	10	1	3	6	4.19	1	24,793
33426	Repair of mitral valve	10	1	3	6	4.22	1	3,726
33430	Replacement of mitral valve	12	1	4	8	5.23	1	9,051
33533	Cabg arterial single	9	1	3	6	4.29	1	63,196
33860	Ascending aortic graft	11	1	4	8	6.14	0	4,140
34705	Evac rpr a-biiliac ndgft	5	0	1	2	1.67	0	20,368
34706	Evasc rpr a-biiliac rpt	10	0	1	3	1.93	0	3,594
34710	Dlyd plmt xtn prosth 1st vsl	5	0	1	2	1.43	1	2,229
35301	Rechanneling of artery	5	1	1	2	1.73	1	43,395
36819	Av fuse uppr arm basilic	2.5	0	1	3	1.81	1	9,414
36821	Av fusion direct any site	2.5	0	1	2	1.40	0	32,757
36830	Artery-vein nonautograft	2.5	0	1	2	1.55	1	22,535
36832	Av fistula revision open	3.5	0	1	2	1.53	0	22,081
37607	Ligation of a-v fistula	2	0	1	2	1.35	0	8,672
37765	Stab phleb veins xtr 10-20	2.5	0	0	1	0.76	0	12,808
37766	Phleb veins - extrem 20+	2.5	0	0	1	0.74	0	10,491
38525	Biopsy/removal lymph nodes	2.5	0	1	1	1.23	1	32,650
38724	Removal of lymph nodes neck	8	1	1	2	1.90	1	7,981

HCPCS Code	CPT Short Descriptors	Time File Visits	Reported Visits, 25th Pctl.	Reported Visits, Median	Reported Visits, 75th Pctl.	Reported Visits, Mean	Reported Visits, Mode	2018 Medicare Volume
43281	Lap paraesophag hern repair	5	1	2	3	2.16	1	10,722
43644	Lap gastric bypass/roux-en-y	7	1	2	4	2.69	2	5,032
44005	Freeing of bowel adhesion	9	1	2	6	4.33	0	10,438
44120	Removal of small intestine	12	1	3	7	5.00	0	23,524
44140	Partial removal of colon	10	0	2	6	4.10	0	15,610
44143	Partial removal of colon	11	0	3	8	5.35	0	10,944
44145	Partial removal of colon	10	1	3	6	4.12	2	6,696
44160	Removal of colon	10	1	2	6	4.08	0	12,583
44204	Laparo partial colectomy	8	1	2	5	3.11	0	12,829
44205	Lap colectomy part w/ileum	9	1	2	4	3.09	1	11,867
44207	L colectomy/coloproctostomy	8	1	2	4	3.08	1	9,308
44970	Laparoscopy appendectomy	4	0	1	2	1.69	1	20,762
46930	Destroy internal hemorrhoids	1	0	0	0	0.27	0	8,939
47562	Laparoscopic cholecystectomy	3.5	0	1	2	1.32	1	109,328
47563	Laparo cholecystectomy/graph	2.5	0	1	2	1.33	1	44,752
47600	Removal of gallbladder	8	1	2	5	3.53	1	9,465
49505	Prp i/hern init reduc >5 yr	2.5	1	1	1	1.14	1	62,691
49507	Prp i/hern init block >5 yr	2.5	0	1	2	1.46	1	11,160
49560	Rpr ventral hern init reduc	2.5	1	1	2	1.89	1	24,325
49561	Rpr ventral hern init block	6	1	1	3	2.26	1	13,619
49585	Rpr umbil hern reduc > 5 yr	2.5	1	1	1	1.23	1	17,668
49650	Lap ing hernia repair init	2	1	1	1	1.12	1	36,097
50360	Transplantation of kidney	10	0	0	2	1.61	0	11,223
50590	Fragmenting of kidney stone	3.5	0	1	1	0.94	0	57,987
52601	Prostatectomy (turp)	2.5	0	1	2	1.60	0	46,288
52648	Laser surgery of prostate	3	0	1	2	1.39	0	21,550
53850	Prostatic microwave thermotx	3	0	0	1	0.81	0	5,706
55866	Laparo radical prostatectomy	5	1	2	3	2.09	2	17,025
57240	Anterior colporrhaphy	2.5	0	1	2	1.32	0	7,073
57288	Repair bladder defect	4.5	0	1	2	1.35	1	20,063
58571	Tlh w/t/o 250 g or less	2.5	0	1	2	1.44	0	17,322
58575	Laps tot hyst resj mal	5	0	1	2	1.35	0	857
60240	Removal of thyroid	2.5	1	1	2	1.36	1	9,127.16
60500	Explore parathyroid glands	3.5	0	1	1	1.12	1	16,494
61312	Open skull for drainage	14	0	1	4	2.88	0	9,683
61510	Removal of brain lesion	11	0	2	3	2.49	0	8,160
63030	Low back disk surgery	6	1	2	2	1.70	2	31,933
63042	Laminotomy single lumbar	7	1	2	3	1.95	1	12,666
63045	Remove spine lamina 1 crvl	6	0	1	2	1.71	0	9,465
63047	Remove spine lamina 1 lmbr	6	1	2	3	1.97	2	89,093
63056	Decompress spinal cord lmbr	9.5	0	1	2	1.54	1	6,253

HCPCS Code	CPT Short Descriptors	Time File Visits	Reported Visits, 25th Pctl.	Reported Visits, Median	Reported Visits, 75th Pctl.	Reported Visits, Mean	Reported Visits, Mode	2018 Medicare Volume
63081	Remove vert body dcmprn crvl	12	0	2	3	1.96	2	6,451
64581	Implant neuroelectrodes	1.5	0	1	2	1.30	1	10,397
64718	Revise ulnar nerve at elbow	4.5	0	1	2	1.55	2	22,118
64721	Carpal tunnel surgery	3.5	1	1	2	1.40	1	104,552
65756	Corneal trnspl endothelial	6.5	3	4	5	3.87	4	13,667
66170	Glaucoma surgery	9.5	2	5	7	5.19	0	10,446
66179	Aqueous shunt eye w/o graft	8.5	4	4	6	4.59	4	880
66180	Aqueous shunt eye w/graft	8.5	3	5	6	4.92	4	11,979.58
66711	Ciliary endoscopic ablation	5.5	0	1	3	1.95	0	10,203
66821	After cataract laser surgery	2	0	1	1	0.69	0	637,157
66982	Cataract surgery complex	4.5	1	3	4	2.68	0	162,580
66984	Cataract surg w/iol 1 stage	4.5	1	3	4	2.72	0	1,680,887
67036	Removal of inner eye fluid	5.5	0	2	3	2.39	3	15,115
67040	Laser treatment of retina	5.5	1	2	3	2.30	3	9,497
67041	Vit for macular pucker	5.5	1	3	4	2.58	3	13,822
67042	Vit for macular hole	5.5	1.5	3	4	2.61	3	26,245
67108	Repair detached retina	5.5	2	3	5	3.32	3	15,946
67113	Repair retinal detach cplx	6.5	1	3	4	3.09	3	12,727
67145	Treatment of retina	3	0	1	2	1.12	0	26,205
67210	Treatment of retinal lesion	3	0	0	0	0.40	0	66,469
67255	Reinforce/graft eye wall	6.5	1	3	5	3.82	3	899
67900	Repair brow defect	3	0	1	2	1.51	1	9,335.4
67904	Repair eyelid defect	4.5	1	1	2	1.59	2	40,375
67917	Repair eyelid defect	3.5	0	1	2	1.56	2	18,222
67924	Repair eyelid defect	3.5	1	1	2	1.52	1	9,580

