



ACUMEN

**Interim Report on the Malpractice Relative Value
Units for the CY 2018 Medicare Physician Fee
Schedule**

July 2017

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EXECUTIVE SUMMARY

The Centers for Medicare and Medicaid Services (CMS) pays physicians for their services according to the Physician Fee Schedule (PFS), which specifies payment policies and amounts for several thousand services. Payments for services paid under the PFS are determined based on relative value units (RVUs) for each service that are set using a methodology referred to as the resource-based relative value scale (RBRVS). In this method, each procedure is interpreted as being produced by a combination of three categories of inputs: practitioner work, practice expense (PE), and malpractice insurance (MP). A payment for a procedure depends on its assigned RVUs and the input prices assessed for each RVU component based on a variety of data sources.

As mandated under Section 1848(c) of the Social Security Act, CMS is required to establish national RVUs for each of the three categories of inputs. The MP RVUs, which reflect the relative costs of professional liability insurance to practitioners, were first implemented in the PFS final rule published November 2, 1999.¹ Section 1848(c)(2)(B)(i) of the Act requires that CMS review and, if necessary, adjust RVUs at least once every five years. Beginning with the CY 2016 PFS final rule, CMS updates the MP RVUs annually based on a Medicare claims-based specialty mix for each service. CMS generally updates the malpractice insurance premium data every five years; these premiums are used to reflect the amount of malpractice insurance typically required to furnish medical services. Using more recent data ensures that the MP RVUs closely reflect malpractice insurance premium trends. CMS last updated the malpractice premium data used to construct MP RVUs in the CY 2015 PFS final rule (“CY 2015 Update”). Based on established precedent, the next MP RVU update will occur no later than CY 2020.

After evaluating both the current data and methods CMS uses to calculate the MP RVUs and assessing other means of determining MP RVUs, Acumen recommends that CMS implement six modifications to the MP RVU framework for the next MP RVU update. These modifications include updating:

1. The methodology to construct MP RVUs;
2. The malpractice premium data;
3. The malpractice premium amount reflecting technical component procedures;
4. The Current Procedural Terminology RVUs and Services (CRS) dataset;
5. The American Community Survey (ACS) Population Estimates dataset; and
6. The Geographic Practice Cost Index (GPCI) dataset.

¹ 64 FR 59380

Acumen recommends these modifications for several reasons. First, the proposed methodological changes to the MP RVU calculations ensure that the RVUs are calculated in an effective manner consistent with the RBRVS method, in which physician payment should reflect the relative resources involved in furnishing a service. Second, updating malpractice premium data for all types of procedures generates MP RVUs that are more reflective of recent premium trends. Third, using recent data on RVUs, population estimates, and geographic cost variation creates more representative MP RVUs.

The remainder of the Executive Summary provides additional information about RVUs and highlights this report's key findings. The first section reviews how Medicare uses RVUs within the PFS. The second section discusses proposed refinements to the MP RVU calculation methodology. The third section describes how updated data was used to construct the specialty risk factors. Finally, the fourth section concludes with highlights from the empirical analysis of the impact of the above changes.

How RVUs Affect Practitioner Payments

Under the PFS, Medicare pays practitioners for care based on a list of services and their payment rates. Every practitioner service corresponds to a specific procedure code within the Healthcare Common Procedure Coding System (HCPCS); many services are further classified by modifier (MOD) type. Payments for each service depend on the relative amounts of inputs required to perform the procedure. These inputs include the amount of practitioner work needed to furnish a medical service, expenses related to maintaining a practice, and malpractice insurance costs. CMS estimates the quantity of inputs involved in furnishing these services under the PFS using work RVUs, PE RVUs, and MP RVUs. Higher RVU levels indicate that the service requires more relative resources.

CMS measures the regional variation of each of the three input categories using Geographic Practice Cost Indices (GPCIs). GPCIs increase the price associated with an RVU in high cost regions and decrease the price associated with an RVU in low cost regions. GPCIs are budget neutral (except when exempted by statute) and do not affect aggregate payment levels; rather, they reallocate payment rates by locality to reflect regional variation in relative input prices. For instance, a PE GPCI of 1.2 indicates that practice expenses in that area are 20 percent above the national average, whereas a PE GPCI of 0.8 indicates that practice expenses in that area are 20 percent below the national average.

To translate the sum of the GPCI-adjusted RVUs into a PFS payment amount for a medical service, CMS applies an established conversion factor. Equation (1) below demonstrates how the work, PE, and MP RVUs combine with the three GPCIs and the CF to establish a practitioner payment for any procedure code *HCPCS* in Medicare locality *L*:

$$Payment_{HCPCS,L} = \{ [GPCI_{Work,L} \times RVU_{Work,HCPCS}] + [GPCI_{PE,L} \times RVU_{PE,HCPCS}] + [GPCI_{MP,L} \times RVU_{MP,HCPCS}] \} \times CF \quad (1)$$

Modifying the MP RVU Methodology

The first modification proposed in this report is to refine three components of the methodology used to calculate MP RVUs: national average malpractice premiums, specialty risk factors, and raw MP RVU values. The ultimate goal of evaluating the MP RVU methodology is to ensure that the calculations accurately account for regional variation in malpractice premiums and generate an interpretable scale to gauge the relative risk of each medical specialty. The MP RVU methodology should be consistent with the RBRVS and the general methods for calculating work and PE RVUs.

MP RVUs are determined in four broad steps:

1. Calculate a national average MP premium for each specialty,
2. Normalize specialty premiums to create a specialty-specific risk factor,
3. Calculate unadjusted MP RVUs for each service based on the volume of practitioners that perform a service, and
4. Adjust the RVUs for budget neutrality.

Acumen identified three decision points in these four steps where changes could be made to update the MP RVU methodology. The three points are: 1) the method used to compute national average MP premiums for each specialty, 2) the approach used to normalize specialty premiums, and 3) the interpretation of the malpractice premium data collected from insurers. For each decision point, Acumen conducted exploratory data analyses to assess the impacts of making a change by comparing the results of each methodological option.

First, Acumen began by evaluating several methods to calculate national average premiums (i.e., the first step of the MP RVU calculations). Beginning CY 2016, CMS incorporated population estimates from the ACS as weights for specialty premiums. The ACS estimates replaced the use of total RVU and MP RVUs to weight specialty premiums in the CY 2015 MP RVU Update. This change was implemented following CMS's determination that using RVUs as weights introduced the potential for circularity in the MP RVU calculations.

Acumen examined the differences in national average premiums across specialties that result from four calculation methods:

1. Using population estimates as weights for price-adjusted premiums (i.e., the CYs 2016 and 2017 methodology)

2. Using only work and PE RVUs as weights for price-adjusted premiums
3. Using total RVUs as weights for price-adjusted premiums
4. Using total and MP RVUs as weights (i.e., the CY 2015 methodology)

In Methods 1 – 3, the national average premiums were calculated by determining the weighted average of the premiums and then normalizing by the MP GPCI. In Method 4, the premiums were geographically normalized before finding the average.

No substantial differences in the national average premiums by specialty were observed among these different methods. Consequently, CMS decided to maintain the CY 2016/2017 methodology of using population estimates from the ACS as weights for malpractice specialty premiums.

Second, Acumen investigated the impacts of two options for determining final risk factors, which is the second step of MP RVU calculations. Currently, each specialty premium is normalized relative to the value of the lowest specialty premium. We compared the impacts of:

1. Normalizing each specialty premium to the value of the lowest specialty premium
2. Normalizing each specialty premium to the average value of all premiums

The first method measures each specialty's excess risk relative to the specialty with the lowest premium. The second method produces risk factors that normalize around 1.0, measuring each specialty's risk relative to the average of all premiums; this method is more consistent with the PE RVU and GPCI methodologies. However, the data revealed that normalizing to either the lowest or the average specialty premium had no impact on the final, budget-neutralized MP RVUs. Thus, CMS will maintain its current methodology of normalizing each premium to the lowest specialty premium amount.

Third, Acumen evaluated two options for interpreting malpractice premium data that impact the raw MP RVU calculations, which is the third step in the MP RVU calculation process. As noted in Section 2.2.3, the current methodology assumes that the malpractice premium data reflect global procedures, or the malpractice liability associated with both practitioner work and technical supplies/overhead. This interpretation was used for the CY 2010 and CY 2015 MP RVU updates. However, another possible interpretation is that the malpractice premium data reflect professional component procedures (i.e., the liability associated with practitioner work). This assumption was made in the CY 2005 MP RVU update. Compared to the global data interpretation, the professional data interpretation results in lower MP RVUs for single HCPCS codes but higher MP RVUs for global HCPCS codes.² Based on these results,

² Single HCPCS codes are those that are not eligible to be billed as a global, professional, or technical service through the use of a modifier code.

CMS determined that it will continue to interpret collected MP premium data as representing global procedures.

Calculating the Specialty Risk Factors with Updated Data

Four major modifications were made to update the data sources currently used to calculate the specialty risk factors. Table 1 below summarizes the data sources for the specialty risk factors and compares them to the CY 2017 MP RVU data sources.

Table 1. Comparison of Specialty Risk Factor Data Sources for CY 2015 and 2018 MP RVUs

Risk Factor Calculation Data Source	Source	CY 2018 Update	CY 2015 Update
Malpractice Premiums	State Departments of Insurance	2014 – 2015	2011 - 2012
American Community Survey (ACS) Population Estimates	U.S. Census Bureau	2015	N/A
Current Procedural Terminology RVUs and Services (CRS) File	CMS	2015	2013
Geographic Practice Cost Index	CMS	2017	2014

Summary of the Predicted Impacts on MP RVUs

To assess the effect of updating the data and methodology used to calculate MP RVUs as a whole, Acumen conducted a detailed impact analysis of the newly updated specialty risk factors. The goal of this analysis was to observe differences between the CY 2017 raw MP RVUs and the modeled MP RVUs based on the updated MP RVU methodology. For the purposes of assessing impacts, some smaller specialties were grouped with larger ones. A crosswalk detailing these aggregations is available in Appendix E. Table 2 below presents the percent changes in MP RVUs by specialty group. Overall, Acumen found that the use of updated specialty risk factors did not make a substantial impact on total RVUS. While the impacts on MP RVUs for specific specialty groups is more noticeable, these changes are in line with past updates.