NOTES: Mode is populated with the maximum value in three cases (HCPCS 23120, 36832, and 66180). The CPT short descriptors are those available in the Physician Fee Schedule. The HCPCS codes included in this table are based on the subset of HCPCS codes included in our earlier analysis (Kranz et al., 2021) that were active and retained a 90-day global period in 2018. Pctl. = percentile.

Table C.1b. Distributional Statistics, Reported Visits, Procedures with 10-Day Global Periods

HCPCS Code	CPT Short Descriptors	Time File Visits	Reported Visits, 25th Pctl.	Reported Visits, Median	Reported Visits, 75th Pctl.	Reported Visits, Mean	Reported Visits, Mode	2018 Medicare Volume
10040	Acne surgery	1	0	0	0	0.01	0	30,342
10060	Drainage of skin abscess	1	0	0	0	0.15	0	413,247
10061	Drainage of skin abscess	2	0	0	0	0.23	0	154,272
10120	Remove foreign body	1	0	0	0	0.05	0	42,785
10140	Drainage of hematoma/fluid	1	0	0	0	0.35	0	57,576
10160	Puncture drainage of lesion	1	0	0	0	0.12	0	60,332
10180	Complex drainage wound	1	0	0	1	0.75	0	10,405
11200	Removal of skin tags <w/15	1	0	0	0	0.01	0	82,964
11400	Exc tr-ext b9+marg 0.5 cm<	1	0	0	0	0.11	0	26,675
11401	Exc tr-ext b9+marg 0.6-1 cm	1	0	0	0	0.11	0	56,457
11402	Exc tr-ext b9+marg 1.1-2 cm	1	0	0	0	0.16	0	78,114
11403	Exc tr-ext b9+marg 2.1-3cm	1	0	0	0	0.20	0	33,831
11404	Exc tr-ext b9+marg 3.1-4 cm	1	0	0	0	0.23	0	13,311
11406	Exc tr-ext b9+marg >4.0 cm	1	0	0	0	0.31	0	15,154
11420	Exc h-f-nk-sp b9+marg 0.5/<	1	0	0	0	0.12	0	17,892
11421	Exc h-f-nk-sp b9+marg 0.6-1	1	0	0	0	0.18	0	25,764
11422	Exc h-f-nk-sp b9+marg 1.1-2	1	0	0	0	0.19	0	28,898
11423	Exc h-f-nk-sp b9+marg 2.1-3	1	0	0	0	0.25	0	12,509
11440	Exc face-mm b9+marg 0.5 cm/<	1	0	0	0	0.13	0	28,749
11441	Exc face-mm b9+marg 0.6-1 cm	1	0	0	0	0.23	0	29,574
11442	Exc face-mm b9+marg 1.1-2 cm	1	0	0	1	0.26	0	25,786
11443	Exc face-mm b9+marg 2.1-3 cm	1	0	0	1	0.34	0	7,524
11601	Exc tr-ext mal+marg 0.6-1 cm	1	0	0	0	0.11	0	21,952
11602	Exc tr-ext mal+marg 1.1-2 cm	1	0	0	0	0.11	0	126,304
11603	Exc tr-ext mal+marg 2.1-3 cm	1	0	0	0	0.16	0	68,762
11604	Exc tr-ext mal+marg 3.1-4 cm	1	0	0	0	0.21	0	27,874
11606	Exc tr-ext mal+marg >4 cm	1	0	0	0	0.29	0	28,712
11621	Exc s/n/h/f/g mal+mrg 0.6-1	1	0	0	0	0.18	0	9,863
11622	Exc s/n/h/f/g mal+mrg 1.1-2	1	0	0	0	0.18	0	39,789
11623	Exc s/n/h/f/g mal+mrg 2.1-3	1	0	0	0	0.20	0	20,118
11640	Exc f/e/e/n/l mal+mrg 0.5cm<	1	0	0	0	0.24	0	8,393
11641	Exc f/e/e/n/l mal+mrg 0.6-1	1	0	0	0	0.24	0	30,348
11642	Exc f/e/e/n/l mal+mrg 1.1-2	1	0	0	0	0.25	0	72,790
11643	Exc f/e/e/n/l mal+mrg 2.1-3	1	0	0	1	0.29	0	29,155
11644	Exc f/e/e/n/l mal+mrg 3.1-4	1	0	0	1	0.35	0	9,905
11646	Exc f/e/e/n/l mal+mrg >4 cm	1	0	0	1	0.38	0	8,066
11750	Removal of nail bed	1	0	0	0	0.13	0	194,732
11765	Excision of nail fold toe	1	0	0	0	0.02	0	44,899
12031	Intmd rpr s/a/t/ext 2.5 cm/<	1	0	0	0	0.08	0	49,892

HCPCS Code	CPT Short Descriptors	Time File Visits	Reported Visits, 25th Pctl.	Reported Visits, Median	Reported Visits, 75th Pctl.	Reported Visits, Mean	Reported Visits, Mode	2018 Medicare Volume
12032	Intmd rpr s/a/t/ext 2.6-7.5	1	0	0	0	0.10	0	224,558
12034	Intmd rpr s/tr/ext 7.6-12.5	1	0	0	0	0.09	0	18,288
12041	Intmd rpr n-hf/genit 2.5cm/<	1	0	0	0	0.09	0	15,803
12042	Intmd rpr n-hf/genit2.6-7.5	1	0	0	0	0.11	0	39,010
12051	Intmd rpr face/mm 2.5 cm/<	1	0	0	1	0.30	0	42,023
12052	Intmd rpr face/mm 2.6-5.0 cm	1	0	0	1	0.28	0	59,173
13101	Cmplx rpr trunk 2.6-7.5 cm	1	0	0	0	0.13	0	75,178
13121	Cmplx rpr s/a/l 2.6-7.5 cm	1	0	0	0	0.17	0	128,380
13131	Cmplx rpr f/c/c/m/n/ax/g/h/f	1	0	0	1	0.29	0	26,329
13132	Cmplx rpr f/c/c/m/n/ax/g/h/f	1	0	0	1	0.29	0	173,065
13151	Cmplx rpr e/n/e/l 1.1-2.5 cm	1	0	0	1	0.35	0	22,307
13152	Cmplx rpr e/n/e/l 2.6-7.5 cm	1	0	0	1	0.34	0	33,770
17000	Destruct premalg lesion	1	0	0	0	0.01	0	4,588,227
17004	Destroy premal lesions 15/>	1	0	0	0	0.01	0	861,245
17110	Destruct b9 lesion 1-14	1	0	0	0	0.01	0	2,049,227
17111	Destruct lesion 15 or more	1	0	0	0	0.01	0	105,055
17260	Destruction of skin lesions	1	0	0	0	0.02	0	14,457
17261	Destruction of skin lesions	1	0	0	0	0.02	0	121,528
17262	Destruction of skin lesions	1	0	0	0	0.03	0	239,408
17263	Destruction of skin lesions	1	0	0	0	0.03	0	43,931
17270	Destruction of skin lesions	1	0	0	0	0.01	0	8,806
17271	Destruction of skin lesions	1	0	0	0	0.02	0	46,243
17272	Destruction of skin lesions	1	0	0	0	0.02	0	74,213
17273	Destruction of skin lesions	1	0	0	0	0.01	0	13,853
17280	Destruction of skin lesions	1	0	0	0	0.01	0	26,776
17281	Destruction of skin lesions	1	0	0	0	0.01	0	97,241
17282	Destruction of skin lesions	1	0	0	0	0.01	0	89,820
17283	Destruction of skin lesions	1	0	0	0	0.01	0	13,619
20670	Removal of support implant	1	0	0	1	0.38	0	7,925
22513	Perq vertebral augmentation	1.5	0	0	0	0.19	0	23,139
22514	Perq vertebral augmentation	1.5	0	0	0	0.19	0	25,044
36558	Insert tunneled cv cath	1.5	0	0	0	0.09	0	122,510
36561	Insert tunneled cv cath	1.5	0	0	0	0.07	0	128,750
36581	Replace tunneled cv cath	1.5	0	0	0	0.06	0	35,432
36589	Removal tunneled cv cath	1.5	0	0	0	0.07	0	88,824
36590	Removal tunneled cv cath	1.5	0	0	0	0.08	0	50,893
37609	Temporal artery procedure	1.5	0	0	0	0.24	0	13,943
38500	Biopsy/removal lymph nodes	1.5	0	0	1	0.31	0	8,502
38571	Laparoscopy lymphadenectomy	3	0	0	1	0.80	0	11,611
40808	Biopsy of mouth lesion	1	0	0	0	0.07	0	11,998

HCPCS Code	CPT Short Descriptors	Time File Visits	Reported Visits, 25th Pctl.	Reported Visits, Median	Reported Visits, 75th Pctl.	Reported Visits, Mean	Reported Visits, Mode	2018 Medicare Volume
46221	Ligation of hemorrhoid(s)	1	0	0	0	0.01	0	70,956
46500	Injection into hemorrhoid(s)	1	0	0	0	0.02	0	12,294
49440	Place gastrostomy tube perc	1	0	0	0	0.07	0	18,920
54161	Circum 28 days or older	1	0	0	0	0.19	0	8,999
58661	Laparoscopy remove adnexa	1.5	0	0	0	0.27	0	12,987
62264	Epidural lysis on single day	0.5	0	0	0	0.02	0	9,020
63650	Implant neuroelectrodes	1.5	0	0	1	0.40	0	54,809
63685	Insrt/redo spine n generator	1.5	0	0	0	0.25	0	12,528
64555	Implant neuroelectrodes	1.5	0	0	1	0.28	0	7,444
64561	Implant neuroelectrodes	1	0	0	1	0.52	0	11,588
64590	Insrt/redo pn/gastr stimul	1	0	0	0	0.11	0	8,585
64612	Destroy nerve face muscle	1	0	0	0	0.01	0	94,140
64632	N block inj common digit	1	0	0	0	0.01	0	21,353
64633	Destroy cerv/thor facet jnt	1.5	0	0	0	0.02	0	61,379
64635	Destroy lumb/sac facet jnt	1.5	0	0	0	0.02	0	252,467
64640	Injection treatment of nerve	1	0	0	0	0.02	0	90,882
65855	Trabeculoplasty laser surg	1	0	0	0	0.11	0	151,350
66761	Revision of iris	2	0	0	0	0.24	0	76,347
67228	Treatment x10sv retinopathy	1	0	0	0	0.04	0	76,671
67800	Remove eyelid lesion	0.5	0	0	0	0.06	0	19,825
67840	Remove eyelid lesion	1	0	0	0	0.10	0	45,961
68760	Close tear duct opening	1	0	0	0	0.04	0	9,678
68761	Close tear duct opening	1	0	0	0	0.03	0	341,423
68801	Dilate tear duct opening	1	0	0	0	0.01	0	31,685
68810	Probe nasolacrimal duct	1	0	0	0	0.11	0	24,497
68840	Explore/irrigate tear ducts	1	0	0	0	0.02	0	39,647
69420	Incision of eardrum	1	0	0	0	0.04	0	13,418
69433	Create eardrum opening	1	0	0	0	0.04	0	42,244
69436	Create eardrum opening	1	0	0	0	0.09	0	11,887

NOTES: The CPT short descriptors are those available in the Physician Fee Schedule. The HCPCS codes included in this table are based on the subset of HCPCS codes included in our earlier analysis (Kranz et al., 2021) that were active and retained a 10-day global period in 2018. Pctl. = percentile.