Table 2. Impact by Specialty Group

Group #	CMS Specialty Name	MTUS	MP RVUs			Total RVUs		
			2017	2018	Percent Change	2017	2018	Percent Change
18	Internal Medicine	122,388,565	12,386,651	13,497,357	9.0%	307,238,527	308,349,234	0.4%
53	Physical/ Occupational Therapy	107,081,799	1,917,813	2,088,298	8.9%	96,711,672	96,882,156	0.2%
38	Radiology	96,494,243	4,346,005	4,297,843	-1.1%	130,508,195	130,460,034	0.0%
04	Cardiology	75,369,673	8,143,760	6,082,766	-25.3%	181,552,573	179,491,579	-1.1%
10	Family Practice	73,744,049	6,505,940	7,000,257	7.6%	172,209,579	172,703,896	0.3%
28	Ophthalmology	46,528,208	3,846,840	3,729,392	-3.1%	150,143,548	150,026,100	-0.1%
07	Dermatology	42,967,408	3,911,957	2,963,520	-24.2%	92,444,824	91,496,387	-1.0%
50	Nurse Practitioner	35,939,997	3,488,320	3,653,370	4.7%	83,938,608	84,103,658	0.2%
55	Podiatry	31,326,887	1,955,080	2,280,985	16.7%	55,011,155	55,337,060	0.6%
29	Orthopedic Surgery	28,063,553	7,793,895	7,911,140	1.5%	102,954,510	103,071,754	0.1%

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1 INTRODUCTION

The Centers for Medicare and Medicaid Services (CMS) pays physicians for their services according to the Physician Fee Schedule (PFS), which specifies payment amounts and policies for several thousand services. Payments for services paid under the PFS are determined based on relative value units (RVUs) for each service that are set using a methodology referred to as the resource-based relative value scale (RBRVS). In this method, each service is interpreted as being produced by a combination of three categories of resource inputs: practitioner work, practice expense (PE), and malpractice insurance (MP). A payment for a service depends on its assigned RVUs and the relative resources assessed for each RVU component based on a variety of data sources.

As mandated under Section 1848(c) of the Social Security Act, CMS is required to establish national RVUs for each of the three categories of resource inputs. The MP RVUs, which reflect the relative costs of professional liability insurance to practitioners, were first implemented in the PFS final rule published November 2, 1999.³ Section 1848(c)(2)(B)(i) of the Act requires that CMS review and, if necessary, adjust RVUs at least once every five years. Beginning with the CY 2016 PFS final rule, CMS updates the MP RVUs annually based on the Medicare claims-based specialty mix for each service. CMS generally updates the malpractice insurance premium data every five years; these premiums are used to reflect the amount of malpractice insurance typically required to furnish medical services. Using more recent data ensures that the MP RVUs closely reflect malpractice insurance premium trends. CMS last updated the malpractice premium data used to construct MP RVUs in the CY 2015 PFS final rule (“CY 2015 Update”). Based on established precedent, the next MP RVU update will occur no later than CY 2020.

This report describes the results of analyzing the data and methods used to calculate MP RVUs and will inform CMS’ decisions regarding the next MP RVU update. This report will discuss refining the MP RVU methodology, constructing specialty risk factors with updated data, and assessing the impact of the updated risk factors on MP RVUs. Updating the malpractice premium data used to construct the specialty risk factors will generate MP RVUs that are reflective of more recent malpractice premium trends. Moreover, the proposed methodological changes to the MP RVU calculations ensure that the RVUs are calculated in an effective manner, consistent with the RBRVS method in which physician payment should reflect the relative resource costs for providing a service.

Section 2 provides a brief overview of the current MP RVU methodology and proposed changes. Sections 3 and 4 discuss updating the data sources used to calculate specialty risk

³ 64 FR 59380

factors. Section 5 concludes with the impacts that the updated data and methodology have on MP RVUs.

2 REFINING THE MP RVU METHODOLOGY

As part of the PFS, MP RVUs reflect the relative cost of medical malpractice insurance to practitioners. This section provides an overview of how CMS uses MP RVUs within the Medicare PFS and proposes changes to the calculation process. Section 2.1 discusses how RVUs affect Medicare payments. Section 2.2 presents the current methodology CMS uses to calculate MP RVUs. Section 2.3 discusses the results of Acumen’s analyses of the MP RVU methodology and proposes changes.

2.1 How RVUs Affect Practitioner Payments

Under the PFS, Medicare pays for practitioner services based on a list of services and their payment rates. Every practitioner service corresponds to a specific procedure code within the Healthcare Common Procedure Coding System (HCPCS). For some services paid under the PFS, CMS allows different practitioners to bill for different components of the same service. The technical component (TC) of a procedure includes the cost of equipment, supplies, technician salaries, and malpractice insurance for the service (e.g., the cost of producing an x-ray). The professional component (PC) of a procedure includes the practitioner work, associated overhead, and malpractice insurance costs involved in the service (e.g., the cost of interpreting the contents of an x-ray). For most of these services, PC and TC modifiers (MOD) are appended to procedure codes when the professional and technical components are billed separately. Without these modifiers, the practitioner is billing for the complete service, referred to as the “global” code. Table 2.1 below summarizes the differences among PC, TC, and global HCPCS codes. Note that whereas the MOD variable for the technical component is “TC,” the modifier value for the professional component is “26.” For some other PC and TC services, there are distinct codes that are used to report each component. For these codes, neither the “TC” or “26” modifier is applied.

Table 2.1 Distinctions Among Professional Component, Technical Component, and Global Codes

HCPCS Code Type	MOD Variable	Description
Professional Component	26	Practitioner work, overhead, and malpractice insurance
Technical Component	TC	Equipment, supplies, technical salaries, and malpractice insurance
Global	None	PC and TC billed together

CMS has relied on the RBRVS system to determine the fee for each procedure to calculate payment rates for individual services. In the RBRVS system, payments for each service depend on the relative amounts of inputs required to perform the procedure. These inputs include the amount of practitioner work involved in furnishing a medical service, expenses related to maintaining a practice, and malpractice insurance costs. CMS estimates the quantity of inputs involved in furnishing these services under the PFS using the work RVU, PE RVU, and MP RVU. Higher RVU levels indicate that the service involves a greater amount of relative resources.

CMS measures the regional variation of each of the three input categories using the costs of each of the three input categories by locality: work, PE, and MP. Geographic Practice Cost Indices (GPCIs) are then used to increase the payment rates associated with an RVU in high cost regions and decrease the payment rates associated with an RVU in low cost regions. As calculated, variations in GPCIs are budget neutral and do not affect aggregate payment levels; rather, they reallocate payment rates by locality to reflect regional variation in relative resource inputs. For instance, a PE GPCI of 1.2 indicates that practice expenses in that area are 20 percent above the national average, whereas a PE GPCI of 0.8 indicates that practice expenses in that area are 20 percent below the national average. The three GPCIs are calculated for 112 localities, defined alternatively by state boundaries (e.g., Wisconsin), metropolitan statistical areas (MSAs) (e.g., Metropolitan St. Louis, MO), portions of an MSA (e.g., Manhattan), or rest-of-state areas that exclude metropolitan areas (e.g., Rest of Missouri).

To translate the sum of the GPCI-adjusted RVUs into a PFS payment amount for a medical service, CMS applies a conversion factor. The methodology prior to CY 2015 determined the conversion factor based on a statutory formula with annual updates. However, the Medicare Access and CHIP Reauthorization Act of 2015 repealed the statutory formula update and specified annual adjustment factors for CYs 2015 onward.⁴

Equation (1) below demonstrates how the PW, PE, and MP RVUs combine with the three GPCIs and the CF to establish a Medicare practitioner payment for any procedure code *HCPCS* in locality *L*:

$$\begin{aligned}
 \text{Payment}_{HCPCS,L} = & \{ [GPCI_{Work,L} \times RVU_{Work,HCPCS}] + [GPCI_{PE,L} \times RVU_{PE,HCPCS}] + [GPCI_{MP,L} \times RVU_{MP,HCPCS}] \} \\
 & \times CF
 \end{aligned}
 \tag{1}$$

⁴ 80 FR 70885

2.2 Current Policy for Calculating MP RVUs

The current policy for calculating MP RVUs involves several data sources and four main steps. MP RVUs are primarily based on malpractice premiums and data sources from the Census Bureau and CMS that account for population, geographic cost variation, RVUs, and volume of Medicare claims. Each data source is summarized in Table 2.2 below.

Table 2.2 MP RVU Data Overview

Dataset Name	Source	Observation Level	Data Source Role	Methodology Step
Malpractice Premiums (MP File)	State Departments of Insurance	County, Specialty, Surgery Class	Determining specialty risk factors	1
American Community Survey Population Estimates (ACS File)	U.S. Census Bureau	County, Population	Weighting malpractice premiums	1
Geographic Practice Cost Index (GPCI File)	CMS	Locality	Applying geographic adjustments to malpractice premiums	1
Current Procedural Terminology RVUs and Services (CRS File)	CMS	Carrier Number, Locality, Specialty, Current Procedural Terminology, Modifier	Weighting the blended specialties by their respective PW RVUs	2
Medicare PFS Relative Values (MPFS File)	CMS	Current Procedural Terminology, Modifier	Identifying all procedure codes and respective modifiers	3
Work and PE RVUs	CMS	Current Procedural Terminology, Modifier	Risk of service	3
Discounted Utilization Files	CMS	Specialty, Current Procedural Terminology, Modifier	Weighting national specialty risk factors and calculating budget neutralization factor	3, 4

The current approach to calculate MP RVUs involves four main steps:

1. Calculate a national average MP premium for each specialty,
2. Normalize specialty premiums to create a specialty-specific risk factor,

3. Calculate unadjusted MP RVUs for each service based on the volume of practitioners that perform a service, and
4. Adjust the RVUs for PFS relativity (budget neutrality).

MP RVUs are based in part on medical malpractice insurance premium data for specialties that provide Medicare services. Medical malpractice insurance is a type of professional liability insurance that protects health care professionals (e.g., physicians, dentists, nurses) from liability associated with negligent or intentionally harmful treatment decisions. Malpractice premiums vary by specialty and practice. Specialties are further categorized by surgery class (i.e., surgical and non-surgical) to reflect differences in risk.

Malpractice premiums are used to develop specialty risk factors that gauge the relative risk of practicing a particular specialty and surgery class (e.g., General Practice – Surgical, Dermatology – Non-surgical). Specialty risk factors in turn support the calculation of service-level MP RVUs.

The remainder of this section discusses each of the four MP RVU steps in detail.

2.2.1 Step 1: Calculating the National Average Premiums

The first step in computing MP RVUs is to aggregate state-level specialty/surgery class premiums and generate a national estimate. State- and territory-level premiums must be aggregated and adjusted for regional differences since the MP RVUs are applied nationally. These national average premiums are later used to determine the relative risk associated with each specialty and surgery class.

Malpractice premiums are collected from state departments of insurance for the top malpractice insurers in each state and are then used to calculate an average specialty/surgery class premium for each county. Malpractice premiums were collected from insurers at multiple geographic levels, including states and areas within states (i.e., territories); the methodology assumes that state- or territory-level premiums are applicable to all counties. To account for the relative size of each insurance company, the methodology incorporates how much of the malpractice market the insurance company captures. Market share is defined as the ratio of the insurer's number of direct premiums written to the total number of direct premiums written in the state. Market share data is drawn from the annually published National Association of Insurance Commissioners (NAIC) Property/Casualty Report (discussed in Section 3.1.2).

The county-level specialty/surgery class premium (P_{SK}) is determined by summing all insurance company's county-level premiums (P_{SKF}), weighted by each company's market share (MS_{KF}) in the state (MS_K). In mathematical notation, the average specialty/surgery class premium for each county is given by:

$$P_{SK} = \sum_F \frac{P_{SKF} \times MS_{KF}}{MS_K} \tag{2.1}$$

where K indicates the county; S designates the specialty and surgery class combination; and F indicates the insurance company (firm).

County-level specialty premiums are then aggregated to create national specialty premiums. This step involves calculating the national average premium for a specialty by using a price-adjusted premium (i.e., the premium divided by the MP GPCI) in each county and determining the weighted average of those premiums. A geographic adjustment is necessary to avoid inflated or deflated values due to possible differences in the distribution of services across regions. Normalizing each county-level premium by the MP GPCI adjusts the national average premiums to account for these geographic differences in cost. Additionally, to account for the relative size of each county, the county-level populations are used as a weight; these population estimates are drawn from the U.S. Census Bureau’s American Community Survey (ACS). Mathematically, the national average premium for a specialty/surgery class S is given by:

$$Premiums_{NS} = \sum_K \left(\frac{Premium_{SK}}{GPCI_{MP,K}} \times \text{share of total U.S. population in county } K \right) \tag{2.2}$$

where $Premium_{NS}$ identifies the national average specialty premium and $GPCI_{MP}$ refers to the malpractice GPCI value.

2.2.2 Step 2: Calculating the Specialty Risk Factors

The second step is to develop relative risk factors by specialty. Risk factors are weights given to each specialty based on the relative professional liability. These specialty risk factors are in turn used to gauge the relative risk of furnishing each service.

Risk factors for specialty/surgery classes are calculated by normalizing the national average premium for that specialty/surgery class to a standard base. The lowest physician premium specialty was chosen as the standard base for the CY 2017 methodology. As a result, specialty risk factors are presented as excess risk above the lowest premium specialty with all values greater than or equal to 1.0. Mathematically:

$$RF_S = \frac{Premium_{NS}}{Premium_{N_{Lowest}}} \tag{2.3}$$

where RF_S is the risk factor for the specialty and surgery class combination, $Premium_{NS}$ is the corresponding national average specialty premium, and $Premium_{N_{Lowest}}$ is the lowest specialty premium value.

After computing risk factors, CMS makes some adjustments for certain specialty and surgery class combinations based on the availability and quality of malpractice premium data. Currently, CMS reassigns specialties to receive the risk factor of another specialty if they either i) lack malpractice premium data for 35 or more states across all surgery classes or ii) display extreme variation in data relative to other specialties with comparable risk.

2.2.3 Step 3: Calculating the MP RVUs by Service

In the third step, raw MP RVUs for services are calculated using two main components: the service-level risk factor and the work RVU for a service. Service-level risk factors reflect the risk of furnishing the service based on the mix of specialties that furnish the procedure and the volume of Medicare claims data that include the HCPCS codes. Work RVUs account for the practitioner time, technical skill, and effort involved in a specific procedure. As discussed in Section 2.1, services are denoted by HCPCS codes, in some cases with modifiers (*MOD*) used to describe the global, professional component, and technical component.

Services are classified by general categories of risk. As noted earlier in Section 2.2, CMS’s surgery classifications are designed to reflect differences in risk of professional liability; the same concept applies to procedures because certain services carry greater malpractice risks. The liability risks are grouped by surgery, no surgery, and obstetrics as show in Table 2.3. Surgery HCPCS codes range from 10000-69999; in addition, surgery codes include a list of G codes and invasive cardiology codes provided by CMS. Codes ranging from 59000-59899 identify procedures grouped into the Obstetrics risk category. All remaining HCPCS codes are treated as having no surgery risk. The surgical, non-surgical, and obstetrics risk factors determined in Step 2 are applied to surgical, non-surgical, and obstetrics procedures respectively.

Table 2.3 HCPCS Code Surgery Classes

Surgery Class	HCPCS Code
Surgery	10000-69999, invasive cardiology codes treated as surgery and surgical codes
Obstetrics (OB)	59000-59899
No Surgery (NS)	All Other HCPCS Codes

Service-level risk factors for procedures are then determined based on the specialty risk factors calculated in Step 2. The service-level risk factor represents the relative malpractice liability associated with that procedure based on the specialties of the practitioners who furnish the service. The service-level risk factors are calculated differently for global services and services with PC and TC modifiers.

For any given global procedure, the average risk factor ($avgRF_{HCPCS/Global}$) is a weighted average of the risk factors for each specialty that performs the procedure, weighted by the share of the allowed service count performed by that specialty. Service counts, denoted as the Miles/Times/Units/Service ($MTUS_{HCPCS/Global,S}$), are the sum of the number of services performed per specialty per procedure in Medicare claims. To mitigate fluctuations in utilization across years, a three-year average of service counts is used in the calculations. Mathematically:

$$avgRF_{CPT/Global} = \frac{\sum_S (RF_S \times MTUS_{CPT/Global,S})}{\sum_S MTUS_{CPT/Global,S}} \quad (2.4)$$

where $avgRF_{HCPCS/Global}$ represents the malpractice risk for a global procedure code. The CY 2017 methodology assumes that the collected malpractice premium data and the resulting specialty risk factors represent global procedures.

To determine the service-level risk factors for HCPCS codes with PC and TC modifiers, the average risk factors for the corresponding global procedures and the general technical component risk factor is used. The general technical component risk factor is based on the umbrella mean non-physician premium value from the Radiology Business Management Association (RBMA), discussed in detail in Section 3.3. Similar to the calculations of all specialty risk factors, the general TC risk factor is the ratio of the RBMA umbrella premium to the lowest specialty premium value.

Because global procedures consist of both the technical and professional components billed together, the PC risk factor for a procedure can be derived by subtracting the general TC risk factor from the computed average risk factor from Equation 2.4 for the corresponding procedure. In mathematical notation, the service-level risk factor for a procedure with a PC modifier ($RF_{HCPCS/26}$) is:

$$RF_{HCPCS/26} = avgRF_{HCPCS/Global} - RF_{TC} \quad (2.5)$$

$$MP RVU_{HCPCS/26} = MP RVU_{HCPCS/Global} - MP RVU_{HCPCS/TC} \quad (2.6)$$

Table 2.4 shows the MOD, work RVU, and MP RVU values for HCPCS code 73610: “X-Ray Exam of Ankle” as an example. As described in Equation 2.6, the MP RVU for the TC MOD and the MP RVU for the 26 MOD add up to the global MP RVU. The TC portion of the code does not have a work RVU.

Table 2.4 CY 2017 Work and MP RVU Values by Component for HCPCS 73610: X-Ray Exam of Ankle

Component	MP RVU	Work RVU
Global	0.02	0.17
Professional (MOD = 26)	0.01	0.17
Technical (MOD = TC)	0.01	0.00

Finally, using the service-level risk factors for each procedure code determined from Equations 2.4 and 2.5, raw MP RVUs for each HCPCS/MOD combination can be determined by multiplying the procedure’s work RVU and the risk factor:

$$MP\ RVU_{HCPCS/MOD} = RF_{HCPCS/MOD} \times Work\ RVU_{HCPCS/MOD} \quad (2.7)$$

Clinical labor RVUs, a subset of PE RVUs, reflect non-physician staff labor costs. To incorporate accurate measures of relative practitioner costs and efforts, clinical labor RVUs are used in place of work RVUs in two cases: (i) for procedures codes with TC modifiers that do not have corresponding work RVUs, and (ii) for procedure codes that have higher clinical labor RVUs than work RVUs.

2.2.4 Step 4: Calculating the MP RVUs Adjusted for Budget Neutrality

The fourth step adjusts the MP RVUs for budget neutrality so that the aggregate pool of MP RVUs relative to the pool of work and PE RVUs is the same as the prior year. The calculation applies an adjustment that either scales up or scales down the new MP RVU values to maintain the current relative weights among the MP, PE, and work RVUs. Mathematically:

$$\sum MP\ RVU_{CPT/MOD}^{New} = \frac{\sum MP\ RVU_{CPT/MOD}^{Old}}{\sum Work\ RVU_{CPT/MOD}^{Old}} \times \sum Work\ RVU_{CPT/MOD}^{New} \quad (2.8)$$

where $MP\ RVU_{CPT/MOD}^{Old}$ indicates the previous MP RVUs; $MP\ RVU_{CPT/MOD}^{New}$ indicates the newly calculated MP RVUs from Equation 2.6; $Work\ RVU_{CPT/MOD}^{Old}$ indicates the previous work RVUs from the past year; and $Work\ RVU_{CPT/MOD}^{New}$ indicates the proposed work RVUs.