Table C.2a. Updated Work RVUs, Procedures with 90-Day Global Periods

HCPCS Code	CPT Short Descriptors	2018 Medicare Volume	PFS Work RVUs	New wRVUs, Median Visits	New wRVUs, 75th Pctl. Visits	New wRVUs, Mean Visits	New wRVUs, Mode of Visits
13160	Late closure of wound	14,889	12.04	6.86	8.75	7.23	4.98
14020	Tis trnfr s/a/l 10 sq cm/<	18,388	7.22	3.83	4.31	4.20	3.34
14021	Tis trnfr s/a/l 10.1-30 sqcm	17,797	9.72	5.84	6.81	6.57	5.84
14040	Tis trnfr f/c/c/m/n/a/g/h/f	65,508	8.60	6.43	6.43	6.29	5.70
14041	Tis trnfr f/c/c/m/n/a/g/h/f	42,255	10.83	6.95	7.92	7.62	6.95
14060	Tis trnfr e/n/e/l 10 sq cm/<	88,731	9.23	7.05	7.05	6.97	6.33
14061	Tis trnfr e/n/e/l10.1-30sqcm	28,338	11.48	8.09	9.05	8.10	7.12
14301	Tis trnfr any 30.1-60 sq cm	30,102	12.65	9.52	10.41	9.70	8.62
15100	Skin splt grft trnk/arm/leg	13,760	9.90	7.02	9.08	7.94	4.96
15120	Skn splt a-grft fac/nck/hf/g	8,850	10.15	7.96	9.71	8.83	7.09
15240	Skin full grft face/genit/hf	12,374	10.41	5.77	7.46	6.26	4.93
15260	Skin full graft een & lips	54,521	11.64	7.76	8.73	8.00	6.79
15730	Mdfc flap w/prsrv vasc pedcl	9,069	13.50	11.47	13.16	11.85	10.45
15731	Forehead flap w/vasc pedicle	2,162	14.38	11.87	14.88	13.03	8.85
15734	Muscle-skin graft trunk	20,170	23.00	14.02	16.27	15.80	11.78
15823	Revision of upper eyelid	68,767	6.81	4.44	5.12	4.78	4.44
19120	Removal of breast lesion	11,181	5.92	5.20	5.20	5.34	5.20
19125	Excision breast lesion	15,892	6.69	5.72	5.72	5.96	5.72
19301	Partial mastectomy	53,842	10.13	7.94	8.82	8.21	7.94
19303	Mast simple complete	21,078	15.00	13.25	15.58	14.11	13.25
19307	Mast mod rad	7,895	18.23	11.33	13.17	11.74	11.33
19357	Breast reconstruction	6,131	18.50	11.63	15.06	12.26	8.19
20680	Removal of support implant	47,605	5.96	5.00	5.64	5.47	5.00
20926	Removal of tissue for graft	10,658	5.79	3.01	3.01	2.95	2.31
22551	Neck spine fuse&remov bel c2	41,660	25.00	21.65	22.77	21.60	21.65
22558	Lumbar spine fusion	16,484	23.53	15.15	17.94	16.17	15.15
22600	Neck spine fusion	8,606	17.40	9.45	11.21	10.08	7.68
22612	Lumbar spine fusion	47,864	23.53	18.01	19.11	18.15	15.80
22630	Lumbar spine fusion	7,079	22.09	16.51	18.37	17.42	16.51
22633	Lumbar spine fusion combined	38,790	27.75	20.91	23.64	21.81	20.91
22830	Exploration of spinal fusion	5,337	11.22	9.10	11.22	9.42	9.10
23120	Partial removal collar bone	5,369	7.39	4.64	5.42	5.24	4.64
23412	Repair rotator cuff chronic	15,753	11.93	9.96	10.75	10.18	10.75
23430	Repair biceps tendon	12,093	10.17	8.60	8.99	8.57	8.99
23472	Reconstruct shoulder joint	53,040	22.13	16.45	17.39	16.93	17.39
23500	Treat clavicle fracture	12,367	2.21	1.49	1.97	1.59	1.01
23600	Treat humerus fracture	32,563	3.00	1.80	2.40	1.70	0.59
23615	Treat humerus fracture	8,133	12.30	9.59	10.49	9.35	9.59
23650	Treat shoulder dislocation	12,075	3.53	2.09	2.57	2.48	2.09

HCPCS Code	CPT Short Descriptors	2018 Medicare Volume	PFS Work RVUs	New wRVUs, Median Visits	New wRVUs, 75th Pctl. Visits	New wRVUs, Mean Visits	New wRVUs, Mode of Visits
25447	Repair wrist joints	18,066	11.14	8.58	9.31	8.74	9.31
25600	Treat fracture radius/ulna	41,444	2.78	1.34	1.82	1.31	0.38
25605	Treat fracture radius/ulna	18,058	6.25	4.65	5.29	4.39	2.72
25607	Treat fx rad extra-articul	9,013	9.56	6.69	7.51	6.92	7.51
25609	Treat fx radial 3+ frag	16,238	14.38	10.59	11.43	10.87	11.43
26055	Incise finger tendon sheath	71,862	3.11	1.27	2.01	1.44	1.27
26160	Remove tendon sheath lesion	13,825	3.57	1.73	2.47	1.88	1.73
26600	Treat metacarpal fracture	14,903	2.60	1.16	1.64	1.32	0.68
26720	Treat finger fracture each	9,979	1.76	1.28	1.76	1.39	0.80
27125	Partial hip replacement	10,074	16.64	8.38	9.25	8.46	6.65
27130	Total hip arthroplasty	163,089	20.72	15.20	16.30	15.37	15.20
27132	Total hip arthroplasty	6,517	25.69	15.02	16.73	15.74	15.02
27134	Revise hip joint replacement	11,066	30.28	22.50	24.23	23.30	22.50
27235	Treat thigh fracture	15,954	13.00	7.03	8.43	7.31	5.62
27236	Treat thigh fracture	61,128	17.61	11.45	12.48	11.66	9.40
27244	Treat thigh fracture	10,680	18.18	11.20	12.20	11.46	9.21
27245	Treat thigh fracture	83,528	18.18	11.20	13.20	11.54	9.21
27446	Revision of knee joint	18,088	17.48	13.58	14.56	13.61	13.58
27447	Total knee arthroplasty	319,995	20.72	15.20	16.30	15.52	15.20
27486	Revise/replace knee joint	10,293	21.12	13.95	15.74	14.54	13.95
27487	Revise/replace knee joint	15,955	27.11	19.94	21.73	20.64	19.94
27506	Treatment of thigh fracture	7,696	19.65	10.83	12.59	11.32	9.07
27590	Amputate leg at thigh	12,566	13.47	3.01	5.18	4.27	2.29
27786	Treatment of ankle fracture	23,093	3.02	1.82	2.78	2.15	1.34
27814	Treatment of ankle fracture	11,557	10.62	7.84	8.76	8.08	7.84
27880	Amputation of lower leg	14,483	15.37	8.26	10.93	9.68	6.48
28122	Partial removal of foot bone	11,198	6.76	4.79	6.37	5.41	3.22
28124	Partial removal of toe	9,066	5.00	4.04	4.52	4.25	3.08
28232	Incision of toe tendon	12,387	3.51	2.79	3.27	2.91	2.31
28270	Release of foot contracture	15,524	4.93	3.25	3.73	3.57	3.25
28285	Repair of hammertoe	53,295	5.62	4.44	5.23	4.25	4.44
28296	Correction hallux valgus	12,399	8.25	6.42	7.15	6.07	4.23
28308	Incision of metatarsal	9,757	5.48	5.00	5.48	4.84	5.00
28470	Treat metatarsal fracture	31,309	2.03	1.07	1.55	1.19	0.59
28510	Treatment of toe fracture	13,373	1.17	0.45	0.93	0.74	0.45
28810	Amputation toe & metatarsal	15,623	6.64	3.27	5.29	4.26	1.92
28820	Amputation of toe	24,207	5.82	3.85	5.43	4.40	2.28
28825	Partial amputation of toe	11,452	5.37	3.40	4.98	4.08	1.83
29822	Shoulder arthroscopy/surgery	13,601	7.60	6.44	7.02	6.38	6.44
29823	Shoulder arthroscopy/surgery	32,736	8.36	6.94	7.51	6.83	6.94
29824	Shoulder arthroscopy/surgery	40,433	8.98	7.01	7.01	6.70	7.01