Every procedure carries a degree of professional liability risk, so a floor of 0.01 for the PC component is applied for all procedures except add-on codes. This condition may require a recalculation of global MP RVUs. If the TC and PC components no longer sum to the global after the floor is applied, the floor is applied to only the PC and TC modifier codes. For cases where the application of the floor changes one of these values, the global component is recalculated as the sum of the TC and PC components.

Because the application of the floor affects budget neutrality, a second round of budget neutralization is applied.

2.3 Proposed Policy for Calculating MP RVUs

The ultimate goal of evaluating the MP RVU methodology is to ensure that the calculations accurately account for regional variation in malpractice premiums and generate an interpretable scale to gauge the relative risk of each medical specialty. The MP RVU methodology should be consistent with the RBRVS and the general methods for calculating work and PE RVUs. Based on analyses of the current and possible approaches to determining MP RVUs, Acumen suggested implementing several changes to the methodology for calculating MP RVUs.

Our group evaluated the first three steps of the MP RVU methodology. Sections 2.3.1 – 2.3.3 discuss Acumen’s analyses and findings for each step in turn.

2.3.1 National Average Premiums

Acumen explored different methods of calculating national average premiums, which is the first step of MP RVU calculations. Beginning CY 2016, CMS determined that using RVUs as weights for specialty premiums introduced the potential for circularity in the MP RVU calculations. Whereas the CY 2015 MP RVU update used total RVUs and MP RVUs as weights for the specialty premiums and MP GPCIs respectively, the CY 2016 methodology incorporated population estimates from the ACS. Additionally, in past updates, the national average premiums were calculated by determining the weighted average of the premiums and then normalizing by the MP RVU-weighted MP GPCI. For CY 2018, CMS recommended testing a method in which the premiums were geographically normalized before finding the average for comparison.

Table 2.5 National Average Premium Options

Averaging Option	Description
1	Sum all county-level price adjusted premiums, weighted by share of total population
2	Sum all county-level price adjusted premiums, weighted by the share of work and PE RVUs
3	Sum all county-level price adjusted premiums, weighted by the share of total RVUs
4	Sum the ratio of each total RVU weighted specialty premium to each MP RVU-weighted MP GPCI

To assess the effect of these recommended changes, Acumen examined the differences among four calculation options for comparison and validation purposes. These calculation options are described in Table 2.5. Acumen generally found that there were no substantial differences in national average premiums resulting from each option, as shown in Table 2.6. This indicates that each weight has a similar effect on national average premium calculations. Consequently, CMS plans to maintain Averaging Option 1, which weights national average premiums with ACS population estimates and conforms to the methodology used in calculating the CY 2016 and 2017 MP RVUs.

Table 2.6 National Average Premium Distributions Across Options

Metrics	Averaging Option 1	Averaging Option 2	Averaging Option 3	Averaging Option 4
Mean	\$11,537.81	\$12,279.16	\$12,279.75	\$12,321.22
Standard Deviation	\$11,243.07	\$11,373.04	\$11,372.84	\$11,518.26
Coefficient of Variation	0.97	0.93	0.93	0.93
Minimum	\$1.74	\$122.06	\$122.05	\$98.35
Maximum	\$81,169.54	\$79,918.94	\$79,882.93	\$80,792.77
1st Percentile	\$42.25	\$145.62	\$144.40	\$102.68
5th Percentile	\$488.71	\$746.71	\$747.38	\$632.32
10th Percentile	\$1,249.94	\$2,740.67	\$2,752.12	\$2,499.58
25th Percentile	\$5,227.88	\$5,920.34	\$5,916.35	\$6,018.61
50th Percentile	\$9,045.99	\$9,756.61	\$9,757.77	\$9,708.93
75th Percentile	\$13,542.42	\$14,308.85	\$14,298.23	\$13,992.80
90th Percentile	\$21,652.59	\$23,164.02	\$23,167.78	\$22,612.42
95th Percentile	\$38,674.90	\$39,231.76	\$39,221.27	\$38,708.28
99th Percentile	\$52,050.46	\$52,442.50	\$52,464.90	\$54,126.77

2.3.2 Specialty Risk Factors

Acumen also investigated the impact of two options of determining final risk factors, which is the second step of MP RVU calculations. These two options are:

1. Normalizing each specialty premium to the value of the lowest specialty premium
2. Normalizing each specialty premium to the average value of all premiums

Normalizing Option 1, used in all past MP RVU updates, depicts each risk factor as excess risk above the lowest premium specialty. As a result, all values are greater than or equal to 1.0.

Normalizing Option 2 presents specialties as either above average or below average, relative to an average risk premium of 1.0. This particular method is more consistent with the methodology used to develop PE RVUs. The indirect practice cost index, used in part to determine PE RVUs, is calculated by normalizing each specialty factor by the average scaling factor.

The data revealed that changing the normalization method had no impact on the final, budget neutralized MP RVUs. CMS chose to maintain the current method of normalizing each premium relative to the value of the lowest specialty premium.

2.3.3 Raw MP RVUs

Acumen evaluated two options for interpreting malpractice premium data that impact the raw MP RVU calculations, which is the third step of the MP RVU calculation process. As noted in Section 2.2.3, the current methodology assumes that the malpractice premium data reflect global procedures, or the liability associated with both practitioner work and technical supplies/overhead. This interpretation was used for the CY 2010 and CY 2015 MP RVU updates. However, another possible interpretation is that the malpractice premium data reflect professional component procedures, or the liability associated with practitioner work. This assumption was made in the CY 2005 MP RVU update. The two differing interpretation options are described in Table 2.7.

Table 2.7 Comparison of the Global and Professional Interpretations of Malpractice Premium Data

Interpretation of Malpractice Premium Data	Description	Relationship with TC Risk Factor	Years Used
Global Data Assumption	Assumes MP premium data represent global procedures	If the TC risk factor exceeds the global risk factor, the TC risk factor receives the value of the global risk factor and the PC risk factor is set to 0.01	CY 2010 and CY 2015
Professional Data Assumption	Assumes MP premium data represent professional component procedures	The risk factors that result from the professional assumption are summed to compute global risk factors.	CY 2005

Compared to the global data interpretation, the professional data interpretation results in lower MP RVUs for HCPCS codes without separately billable professional and technical components but higher MP RVUs for HCPCS codes that can be billed globally or by component.⁵ Based on these results, CMS determined that it will continue to interpret collected MP premium data as representing global procedures.

3 UPDATING MALPRACTICE PREMIUM DATA

To construct specialty risk factors based on the most recently available data, Acumen identified, collected, cleaned, and verified malpractice premiums from 2014 and 2015. Acumen determined the updated risk factors based on premiums collected for the CY 2017 GPCI Update. The resulting specialty risk factors will align with the complete implementation of the MP GPCIs from the CY 2017 GPCI update. Using the most up-to-date malpractice premium data ensures that the next MP RVU update will reflect recent malpractice insurance market trends.

The remainder of this section discusses Acumen's process for collecting premium data, constructing the malpractice premium dataset, and updating technical component premium data. Each section discusses these items in turn.

3.1 Malpractice Premium Data Collection

As part of the CY 2017 GPCI Update, Acumen collected malpractice data from the System for Electronic Rate and Form Filing (SERFF), state departments of insurance, National Association of Insurance Commissioners (NAIC), the Medical Liability Monitor (MLM), and other sources. This section describes the major steps to collect data from these sources, which include: (i) defining standard characteristics for malpractice policies, (ii) identifying the medical malpractice underwriters with the largest market shares in each state, (iii) collecting the malpractice premium data, and (iv) collecting additional information on patient compensation fund (PCF) surcharges. Each of the following four subsections describes these steps in detail.

3.1.1 Defining a Standard for Malpractice Policies

The first step of the data collection process is to identify specific characteristics of a malpractice insurance policy that can be used to standardize the collection of rate filings. Malpractice premiums vary across regions and companies due to a number of factors related to the type of policy that is purchased. Policy characteristics that affect premiums include: whether the policy is claims-made or occurrence-based, the liability limits, years of coverage, and other factors. By collecting malpractice data for one standardized malpractice coverage type that is widely used across regions, regional variation in malpractice premiums can be attributed to geographic price differences of premiums rather than to regional variation in the types of coverage that physicians elect to purchase.

Table 3.1 below summarizes each element of malpractice insurance policy and the standards Acumen used.

Table 3.1 Elements of Malpractice Insurance and Methodological Decisions

Element	Description	Acumen's Decision	Rationale
Type of Insurance Policy	MP insurance policies fall under three categories (claims-made, modified claims-made, and occurrence) that depend on what triggers the coverage.	Collect premiums associated with claims-made insurance policies only.	Claims-made insurance policies are the most common type
Type of Health Care Professional	MP insurance is offered to a variety of health care professionals and providers (e.g., Physicians, Dentists, Hospitals).	Collect premiums associated with physicians/surgeons.	The PFS determines amounts for physicians rather than facilities.
Claims-Made Rates	Claims-made policies have different premium rates depending on the number of years of coverage.	Collect premiums associated with mature or 5+ rates.	Mature rates are considered the final, adjusted premiums under a plan.
Liability Limit	The insurance company issues a coverage limit with specified maximum amounts.	Collect premiums associated with \$1 million/\$3 million liability limit.	\$1 million/\$3 million is the most common liability limit.
Geographic Specificity	In some states, insurance companies list premiums that vary geographically.	Collect premiums at the most granular level of geography.	Premiums for the most granular geographies available allow for specificity in MP RVU calculations.

3.1.2 Identifying the Primary Medical Malpractice Underwriters

In the second step of the data collection process, Acumen identified the top medical malpractice underwriters in each state based on their 2014 market shares, or share of direct written premiums. To determine the top medical malpractice insurance companies, Acumen used the most recently available data published in the 2014 Market Share Reports accessed from the NAIC website.

The NAIC Property/Casualty reports include the top ten company groups by state and the top 125 groups nationwide for each property/casualty annual statement line of business. Medical MP is one of hundreds of lines of insurance. The CY 2015 MP data collection methodology compiled market share data from state departments of insurance, the Perr and Knight database, and NAIC data. However, the current methodology uses NAIC data exclusively. This simplifies and standardizes the process in anticipation of more frequent updates by relying on a single data source reconciled at the same point in time for all market share calculations. Furthermore, using

the NAIC data ensures that the market share data collection process is transparent and easily retraceable.

One difficulty in using NAIC data exclusively is that the NAIC records market share information by group. A group can consist of several different insurance companies. To ensure that data are collected for all companies within a group, Acumen referred to the group-to-company crosswalk in the appendix of the NAIC report. Moreover, our group compiled a master list of malpractice insurers offering services in each state whenever possible. However, because it was not possible to determine the market share of the individual companies within a group using the NAIC data, Acumen weighted each company within the group evenly for a given state. Table 3.2 below shows the market share that was collected from each state or territory based on 2014 NAIC data.

Table 3.2 NAIC Market Share by State

State	Number of Companies	2014 Market Share	State	Number of Companies	2014 Market Share
AK	2	65.02%	MT	3	41.27%
AL	4	65.06%	NC	4	57.24%
AR	4	56.10%	ND	2	39.26%
AZ	2	56.57%	NE	4	34.65%
CA	5	52.94%	NH	4	58.20%
CO	2	58.14%	NJ	4	70.99%
CT	1	26.30%	NM	2	37.56%
DC	2	50.57%	NV	5	50.62%
DE	4	61.95%	NY	1	28.81%
FL	4	43.90%	OH	5	64.23%
FA	5	27.93%	OK	1	30.11%
HI	2	51.48%	OR	2	50.12%
IA	5	58.66%	PA	4	19.03%
ID	4	48.59%	RI	3	50.37%
IL	4	52.14%	SC	2	18.21%
IN	4	49.22%	SD	2	73.47%
KS	4	59.13%	TN	3	55.48%
KY	4	32.79%	TX	5	51.77%
LA	2	57.65%	UT	4	67.45%
MD	2	37.21%	VA	2	26.62%
MD	4	55.84%	VT	2	58.54%
ME	2	66.59%	WA	3	54.22%
MI	1	6.36%	WI	5	71.90%
MN	3	13.45%	WV	4	58.10%
MO	3	52.63%	WY	2	54.28%
MS	2	7.29%			

3.1.3 Collecting Malpractice Premium Data

In the third step, Acumen collected rate filings for malpractice insurance premiums through the SERFF Filing Access Interface and state departments of insurance. The SERFF Filing Access Interface, property of the NAIC, is a web-based tool that enables consumer access to all rate and form filings marked public by the state. Though not every state participates in SERFF, Acumen was able to collect malpractice premium data from 32 states' SERFF portals. Using SERFF as the primary method of data collection for all participating states optimized the malpractice premium data collection process by obviating the need to contact each state's department of insurance and rely on them to send the correct filings. However, for states that do not participate in the SERFF Filing Access Interface for property and casualty filings, Acumen used both email and telephone outreach to identify the appropriate person within each state's department of insurance and contacted them to access and send medical malpractice rate filings. Acumen requested rate filings with effective dates in 2014 and 2015; if those were not available, the most recent effective date was requested.

Virtually all state insurance departments have established mechanisms to release rate filings to the public. Our data collection process followed these established mechanisms. About eighty percent of the state insurance departments that our group contacted processed our public records request internally. For the remainder, the state insurance departments referred requests to third party vendors who pull rate filings in person. For these states, Acumen was required to hire third party vendors to pull rate filings, scan copies, and email the documents.

Using these methods, Acumen was able to collect rate filings in all 50 states, the District of Columbia and Puerto Rico. Rate filings were collected from top companies representing at least 50% of the medical malpractice market or the top four companies in 31 states and the District of Columbia. In the remaining states and Puerto Rico, Acumen collected rate filings representing a smaller percentage of the market because rate filings for the largest companies were unavailable.

3.1.4 Collecting Patient Compensation Fund Surcharges

In the fourth step, Acumen collected Patient Compensation Fund (PCF) surcharges. These surcharges represent an additional cost to physicians and surgeons in some states. PCFs are state funds that operate like an excess layer of insurance in addition to an individual practitioner's MP policy. If a judgement exceeds the health care professional's policy limit or another statutorily prescribed amount, the PCF pays the difference. PCFs are funded by surcharges paid directly to the PCF by physicians and hospitals in addition to their primary policy premiums. These arrangements give primary insurers, physicians, and hospitals an added level of coverage in the event of a large judgement. Due to these extra charges, it is necessary to include the data when determining the risk for each specialty.

At the time of data collection, 2015 data from the Medical Liability Monitor (MLM) indicated that eight states had PCFs that charge physicians a surcharge on top of their MP premiums. In some states, participation is mandatory. Table 3.3 below lists the states with PCF surcharges.

Table 3.3 States with Mandatory or Voluntary PCFs

State	Mandatory or Voluntary PCF
Indiana	Voluntary
Kansas	Mandatory
Louisiana	Voluntary
Nebraska	Voluntary
New Mexico	Voluntary
Pennsylvania	Mandatory
South Carolina	Voluntary
Wisconsin	Mandatory

For the five states with voluntary PCF participation, Acumen did not add the PCF surcharges to collected premiums; instead, to maintain consistency with non-PCF states, our group used premiums for private coverage with the established policy characteristics listed in Section 3.1.1.

For the states with mandatory PCF participation, Acumen collected the information from the MLM and added the PCF surcharge to the primary policy premium to calculate the full cost of obtaining MP insurance in these states. If the PCF provided multiple coverage options, our group used surcharges for coverage that would bring the total liability limit (i.e., primary plus PCF liability limit) as close as possible to the \$1 million/\$3 million liability limit used to collect MP premium data for states without mandatory PCF participation. For example, Kansas' PCF requires participants to hold primary coverage of \$200,000/\$600,000. PCF participants can choose from several PCF coverage options, including \$800,000/\$2.4 million limits of liability. Acumen requested surcharges for this option since it is associated with total coverage (primary plus PCF) of \$1 million/\$3 million.

3.2 Constructing the Malpractice Premium Dataset

Acumen transformed the premium data into a standardized and useable format for developing specialty risk factors. The malpractice premium data collected differed in format,

structure, and content depending on the data source, company, and state. Oftentimes, there were no recent data available for a particular state or company, or an insurance company had a unique specialty classification scheme.

To transform the malpractice premium data into a standardized, useable format for developing specialty risk factors, Acumen: (1) validated and verified the data collection process, (2) employed strategies to adjust for missing data, and (3) mapped the specialties listed in rate filings to CMS-designated specialties. The remainder of this section discusses each of these steps.

3.2.1 Validating and Verifying Malpractice Premium Data

Once the data collection process was complete, our group performed extensive validation and verification steps to ensure that the data were collected accurately and that the data were inputted correctly when constructing a dataset. To validate the market share data, Acumen compared the companies found in the 2014 NAIC Report to the companies listed by several state departments of insurance when available. Our verification efforts ensured that the correct malpractice insurance policy was selected based on the standards established in Section 3.1.1. Acumen verified that the premiums collected were for (1) claims-made policies, rather than occurrence or extended reporting policies, (2) physicians and surgeons, (3) mature rates, and (4) the \$1 million/\$3 million liability limit.

3.2.2 Adjusting for Missing Data

Missing premium data require alternative strategies. Acumen classified missing data into three types and developed methodologies to address each type: (i) premium data missing in the base year or that became effective middle of the base year, (ii) premium data missing rates for specific specialties, (iii) no premium data available (i.e., American Samoa, Guam, and Virgin Islands).

Case 1: Premium Data Missing in Base Year or Became Effective Mid-Year

Our team requested rate filings with effective dates in 2014 and 2015. Whenever possible, this update uses rates that were in effect in 2014 and 2015. However, there were many instances when only filings with earlier or later effective dates were available. For most states, rate filings do not have to be submitted on a regular schedule. Therefore, rate filings can become effective midyear and/or remain effective for more than one year. This methodology considers a rate to be in effect from its effective date until the effective date of a replacement rate from a more recent filing. For example, the 2014 and 2015 periods, respectively, could be represented by a filing with an effective date of January 2013 replaced by one with an effective date in September 2014.

When recent rate filings were unavailable, it was generally for one or more of the following reasons:

- i. The company in question may not have changed its medical malpractice rates recently.
- ii. The state in question may have flexible rate filing requirements.
- iii. The company in question may be a not-for-profit or risk retention group (RRG).

These three cases have different implications for the accuracy of premium rates reported in older filings. The first case arises because underwriters are often not required to file if rates are unchanged from the previous rate filing. In this case, the most recent filing accurately represents current premium rates, even if the most recent filing has an effective date before 2014. The second and third cases arise because some underwriters are not required to file rates, even when rates have changed. In these two cases, the most recent filing does not necessarily accurately represent current premium rates.

Acumen imputed rates for missing years using historical data when 2014 or 2015 rates were unavailable for a specialty from any issuer. If the issuer had at least two filings available for that specialty, Acumen used the two most recent filings to perform a linear extrapolation to impute 2014 or 2015 rates. If the issuer had only one filing available for that specialty, Acumen trended the data over time using the average rate for the relevant state from MLM data.

Case 2: Missing Premium Data for a Specialty

Although Acumen extracted premium information for all physician, surgeon, and ancillary specialties reported in the rate filings, some filings reported rates for only a limited number of specialties. When none of the filings for a given state reported premium rates for certain specialties, failing to account for such omissions could produce an insurer price that reflects a specific mix of specialty risk instead of geographic differences in price. This methodology imputed missing specialties using premiums for other rate filings within the state. Our team computed the national average premium for each specialty to rank specialties by insurance risk. Risk factors were computed by renormalizing the national average premiums so that the least expensive specialty had a risk factor equal to one. In each instance of missing premium data, Acumen computed the average of the imputed values by scaling the premiums of the specialties with the lowest and highest risk factors in that state.