HCPCS Code	CPT Short Descriptors	2018 Medicare Volume	PFS Work RVUs	New wRVUs, Median Visits	New wRVUs, 75th Pctl. Visits	New wRVUs, Mean Visits	New wRVUs, Mode of Visits
29827	Arthroscop rotator cuff repr	94,671	15.59	13.66	14.21	13.76	14.21
29828	Arthroscopy biceps tenodesis	14,752	13.16	11.19	11.98	11.11	11.19
29848	Wrist endoscopy/surgery	28,133	6.39	4.45	5.42	4.76	4.45
29876	Knee arthroscopy/surgery	11,307	8.87	6.33	7.35	6.92	5.32
29879	Knee arthroscopy/surgery	9,859	8.99	6.45	7.47	6.97	6.45
29880	Knee arthroscopy/surgery	44,401	7.39	6.08	6.08	5.77	6.08
29881	Knee arthroscopy/surgery	58,701	7.03	4.84	5.72	5.30	5.72
30520	Repair of nasal septum	21,245	7.01	4.26	5.04	4.52	3.47
32480	Partial removal of lung	6,871	25.82	16.45	20.47	18.37	12.44
32663	Thoracoscopy w/lobectomy	7,859	24.64	19.57	22.10	20.50	17.03
33207	Insert heart pm ventricular	15,633	7.80	4.16	5.37	5.33	4.16
33208	Insrt heart pm atrial & vent	99,957	8.52	6.09	7.31	6.20	4.88
33228	Remv&replc pm gen dual lead	37,772	5.52	3.91	4.98	4.61	3.91
33249	Insj/rplcmt defib w/lead(s)	48,716	14.92	12.98	12.98	12.99	12.01
33263	Rmvl & rplcmt dfb gen 2 lead	11,338	6.08	4.47	5.54	5.16	4.47
33264	Rmvl & rplcmt dfb gen mlt ld	17,760	6.35	4.74	5.81	5.67	4.74
33405	Replacement aortic valve opn	24,793	41.32	28.87	34.20	30.98	25.31
33426	Repair of mitral valve	3,726	43.28	30.83	36.16	33.00	27.27
33430	Replacement of mitral valve	9,051	50.93	35.01	42.97	37.46	29.04
33533	Cabg arterial single	63,196	33.75	23.14	28.45	25.43	19.61
33860	Ascending aortic graft	4,140	59.46	45.28	53.38	49.60	37.17
34705	Evac rpr a-biiliac ndgft	20,368	29.58	24.68	25.91	25.51	23.46
34706	Evasc rpr a-biiliac rpt	3,594	45.00	30.36	33.61	31.87	28.73
34710	Dlyd plmt xtn prosth 1st vsl	2,229	15.00	11.10	12.07	11.52	11.10
35301	Rechanneling of artery	43,395	21.16	15.87	17.19	16.83	15.87
36819	Av fuse uppr arm basilic	9,414	13.29	12.04	13.71	12.71	12.04
36821	Av fusion direct any site	32,757	11.90	10.65	11.48	10.98	9.81
36830	Artery-vein nonautograft	22,535	12.03	10.78	11.61	11.24	10.78
36832	Av fistula revision open	22,081	13.50	11.31	12.19	11.77	10.44
37607	Ligation of a-v fistula	8,672	6.25	5.77	6.25	5.94	5.29
37765	Stab phleb veins xtr 10-20	12,808	7.71	5.62	6.46	6.26	5.62
37766	Phleb veins - extrem 20+	10,491	9.66	7.57	8.41	8.19	7.57
38525	Biopsy/removal lymph nodes	32,650	6.43	5.18	5.18	5.37	5.18
38724	Removal of lymph nodes neck	7,981	23.95	16.43	17.50	17.39	16.43
43281	Lap paraesophag hern repair	10,722	26.60	23.38	24.45	23.55	22.30
43644	Lap gastric bypass/roux-en-y	5,032	29.40	23.85	26.07	24.62	23.85
44005	Freeing of bowel adhesion	10,438	18.46	9.88	14.78	12.74	7.43
44120	Removal of small intestine	23,524	20.82	10.37	15.01	12.69	6.88
44140	Partial removal of colon	15,610	22.59	15.48	19.03	17.35	13.70
44143	Partial removal of colon	10,944	27.79	18.12	24.17	20.96	14.50
44145	Partial removal of colon	6,696	28.58	21.05	24.28	22.26	19.97

HCPCS Code	CPT Short Descriptors	2018 Medicare Volume	PFS Work RVUs	New wRVUs, Median Visits	New wRVUs, 75th Pctl. Visits	New wRVUs, Mean Visits	New wRVUs, Mode of Visits
44160	Removal of colon	12,583	20.89	11.68	16.29	14.07	9.38
44204	Laparo partial colectomy	12,829	26.42	20.89	23.66	21.91	19.05
44205	Lap colectomy part w/ileum	11,867	22.95	17.88	19.33	18.67	17.15
44207	L colectomy/coloproctostomy	9,308	31.92	24.99	27.30	26.24	23.84
44970	Laparoscopy appendectomy	20,762	9.45	6.47	7.46	7.15	6.47
46930	Destroy internal hemorrhoids	8,939	1.61	0.64	0.64	0.90	0.64
47562	Laparoscopic cholecystectomy	109,328	10.47	8.28	9.16	8.57	8.28
47563	Laparo cholecystectomy/graph	44,752	11.47	10.22	11.05	10.49	10.22
47600	Removal of gallbladder	9,465	17.48	10.55	14.02	12.32	9.40
49505	Prp i/hern init reduc >5 yr	62,691	7.96	6.71	6.71	6.82	6.71
49507	Prp i/hern init block >5 yr	11,160	9.09	7.84	8.67	8.22	7.84
49560	Rpr ventral hern init reduc	24,325	11.92	10.67	11.50	11.41	10.67
49561	Rpr ventral hern init block	13,619	15.38	10.16	12.25	11.47	10.16
49585	Rpr umbil hern reduc > 5 yr	17,668	6.59	5.34	5.34	5.53	5.34
49650	Lap ing hernia repair init	36,097	6.36	5.88	5.88	5.94	5.88
50360	Transplantation of kidney	11,223	39.88	24.98	27.96	27.38	24.98
50590	Fragmenting of kidney stone	57,987	9.77	7.58	7.58	7.53	6.71
52601	Prostatectomy (turp)	46,288	13.16	11.61	12.64	12.23	10.58
52648	Laser surgery of prostate	21,550	12.15	10.21	11.18	10.59	9.24
53850	Prostatic microwave thermotx	5,706	5.42	2.51	3.48	3.30	2.51
55866	Laparo radical prostatectomy	17,025	26.80	23.13	24.36	23.25	23.13
57240	Anterior colporrhaphy	7,073	10.08	8.53	9.56	8.86	7.50
57288	Repair bladder defect	20,063	12.13	9.00	9.89	9.31	9.00
58571	Tlh w/t/o 250 g or less	17,322	15.00	13.45	14.48	13.90	12.42
58575	Laps tot hyst resj mal	857	32.60	27.71	28.93	28.14	26.49
60240	Removal of thyroid	9,127	15.04	13.49	14.52	13.86	13.49
60500	Explore parathyroid glands	16,494	15.60	13.41	13.41	13.52	13.41
61312	Open skull for drainage	9,683	30.17	15.93	19.21	17.98	14.83
61510	Removal of brain lesion	8,160	30.83	21.85	22.84	22.33	19.85
63030	Low back disk surgery	31,933	13.18	9.37	9.37	9.08	9.37
63042	Laminotomy single lumbar	12,666	18.76	14.14	15.06	14.09	13.21
63045	Remove spine lamina 1 crvl	9,465	17.95	12.67	13.72	13.41	11.61
63047	Remove spine lamina 1 lmbr	89,093	15.37	11.14	12.20	11.11	11.14
63056	Decompress spinal cord lmbr	6,253	21.86	14.47	15.34	14.93	14.47
63081	Remove vert body dcmprn crvl	6,451	26.10	12.95	14.27	12.91	12.95
64581	Implant neuroelectrodes	10,397	12.20	11.49	12.91	11.91	11.49
64718	Revise ulnar nerve at elbow	22,118	7.26	3.74	4.75	4.29	4.75
64721	Carpal tunnel surgery	104,552	4.97	2.78	3.66	3.13	2.78
65756	Corneal trnspl endothelial	13,667	16.84	14.92	15.69	14.82	14.92
66170	Glaucoma surgery	10,446	13.94	10.43	11.99	10.58	6.53
66179	Aqueous shunt eye w/o graft	880	14.00	10.33	11.96	10.81	10.33

HCPCS Code	CPT Short Descriptors	2018 Medicare Volume	PFS Work RVUs	New wRVUs, Median Visits	New wRVUs, 75th Pctl. Visits	New wRVUs, Mean Visits	New wRVUs, Mode of Visits
66180	Aqueous shunt eye w/graft	11,980	15.00	12.15	12.96	12.08	11.33
66711	Ciliary endoscopic ablation	10,203	7.93	3.84	5.66	4.70	2.93
66821	After cataract laser surgery	637,157	3.42	2.45	2.45	2.15	1.48
66982	Cataract surgery complex	162,580	11.08	9.90	10.69	9.65	7.54
66984	Cataract surg w/iol 1 stage	1,680,887	8.52	7.34	8.13	7.12	4.98
67036	Removal of inner eye fluid	15,115	12.13	8.64	9.63	9.02	9.63
67040	Laser treatment of retina	9,497	14.50	11.01	12.00	11.30	12.00
67041	Vit for macular pucker	13,822	16.33	13.83	14.83	13.41	13.83
67042	Vit for macular hole	26,245	16.33	13.83	14.83	13.44	13.83
67108	Repair detached retina	15,946	17.13	14.63	16.63	14.96	14.63
67113	Repair retinal detach cplx	12,727	19.00	15.52	16.52	15.61	15.52
67145	Treatment of retina	26,205	6.32	4.38	5.35	4.50	3.41
67210	Treatment of retinal lesion	66,469	6.36	3.45	3.45	3.83	3.45
67255	Reinforce/graft eye wall	899	8.38	5.69	7.23	6.32	5.69
67900	Repair brow defect	9,335	6.82	5.21	6.01	5.62	5.21
67904	Repair eyelid defect	40,375	7.97	5.60	6.28	6.00	6.28
67917	Repair eyelid defect	18,222	5.93	4.09	4.83	4.50	4.83
67924	Repair eyelid defect	9,580	5.93	4.09	4.83	4.38	4.09

NOTES: The CPT short descriptors are those available in the Physician Fee Schedule. Pctl. = percentile. PFS = Physician Fee Schedule. wRVUs = work RVUs.