3.3 Defining Specialties

Acumen developed a comprehensive list of specialties from the MP premium data that is displayed in Table 3.4 below. There were three main challenges to defining specialties for use in the MP RVU calculations.

1. First, the malpractice premiums are categorized according to either Insurance Service Office (ISO) codes or the insurance company's own classification scheme for health care specialties.

These specialty classes must be mapped to CMS's categories to generate a standardized list of specialties that receive payment under the PFS.

2. Second, specialties are often distinguished by surgery class. Typically, these classes are major surgery, minor surgery, no surgery, and obstetrics/not obstetrics.

As mentioned in Section 2.2, these surgery classes are condensed into surgical, non-surgical, and obstetrics risk factors.

3. Third, a number of specialties lacked sufficient data or displayed extreme variation in premium values.

Acumen re-assigned these specialties to others with comparable risk.

In all cases, Acumen's goal is to maintain as complete a list of specialties as possible but still ensure that the risk factors for the specialties are based on a robust set of data. In total, Acumen collected complete data for 43 specialties. Thirty-two specialties lacked sufficient data and were re-assigned to other specialties. These are denoted by an asterisk in Table 3.4 below. There are six technical subspecialties that are assigned the technical component risk factor described in Sections 2.2.3 and 3.4.

Table 3.4 CY 2017 Physician Fee Schedule Utilization by Specialty

Specialty Code	Specialty Name	% of Total MIUS	States with Premium Data
01	General Practice	0.5%	51
02	General Surgery	1.1%	51
03	Allergy/ Immunology	1.3%	50
04	Otolaryngology	1.4%	51
05	Anesthesiology	0.6%	51
06	Cardiovascular Disease (Cardiology)	6.1%	49
07	Dermatology	4.1%	44
08	Family Practice	6.9%	51
09	Interventional Pain Management	0.4%	38
10	Gastroenterology	1.4%	41
11	Internal Medicine	11.6%	51
12	Osteopathic Manipulative Medicine*	0.1%	6
13	Neurology	1.2%	51
14	Neurosurgery	0.2%	51
15	Speech Language Pathology*	0.0%	0

Specialty Code	Specialty Name	% of Total MTUS	States with Premium Data
16	Obstetrics & Gynecology	0.5%	51
17	Hospice and Palliative Care*	0.0%	6
18	Ophthalmology	4.4%	48
19	Oral Surgery (Dentist only)*	0.0%	25
20	Orthopedic Surgery	2.7%	51
21	Cardiac Electrophysiology	0.5%	0
22	Pathology	2.2%	50
23	Sports Medicine*	0.1%	19
24	Plastic and Reconstructive Surgery	0.2%	51
25	Physical Medicine and Rehabilitation	1.2%	50
26	Psychiatry	1.4%	50
27	Geriatric Psychiatry*	0.0%	1
28	Colorectal Surgery (Proctology)	0.1%	49
29	Pulmonary Disease	1.8%	42
30	Diagnostic Radiology	9.1%	50
32	Anesthesiology Assistant*	0.0%	2
33	Thoracic Surgery	0.1%	49
34	Urology	1.6%	50
35	Chiropractic*	1.9%	18
36	Nuclear Medicine*	0.1%	20
37	Pediatric Medicine	0.1%	49
38	Geriatric Medicine	0.2%	44
39	Nephrology	1.6%	39
40	Hand Surgery*	0.1%	32
41	Optometry*	1.2%	17
42	Certified Nurse Midwife*	0.0%	3
43	Certified Registered Nurse Anesthetist (CRNA)*	0.0%	21
44	Infectious Disease	0.7%	44
45	Mammography Screening Center	0.0%	0
46	Endocrinology	0.4%	45
47	Independent Diagnostic Testing Facility	0.5%	6
48	Podiatry*	3.0%	23
50	Nurse Practitioner	3.3%	39
58	Medical Supply Company with Pharmacist	0.0%	5
60	Public Health or Welfare Agency	0.0%	0
62	Psychologist*	0.0%	2
63	Portable X-Ray Supplier	0.5%	3
64	Audiologist*	0.2%	4

Specialty Code	Specialty Name	% of Total MTUS	States with Premium Data
65	Physical Therapist in Private Practice*	9.4%	10
66	Rheumatology	0.6%	48
67	Occupational Therapist in Private Practice*	0.7%	6
68	Psychologist, Clinical*	0.8%	24
69	Clinical Laboratory	1.0%	2
70	Multispecialty Clinic /Other Phys	0.0%	0
71	Registered Dietitian or Nutrition Professional	0.1%	41
72	Pain Management	0.3%	47
73	Mass Immunizer Roster Biller	0.0%	0
74	Radiation Therapy Center	0.0%	22
75	Slide Preparation Facilities	0.0%	3
76	Peripheral Vascular Disease*	0.0%	5
77	Vascular Surgery	0.5%	50
78	Cardiac Surgery	0.1%	51
79	Addiction Medicine*	0.0%	13
80	Licensed Clinical Social Worker*	0.6%	6
81	Critical Care (Intensivists)*	0.2%	15
82	Hematology	0.1%	43
83	Hematology-Oncology	1.6%	48
84	Preventive Medicine	0.0%	50
85	Maxillofacial Surgery*	0.0%	3
86	Neuropsychiatry*	0.0%	3
87	All Other Suppliers	0.0%	10
88	Unknown Supplier/Provider Specialty	0.0%	29
89	Certified Clinical Nurse Specialist*	0.1%	3
90	Medical Oncology	0.5%	45
91	Surgical Oncology	0.0%	34
92	Radiation Oncology*	1.1%	23
93	Emergency Medicine	2.6%	44
94	Interventional Radiology*	0.3%	22
97	Physician Assistant	2.1%	35
98	Gynecological Oncology*	0.1%	33
99	Undefined Physician type	0.0%	46
A5	Pharmacy	0.0%	10
C0	Physician, Sleep Medicine*	0.0%	11
C3	Interventional Cardiology	0.5%	5

3.3.1 Specialty Crosswalk

Acumen constructed a crosswalk that maps the specialties used by malpractice insurance companies to the specialty codes specified in CMS carrier files. Malpractice insurers use Insurance Service Office (ISO) codes and their own specialty descriptions to categorize and group health care specialties. CMS maintains a separate specialty classification scheme for PFS payment. Consequently, Acumen developed a crosswalk of insurance company specialty categories to CMS specialties. Using the specialty crosswalks obtained from each insurance company, our group created a master list of all specialties and their corresponding ISO codes, if available.

Specialties were further distinguished by surgery classes to reflect increased risk; for example, it is reasonable to expect that the risk of practicing cardiology increases if the physician also performs surgical procedures. As a result, there are three main surgery classes for each specialty: major surgery, minor surgery, and no surgery. All other specialties were categorized as “unspecified” if surgery class was not indicated.

Moreover, four CMS specialties have additional surgery classes for obstetrical procedures, which carry higher risk and merit separate classification. These specialties are: General Practice (01), Family Practice (08), and Obstetrics Gynecology (16), as well as Certified Nurse Midwife (42).⁶

3.3.2 Classifying Specialties by Surgery Class

Acumen used the specialty/surgery class premiums in the rate filings to develop three distinct risk factors: surgical, non-surgical, and obstetrics. Because over half of the listed specialties can have premium rates that differ for major surgery, minor surgery, no surgery, and obstetrics, Acumen determined which surgery classes to retain for each specialty. In calculating MP risk factors, CMS has not distinguished between major and minor surgical procedures and minor surgery premiums were dropped completely from specialty risk factor calculations. The resulting surgical, non-surgical, and obstetrics specialty risk factors are in turn applied to surgical, non-surgical, and obstetrics procedures in Equation 2.4.

To determine what surgery classes to use for each specialty, Acumen assigned the scenarios listed in Table 3.5 to each specialty. Acumen imposed a threshold of 25 states of data to include a particular surgery class, ensuring that premiums from at least half of all states were available in specialty risk factor calculations.

⁶ Certified Nurse Midwife (42) had insufficient malpractice premium data, as described in Section 3.3.3. For this reason, this specialty was assigned to receive the surgery classes, national average premiums, and risk factors for Obstetrics Gynecology (16).

1. *Substantial Data for Major and No Surgery Class*: The major and no surgery classes for a specialty have premium data for more than 25 states. Separate surgical and non-surgical risk factors can be calculated.
2. *Major Surgery Dominates*: The major surgery class for a specialty had data for more than 25 states while all other classes did not. Only one surgical risk factor can be calculated.
3. *Blend All Available*: For all other specialties not in any of the categories above, the available premium data for a specialty are blended into a single risk class applicable to corresponding surgical and non-surgical HCPCS codes. The risk factor is calculated as a weighted average based on the percentage of work RVUs for each surgery class.

Table 3.5 Surgery Class Scenarios

Surgery Scenario	Surgery Classes Included	Risk Factor
Substantial Data for Major and No Surgery Class	Major Surgery No Surgery	Surgical Risk Factor Non-Surgical Risk Factor
Major Surgery Dominates	Major Surgery	Surgical Risk Factor
Blend All Available	Major Surgery No Surgery Unspecified	Surgical Risk Factor Non-Surgical Risk Factor

Acumen considered assigning specialties to a fourth scenario, in which the unspecified category of a specialty had data for more than 25 states while all other classes did not. The unspecified category contains specialty descriptions that did not clearly indicate a surgery class. No specialties fell under this scenario. Table 3.6 below summarizes the scenario assigned to each specialty.

Table 3.6 Surgery Class Scenarios

Scenario	Specialty Codes
1. Substantial Data for Each Class	01, 04, 08, 09, 13, 16, 18, 34, 72, 93
2. Major Surgery Dominates	02, 14, 20, 24, 28, 33, 77, 78, 91

Scenario	Specialty Codes
3. Blend All Available	03, 05, 06, 07, 10, 11, 22, 25, 26, 29, 30, 37, 38, 39, 44, 46, 50, 66, 71, 82, 83, 84, 90, 99

3.3.3 Specialties with Insufficient Coverage and Extreme Variation in Premium Amounts

Some specialties do not have distinct risk categories in the rate filings from all states or lack reliable data. Acumen created two classes for such specialties: (i) insufficient coverage and (ii) extreme variation in premium values.