Table C.2b. Updated Work RVUs, Procedures with 10-Day Global Periods

HCPCS Code	CPT Short Descriptors	2018 Medicare Volume	PFS Work RVUs	New wRVUs, Median Visits	New wRVUs, 75th Pctl. Visits	New wRVUs, Mean Visits	New wRVUs, Mode of Visits
10040	Acne surgery	30,342	0.91	0.43	0.43	0.44	0.43
10060	Drainage of skin abscess	413,247	1.22	0.74	0.74	0.81	0.74
10061	Drainage of skin abscess	154,272	2.45	1.49	1.49	1.60	1.49
10120	Remove foreign body	42,785	1.22	0.74	0.74	0.76	0.74
10140	Drainage of hematoma/fluid	57,576	1.58	1.10	1.10	1.27	1.10
10160	Puncture drainage of lesion	60,332	1.25	0.77	0.77	0.83	0.77
10180	Complex drainage wound	10,405	2.30	1.82	2.30	2.18	1.82
11200	Removal of skin tags <w/15	82,964	0.82	0.34	0.34	0.35	0.34
11400	Exc tr-ext b9+marg 0.5 cm<	26,675	0.90	0.42	0.42	0.47	0.42
11401	Exc tr-ext b9+marg 0.6-1 cm	56,457	1.28	0.80	0.80	0.85	0.80
11402	Exc tr-ext b9+marg 1.1-2 cm	78,114	1.45	0.97	0.97	1.05	0.97
11403	Exc tr-ext b9+marg 2.1-3cm	33,831	1.84	1.36	1.36	1.46	1.36
11404	Exc tr-ext b9+marg 3.1-4 cm	13,311	2.11	1.63	1.63	1.74	1.63
11406	Exc tr-ext b9+marg >4.0 cm	15,154	3.52	2.55	2.55	2.85	2.55
11420	Exc h-f-nk-sp b9+marg 0.5/<	17,892	1.03	0.55	0.55	0.61	0.55
11421	Exc h-f-nk-sp b9+marg 0.6-1	25,764	1.47	0.99	0.99	1.08	0.99
11422	Exc h-f-nk-sp b9+marg 1.1-2	28,898	1.68	1.20	1.20	1.29	1.20
11423	Exc h-f-nk-sp b9+marg 2.1-3	12,509	2.06	1.58	1.58	1.70	1.58
11440	Exc face-mm b9+marg 0.5 cm/<	28,749	1.05	0.57	0.57	0.63	0.57
11441	Exc face-mm b9+marg 0.6-1 cm	29,574	1.53	1.05	1.05	1.16	1.05
11442	Exc face-mm b9+marg 1.1-2 cm	25,786	1.77	1.29	1.77	1.41	1.29
11443	Exc face-mm b9+marg 2.1-3 cm	7,524	2.34	1.86	2.34	2.02	1.86
11601	Exc tr-ext mal+marg 0.6-1 cm	21,952	2.07	1.10	1.10	1.20	1.10
11602	Exc tr-ext mal+marg 1.1-2 cm	126,304	2.27	1.30	1.30	1.41	1.30
11603	Exc tr-ext mal+marg 2.1-3 cm	68,762	2.82	1.85	1.85	2.00	1.85
11604	Exc tr-ext mal+marg 3.1-4 cm	27,874	3.17	2.20	2.20	2.41	2.20
11606	Exc tr-ext mal+marg >4 cm	28,712	5.02	4.05	4.05	4.33	4.05
11621	Exc s/n/h/f/g mal+mrg 0.6-1	9,863	2.08	1.11	1.11	1.28	1.11
11622	Exc s/n/h/f/g mal+mrg 1.1-2	39,789	2.41	1.44	1.44	1.61	1.44
11623	Exc s/n/h/f/g mal+mrg 2.1-3	20,118	3.11	2.14	2.14	2.34	2.14
11640	Exc f/e/e/n/l mal+mrg 0.5cm<	8,393	1.67	0.70	0.70	0.94	0.70
11641	Exc f/e/e/n/l mal+mrg 0.6-1	30,348	2.17	1.20	1.20	1.43	1.20
11642	Exc f/e/e/n/l mal+mrg 1.1-2	72,790	2.62	1.65	1.65	1.90	1.65
11643	Exc f/e/e/n/l mal+mrg 2.1-3	29,155	3.42	2.45	3.42	2.73	2.45
11644	Exc f/e/e/n/l mal+mrg 3.1-4	9,905	4.34	3.37	4.34	3.71	3.37
11646	Exc f/e/e/n/l mal+mrg >4 cm	8,066	6.26	5.29	6.26	5.66	5.29
11750	Removal of nail bed	194,732	1.58	1.10	1.10	1.16	1.10
11765	Excision of nail fold toe	44,899	1.22	0.74	0.74	0.75	0.74
12031	Intmd rpr s/a/t/ext 2.5 cm/<	49,892	2.00	1.52	1.52	1.56	1.52

HCPCS Code	CPT Short Descriptors	2018 Medicare Volume	PFS Work RVUs	New wRVUs, Median Visits	New wRVUs, 75th Pctl. Visits	New wRVUs, Mean Visits	New wRVUs, Mode of Visits
12032	Intmd rpr s/a/t/ext 2.6-7.5	224,558	2.52	2.04	2.04	2.09	2.04
12034	Intmd rpr s/tr/ext 7.6-12.5	18,288	2.97	2.49	2.49	2.53	2.49
12041	Intmd rpr n-hf/genit 2.5cm/<	15,803	2.10	1.62	1.62	1.66	1.62
12042	Intmd rpr n-hf/genit2.6-7.5	39,010	2.79	2.31	2.31	2.36	2.31
12051	Intmd rpr face/mm 2.5 cm/<	42,023	2.33	1.85	2.33	1.99	1.85
12052	Intmd rpr face/mm 2.6-5.0 cm	59,173	2.87	2.39	2.87	2.53	2.39
13101	Cmplx rpr trunk 2.6-7.5 cm	75,178	3.50	3.02	3.02	3.08	3.02
13121	Cmplx rpr s/a/l 2.6-7.5 cm	128,380	4.00	3.52	3.52	3.60	3.52
13131	Cmplx rpr f/c/c/m/n/ax/g/h/f	26,329	3.73	3.25	3.73	3.39	3.25
13132	Cmplx rpr f/c/c/m/n/ax/g/h/f	173,065	4.78	4.30	4.78	4.44	4.30
13151	Cmplx rpr e/n/e/l 1.1-2.5 cm	22,307	4.34	3.86	4.34	4.03	3.86
13152	Cmplx rpr e/n/e/l 2.6-7.5 cm	33,770	5.34	4.86	5.34	5.02	4.86
17000	Destruct premalg lesion	4,588,227	0.61	0.13	0.13	0.13	0.13
17004	Destroy premal lesions 15/>	861,245	1.37	0.89	0.89	0.89	0.89
17110	Destruct b9 lesion 1-14	2,049,227	0.70	0.22	0.22	0.22	0.22
17111	Destruct lesion 15 or more	105,055	0.97	0.49	0.49	0.49	0.49
17260	Destruction of skin lesions	14,457	0.96	0.48	0.48	0.49	0.48
17261	Destruction of skin lesions	121,528	1.22	0.74	0.74	0.75	0.74
17262	Destruction of skin lesions	239,408	1.63	1.15	1.15	1.16	1.15
17263	Destruction of skin lesions	43,931	1.84	1.36	1.36	1.38	1.36
17270	Destruction of skin lesions	8,806	1.37	0.89	0.89	0.89	0.89
17271	Destruction of skin lesions	46,243	1.54	1.06	1.06	1.07	1.06
17272	Destruction of skin lesions	74,213	1.82	1.34	1.34	1.35	1.34
17273	Destruction of skin lesions	13,853	2.10	1.62	1.62	1.63	1.62
17280	Destruction of skin lesions	26,776	1.22	0.74	0.74	0.75	0.74
17281	Destruction of skin lesions	97,241	1.77	1.29	1.29	1.30	1.29
17282	Destruction of skin lesions	89,820	2.09	1.61	1.61	1.62	1.61
17283	Destruction of skin lesions	13,619	2.69	2.21	2.21	2.21	2.21
20670	Removal of support implant	7,925	1.79	1.31	1.79	1.49	1.31
22513	Perq vertebral augmentation	23,139	8.65	7.04	7.04	7.24	7.04
22514	Perq vertebral augmentation	25,044	7.99	6.38	6.38	6.58	6.38
36558	Insert tunneled cv cath	122,510	4.59	3.47	3.47	3.54	3.47
36561	Insert tunneled cv cath	128,750	5.79	4.67	4.67	4.72	4.67
36581	Replace tunneled cv cath	35,432	3.23	2.11	2.11	2.15	2.11
36589	Removal tunneled cv cath	88,824	2.28	1.46	1.46	1.50	1.46
36590	Removal tunneled cv cath	50,893	3.10	1.98	1.98	2.04	1.98
37609	Temporal artery procedure	13,943	3.05	1.93	1.93	2.11	1.93
38500	Biopsy/removal lymph nodes	8,502	3.79	2.67	3.42	2.90	2.67
38571	Laparoscopy lymphadenectomy	11,611	12.00	9.27	10.18	10.00	9.27
40808	Biopsy of mouth lesion	11,998	1.01	0.53	0.53	0.56	0.53
46221	Ligation of hemorrhoid(s)	70,956	2.36	1.39	1.39	1.40	1.39