For practitioner-provided specialties with insufficient state coverage in the MP file, Acumen mapped these specialties to a similar specialty. Acumen designated specialties as having insufficient coverage if the total number of states with premium data for the specialty, including all surgery classes, was less than 35. This group consisted of a total of 32 specialties. These specialties were re-assigned to other specialties with comparable risk based on clinician input. For example, Maxillofacial Surgery (85) is re-assigned to Plastic and Reconstructive Surgery (24) because the specialties are similar in practice; Psychologist (62) is mapped to Allergy/Immunology (03) because these two specialties are both low risk (i.e., have similar average malpractice premiums) even though they differ in the types of services provided.

Similarly, Acumen matched specialties that displayed extreme variation in premium values. This process was needed for one specialty. Acumen used two metrics to identify variation: the coefficient of variation and the percentage change between the lowest premium value and the highest premium value for the specialty. The coefficient of variation is the ratio of the standard deviation to the mean; values over 1.00 indicate high degrees of variation. Acumen found that the premiums for Physician Assistant (97) varied substantially, with a percentage change of 85,231% between the lowest premium value and the highest premium value and a coefficient of variation equal to 1.45. This specialty was re-assigned to Allergy/Immunology, another low-risk specialty.

Table 3.7 lists the recoded specialties discussed in this subsection.

Table 3.7 Reassigned Specialties with Insufficient Coverage, No State Coverage, and Extreme Variation in Premium Amounts

Specialty Code	Specialty Name	New Specialty Code	Reassigned Specialty Name
12	Osteopathic Manipulative Medicine	03	Allergy/ Immunology
15	Speech Language Pathology	03	Allergy/ Immunology

Specialty Code	Specialty Name	New Specialty Code	Reassigned Specialty Name
17	Hospice and Palliative Care	03	Allergy/ Immunology
19	Oral Surgery (Dentist only)	24	Plastic and Reconstructive Surgery
21	Cardiac Electrophysiology	06	Cardiology
23	Sports Medicine	01	General Practice
27	Geriatric Psychiatry	26	Psychiatry
32	Anesthesiology Assistant	05	Anesthesiology
35	Chiropractic	03	Allergy/ Immunology
36	Nuclear Medicine	30	Diagnostic Radiology
40	Hand Surgery	20	Orthopedic Surgery
41	Optometry	03	Allergy/ Immunology
42	Certified Nurse Midwife	16	Obstetrics & Gynecology
43	Certified Registered Nurse Anesthetist (CRNA)	05	Anesthesiology
48	Podiatry	07	Dermatology
60	Public Health and Welfare Agency	03	Allergy/ Immunology
62	Psychologist	03	Allergy/ Immunology
64	Audiologist	03	Allergy/ Immunology
65	Physical Therapist in Private Practice	03	Allergy/ Immunology
67	Occupational Therapist in Private Practice	03	Allergy/ Immunology
68	Psychologist, Clinical	03	Allergy/ Immunology
76	Peripheral Vascular Disease	77	Vascular Surgery
79	Addiction Medicine	03	Allergy/ Immunology
80	Licensed Clinical Social Worker	03	Allergy/ Immunology
81	Critical Care (Intensivists)	29	Pulmonary Disease
85	Maxillofacial Surgery	24	Plastic and Reconstructive Surgery
86	Neuropsychiatry	26	Psychiatry
89	Certified Clinical Nurse Specialist	01	General Practice
92	Radiation Oncology	30	Diagnostic Radiology

Specialty Code	Specialty Name	New Specialty Code	Reassigned Specialty Name
94	Interventional Radiology	30	Diagnostic Radiology
97	Physician Assistant	03	Allergy/ Immunology
98	Gynecological Oncology	02	General Surgery
C0	Sleep Medicine	01	General Practice

3.4 Technical Component Data Update

Acumen obtained updated technical component data to calculate MP RVUs for HCPCS codes with TC and PC modifiers. The technical component of a procedure includes the cost of equipment, supplies, technician salaries, and associated indirect expenses as well as the malpractice insurance for the service, while the professional component of a procedure includes the practitioner work, associated indirect expenses, and malpractice insurance costs involved in the service. Within the context of the MP RVU calculations, the global service risk factor consists of the PC risk factor and the general TC risk factor as illustrated in Equation 2.5. Since CY 2010, the assumption has been that the MP premium data collected represent global procedures. With this understanding, the global service risk factor can be determined from the specialty risk factors while the TC risk factor requires another source of data.

Acumen explored possible sources of technical component premium data. Past updates have used the umbrella non-physician mean premium value from RBMA. The RBMA amount is based on a survey of 29 Independent Diagnostic Testing Facilities (IDTFs) in 2009 and equals \$9,374. The CY 2015 MP RVU update used this value but deflated the premium based on the percentage change in non-surgical rate filings during that time. Acumen analyzed five options for technical component premium data. These options, summarized in Table 3.8, include different premium values from RBMA, including the deflated mean and median amounts from the 2009 survey and the median amount from a more recent 2014 survey, as well as setting the TC risk factor to equal the lowest specialty risk factor. Our group compared the merits of each data point, and CMS expects to propose Option 4, in which the TC risk factor is set to 1.00 to equal the lowest specialty risk factor that results when normalizing to the lowest specialty premium.

Table 3.8 Technical Component Data Options

TC Data Option	RBMA Amount	Normalization Method	
		Risk Factor: Normalizing to Lowest Specialty Premium	Risk Factor: Normalizing to Average Specialty Premium
1	RBMA 2009 umbrella non-physician mean premium	0.89	0.30
2	RBMA 2009 umbrella non-physician median premium	0.57	0.19
3	RBMA 2014 umbrella non-physician median premium	1.28	0.43
4	Set to lowest specialty risk factor	1.00	0.33

4 UPDATING INPUT DATASETS

In addition to malpractice premiums data, the specialty risk factors also rely on three other datasets: the CRS, ACS, and GPCI files. Along with the malpractice premium data, these files must be updated to reflect more recent policy changes. As an example, the CY 2017 PFS Update included a change to the number of Medicare localities. These changes necessitate using the most up-to-date datasets when constructing specialty risk factors. The remainder of this section describes each dataset in detail.

4.1 Current Procedural Terminology RVUs and Services (CRS) File

The CRS file includes information on RVUs (total, work, PE, and MP) and service counts (MTUS) by carrier number, locality, county, specialty, and HCPCS/MOD. For the updated specialty risk factors, Acumen used the 2015 CRS file to weigh the blended specialties by their respective work RVU. The CY 2015 MP RVU update relied on 2013 CRS data.

4.2 American Community Survey Population Estimates

The American Community Survey (ACS) 5-year estimates dataset contains information on population estimates in U.S. counties. Beginning with the CY 2016 PFS final rule, CMS used the ACS population estimates to weigh county-level malpractice premiums and compute national average specialty premiums. For the updated specialty risk factors, Acumen used population estimates from 2015 to weigh county-level malpractice premiums.

4.3 Geographic Practice Cost Index (GPCI) File

The GPCI file provides information on the work, PE, and MP GPCI values assigned to each Medicare locality. Acumen used the GPCI file to adjust the MP premiums for geographic differences in professional liability costs. While the CY 2015 update relied on 2014 GPCI data, the updated specialty risk factors used CY 2017 GPCI data.

5 IMPACT OF THE MODELLED MP RVUS

To assess the effect of updating the data and methodology used to calculate MP RVUs as a whole, Acumen conducted a detailed impact analysis to observe differences between the CY 2017 raw MP RVUs and the modeled MP RVUs based on the newly updated specialty risk factors. The modeled MP RVUs are computed by assuming that malpractice premium data represent global procedures, normalizing premiums to the lowest specialty premium amount, and using a TC risk factor of 1.0 for all codes.

The goal of this section is to gauge the impacts of the updated data and methodology by code type and specialty. However, the impact on MP RVUs discussed below is not final.

5.1 Overall Impact and Impact by HCPCS Code Type

To assess the effect of updating the data and methodology used to calculate MP RVUs as a whole, Acumen conducted a detailed impact analysis of the newly updated specialty risk factors to observe differences between the CY 2017 raw MP RVUs and the modeled MP RVUs based on the updated MP RVU methodology. Table 5.1 below presents the percent changes in MP RVUs by procedure code modifier and type (See Section 2.1 for further discussion of code types). The first row reports the number of procedures that were performed for each code type, and the remaining rows report the percent change in the distribution of MP RVUs by code type from CY2017 to CY2018. Half of the HCPCS-modifier combinations for all codes, technical component codes, professional component codes, and global codes experienced a percent change of -0.6% or less. The utilization-weighted mean MP RVU value for all codes declined 0.7% from CY2017 to 2018. On the other hand, the utilization-weighted mean MP RVU value increased by 5.2% for technical component codes from CY2017 to 2018. Though global codes are the sum of their professional and technical components, the highest percent change for a professional code was for one that does not have an associated global component. Thus, the maximum percent change for professional codes is greater than that for global codes. The minimum percent change for all codes types was -100%, which was observed for a small number of HCPCS codes for which MP RVUs declined to zero in CY 2018.