HCPCS Code	CPT Short Descriptors	2018 Medicare Volume	PFS Work RVUs	New wRVUs, Median Visits	New wRVUs, 75th Pctl. Visits	New wRVUs, Mean Visits	New wRVUs, Mode of Visits
46500	Injection into hemorrhoid(s)	12,294	1.74	0.77	0.77	0.78	0.77
49440	Place gastrostomy tube perc	18,920	3.93	3.17	3.17	3.22	3.17
54161	Circum 28 days or older	8,999	3.32	2.84	2.84	2.93	2.84
58661	Laparoscopy remove adnexa	12,987	11.35	9.74	9.74	10.03	9.74
62264	Epidural lysis on single day	9,020	4.42	3.78	3.78	3.81	3.78
63650	Implant neuroelectrodes	54,809	7.15	5.54	6.61	5.97	5.54
63685	Insrt/redo spine n generator	12,528	5.19	3.58	3.58	3.85	3.58
64555	Implant neuroelectrodes	7,444	5.76	4.15	5.22	4.45	4.15
64561	Implant neuroelectrodes	11,588	5.44	3.94	5.44	4.73	3.94
64590	Insrt/redo pn/gastr stimul	8,585	2.45	1.97	1.97	2.02	1.97
64612	Destroy nerve face muscle	94,140	1.41	0.93	0.93	0.93	0.93
64632	N block inj common digit	21,353	1.23	0.75	0.75	0.75	0.75
64633	Destroy cerv/thor facet jnt	61,379	3.84	2.23	2.23	2.25	2.23
64635	Destroy lumb/sac facet jnt	252,467	3.78	2.17	2.17	2.19	2.17
64640	Injection treatment of nerve	90,882	1.23	0.75	0.75	0.76	0.75
65855	Trabeculoplasty laser surg	151,350	3.00	2.52	2.52	2.57	2.52
66761	Revision of iris	76,347	3.00	1.55	1.55	1.73	1.55
67228	Treatment x10sv retinopathy	76,671	4.39	3.42	3.42	3.46	3.42
67800	Remove eyelid lesion	19,825	1.41	1.17	1.17	1.20	1.17
67840	Remove eyelid lesion	45,961	2.09	1.61	1.61	1.66	1.61
68760	Close tear duct opening	9,678	1.78	1.30	1.30	1.32	1.30
68761	Close tear duct opening	341,423	1.41	0.93	0.93	0.94	0.93
68801	Dilate tear duct opening	31,685	0.82	0.34	0.34	0.34	0.34
68810	Probe nasolacrimal duct	24,497	1.54	1.06	1.06	1.11	1.06
68840	Explore/irrigate tear ducts	39,647	1.30	0.82	0.82	0.83	0.82
69420	Incision of eardrum	13,418	1.38	0.90	0.90	0.92	0.90
69433	Create eardrum opening	42,244	1.57	0.60	0.60	0.64	0.60
69436	Create eardrum opening	11,887	2.01	1.53	1.53	1.57	1.53

NOTES: The CPT short descriptors are those available in the Physician Fee Schedule. Pctl. = percentile. PFS = Physician Fee Schedule. wRVUs = work RVUs.

Table C.3a. Percentage Change from Status Quo to Updated Work RVUs, 90-Day Procedures for Which Reporting Was Required

Specialty	Median of Reported Visits (%)	75th Percentile of Reported Visits (%)	Mean of Reported Visits (%)	Modal Reported Visits (%)
Cardiac surgery	–30	–16	–24	–40
Cardiology	–25	–14	–21	–34
Colorectal surgery	–25	–15	–20	–31
Dermatology	–30	–24	–28	–37
Diagnostic radiology	–20	–14	–16	–22
General surgery	–23	–14	–19	–26
Hand surgery	–39	–25	–35	–41
Interventional radiology	–22	–14	–17	–24
Neurology	–26	–20	–25	–27
Neurosurgery	–26	–20	–25	–28
Nurse practitioner/physician assistant	–35	–23	–33	–52
Ophthalmology	–18	–10	–20	–39
Orthopedic surgery	–29	–22	–27	–31
Other specialty	–23	–14	–20	–31
Otolaryngology	–25	–20	–23	–30
Plastic and reconstructive surgery	–31	–23	–28	–37
Podiatry	–33	–11	–26	–50
Primary care	–26	–16	–22	–33
Surgical oncology	–22	–14	–19	–25
Thoracic surgery	–29	–15	–23	–40
Urology	–17	–11	–14	–24
Vascular surgery	–23	–15	–18	–27
Total	–26	–18	–24	–32

Table C.3b. Percentage Change from Status Quo to Updated Work RVUs, 10-Day Procedures for Which Reporting Was Required

Specialty	Median of Reported Visits (%)	75th Percentile of Reported Visits (%)	Mean of Reported Visits (%)	Modal Reported Visits (%)
Cardiac surgery	–26	–24	–23	–26
Cardiology	–29	–29	–26	–29
Colorectal surgery	–41	–41	–40	–41
Dermatology	–44	–41	–43	–44
Diagnostic radiology	–24	–24	–23	–24
General surgery	–28	–27	–25	–28
Hand surgery	–34	–32	–29	–34
Interventional radiology	–24	–24	–22	–24
Neurology	–36	–35	–35	–36
Neurosurgery	–21	–20	–18	–21
Nurse practitioner/physician assistant	–57	–56	–55	–57
Ophthalmology	–27	–27	–25	–27
Orthopedic surgery	–22	–22	–19	–22
Other specialty	–38	–37	–36	–38
Otolaryngology	–42	–39	–39	–42
Plastic and reconstructive surgery	–17	–10	–14	–17
Podiatry	–44	–44	–41	–44
Primary care	–50	–50	–47	–50
Surgical oncology	–24	–23	–22	–24
Thoracic surgery	–24	–23	–22	–24
Urology	–23	–8	–14	–23
Vascular surgery	–28	–28	–26	–28
Total	–40	–39	–39	–40

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