Table 5.1 Percent Change in MP RVUs by Procedure Code Modifier and Type

Statistic	All	Tech	Prof	Global	Single
Number of Procedures	8,529	791	956	814	5,968
MTUS Weighted Mean	-0.7%	5.2%	3.4%	1.2%	-2.4%
Standard Deviation	27.7%	25.1%	51.9%	31.2%	20.9%
Minimum	-100.0%	-100.0%	-100.0%	-100.0%	-100.0%
Maximum	446.9%	98.9%	297.8%	148.6%	446.9%
1st Percentile	-70.7%	-75.1%	-95.7%	-80.8%	-62.1%
5th Percentile	-35.4%	-0.6%	-75.1%	-50.3%	-29.6%
10th Percentile	-23.5%	-0.6%	-53.6%	-33.7%	-19.7%
25th Percentile	-9.2%	-0.6%	-19.5%	-11.6%	-9.4%
50th Percentile	-0.6%	-0.6%	-0.6%	-0.6%	-3.2%
75th Percentile	3.1%	-0.6%	16.0%	11.9%	3.0%
90th Percentile	21.5%	32.6%	65.7%	39.2%	14.6%
95th Percentile	39.2%	49.2%	98.9%	49.2%	24.3%
99th Percentile	98.9%	98.9%	198.3%	98.9%	63.4%

5.2 Impact by Specialty

To isolate the effect of the updated specialty risk factors, Acumen compared the differences between the modelled MP RVUs for 2018 and the 2017 MP RVUs with HCPCS codes, payment rates, and utilization held constant from 2017. Impacts on overall MP RVUs and total RVUs by specialty are summarized in Table 5.2. For the purposes of assessing impacts, some smaller specialties were grouped with larger ones. A crosswalk detailing these aggregations is available in Appendix D. Overall, the change in MP RVUs from CY 2017 to the modelled 2018 results is relatively modest, with the average specialty group experiencing an absolute percent change of about 10%.

Because MP RVUs are a relatively small component of total RVUs, the effect of the update of MP RVUs on total RVUs is generally very small. The average specialty group experienced an absolute percent change of about 0.4%, while the largest change was observed for Neurosurgery, for which total RVUs declined 1.3% from 2017 to 2018. These changes in MP and total RVUs are in line with results from previous MP RVU updates.

Table 5.2 Percent Change in MP RVUs and Total RVUs by Specialty Group

Group #	CMS Specialty Group Name	MTUS	MP RVUs			Total RVUs		
			2017	2018	Percent Change	2017	2018	Percent Change
01	Allergy/Immunology	13,730,881	233,775	239,976	2.7%	6,497,314	6,503,515	0.1%
02	Anesthesiology	6,340,925	752,039	798,219	6.1%	16,108,900	16,155,081	0.3%
03	Cardiac Surgery	894,733	1,040,729	931,076	-10.5%	9,020,420	8,910,767	-1.2%
04	Cardiology	75,369,673	8,143,760	6,082,766	-25.3%	181,552,573	179,491,579	-1.1%
05	Colon And Rectal Surgery	823,269	366,957	339,996	-7.3%	4,479,198	4,452,237	-0.6%
06	Critical Care	2,415,374	472,010	456,828	-3.2%	8,666,710	8,651,528	-0.2%
07	Dermatology	42,967,408	3,911,957	2,963,520	-24.2%	92,444,824	91,496,387	-1.0%
08	Emergency Medicine	27,238,660	5,842,795	4,955,905	-15.2%	88,014,926	87,128,037	-1.0%
09	Endocrinology	4,747,606	479,963	514,645	7.2%	12,894,127	12,928,809	0.3%
10	Family Practice	73,744,049	6,505,940	7,000,257	7.6%	172,209,579	172,703,896	0.3%
11	Gastroenterology	14,765,518	2,877,777	2,427,561	-15.6%	48,390,103	47,939,886	-0.9%
12	General Practice	5,276,107	485,038	506,560	4.4%	12,129,322	12,150,844	0.2%
13	General Surgery	11,659,171	5,215,793	4,893,686	-6.2%	60,546,731	60,224,624	-0.5%
14	Geriatrics	2,299,500	245,655	267,223	8.8%	6,024,051	6,045,619	0.4%
15	Hand Surgery	1,511,201	312,057	335,524	7.5%	5,081,169	5,104,636	0.5%
16	Hematology /Oncology	22,487,061	1,655,661	1,774,791	7.2%	49,176,986	49,296,116	0.2%
17	Infectious Disease	7,083,366	839,246	926,545	10.4%	18,405,178	18,492,478	0.5%
18	Internal Medicine	122,388,565	12,386,651	13,497,357	9.0%	307,238,527	308,349,234	0.4%
19	Interventional Pain Mgmt	7,352,695	797,716	880,089	10.3%	21,246,772	21,329,145	0.4%
20	Interventional Radiology	2,741,525	339,113	308,045	-9.2%	8,773,233	8,742,165	-0.4%

Group #	CMS Specialty Group Name	MTUS	MP RVUs			Total RVUs		
			2017	2018	Percent Change	2017	2018	Percent Change
21	Multispecialty Clinic/Other Phys	1,430,071	172,654	161,493	-6.5%	3,625,128	3,613,967	-0.3%
22	Nephrology	16,955,417	2,359,767	2,464,892	4.5%	61,636,744	61,741,869	0.2%
23	Neurology	13,154,887	1,678,177	1,751,417	4.4%	42,654,508	42,727,748	0.2%
24	Neurosurgery	2,550,511	2,944,442	2,666,176	-9.5%	21,749,663	21,471,396	-1.3%
25	Nuclear Medicine	667,707	37,097	44,670	20.4%	1,309,208	1,316,781	0.6%
27	Obstetrics/Gynecology	6,213,683	934,230	1,002,941	7.4%	18,165,842	18,234,553	0.4%
28	Ophthalmology	46,528,208	3,846,840	3,729,392	-3.1%	150,143,548	150,026,100	-0.1%
29	Orthopedic Surgery	28,063,553	7,793,895	7,911,140	1.5%	102,954,510	103,071,754	0.1%
30	Otolaryngology	14,740,693	1,476,935	1,454,006	-1.6%	33,585,302	33,562,373	-0.1%
31	Pathology	23,099,667	496,169	355,125	-28.4%	31,246,697	31,105,653	-0.5%
32	Pediatrics	818,066	73,752	74,362	0.8%	1,707,001	1,707,612	0.0%
33	Physical Medicine	12,693,759	1,192,095	1,307,521	9.7%	29,908,679	30,024,106	0.4%
34	Plastic Surgery	1,844,615	718,480	659,245	-8.2%	10,566,283	10,507,048	-0.6%
35	Psychiatry	15,454,439	1,405,195	1,542,534	9.8%	35,477,455	35,614,794	0.4%
36	Pulmonary Disease	18,804,006	2,168,819	2,232,530	2.9%	49,500,645	49,564,356	0.1%
38	Radiology	96,494,243	4,346,005	4,297,843	-1.1%	130,508,195	130,460,034	0.0%
39	Rheumatology	6,445,240	540,908	575,291	6.4%	15,089,048	15,123,431	0.2%
40	Thoracic Surgery	1,066,430	1,118,061	1,009,535	-9.7%	9,943,055	9,834,529	-1.1%
41	Urology	16,366,634	2,105,449	2,067,651	-1.8%	48,510,329	48,472,531	-0.1%
42	Vascular Surgery	5,251,642	1,652,382	1,509,250	-8.7%	29,059,930	28,916,798	-0.5%
43	Audiologist	1,857,102	43,256	31,382	-27.5%	1,727,913	1,716,038	-0.7%
44	Chiropractor	20,570,694	423,320	420,957	-0.6%	21,901,740	21,899,377	0.0%

Group #	CMS Specialty Group Name	MTUS	MP RVUs			Total RVUs		
			2017	2018	Percent Change	2017	2018	Percent Change
45	Clinical Psychologist	8,211,807	602,247	601,297	-0.2%	20,458,441	20,457,490	0.0%
46	Clinical Social Worker	6,423,913	507,734	504,961	-0.5%	16,912,189	16,909,415	0.0%
47	Diagnostic Testing Facility	5,272,514	183,812	174,527	-5.1%	20,893,963	20,884,679	0.0%
48	Independent Laboratory	10,278,041	202,544	147,877	-27.0%	18,766,162	18,711,495	-0.3%
49	Nurse Anesthesiologist/ Anesthesiologist Assistant	197,398	25,871	27,049	4.6%	399,836	401,015	0.3%
50	Nurse Practitioner	35,939,997	3,488,320	3,653,370	4.7%	83,938,608	84,103,658	0.2%
51	Optometry	12,916,587	715,383	684,113	-4.4%	33,561,683	33,530,413	-0.1%
52	Oral/Maxillofacial Surgery	274,070	65,648	64,857	-1.2%	1,354,847	1,354,056	-0.1%
53	Physical/Occupational Therapy	107,081,799	1,917,813	2,088,298	8.9%	96,711,672	96,882,156	0.2%
54	Physician Assistant	22,557,105	2,946,668	2,855,309	-3.1%	54,834,317	54,742,957	-0.2%
55	Podiatry	31,326,887	1,955,080	2,280,985	16.7%	55,011,155	55,337,060	0.6%
56	Portable X-Ray Supplier	5,109,755	63,884	73,219	14.6%	2,973,970	2,983,304	0.3%
58	Other	860,336	44,293	44,132	-0.4%	1,456,499	1,456,338	0.0%
59	Radiation Oncology / Therapy Centers	11,789,256	927,185	650,847	-29.8%	49,421,570	49,145,233	-0.6%

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APPENDIX A: NATIONAL AVERAGE MALPRACTICE PREMIUMS AND RISK FACTORS BY SPECIALTY

Table A.1 reports each specialty's final surgery classes, national average premiums, and risk factors.

Table A.1 Final Surgery Classes, National Average Premiums, and Risk Factors by Specialty

Specialty Code	Specialty Name	Final Surgery Class	Population-Weighted National Average Premium	Risk Factor
01	General Practice	Major Surgery	\$30,521	3.72
01	General Practice	Obstetrics Blend	\$35,231	4.30
01	General Practice	No Surgery	\$14,776	1.80
02	General Surgery	Major Surgery	\$55,375	6.75
03	Allergy/ Immunology	Blend	\$8,201	1.00
04	Otolaryngology	Major Surgery	\$33,486	4.08
04	Otolaryngology	No Surgery	\$12,517	1.53
05	Anesthesiology	Blend	\$21,137	2.58
06	Cardiovascular Disease (Cardiology)	Blend	\$15,587	1.90
07	Dermatology	Blend	\$22,750	2.77
08	Family Practice	Major Surgery	\$30,640	3.74
08	Family Practice	Obstetrics Blend	\$35,306	4.31
08	Family Practice	No Surgery	\$13,696	1.67
09	Interventional Pain Management	Major Surgery	\$24,334	2.97
09	Interventional Pain Management	No Surgery	\$17,025	2.08
10	Gastroenterology	Blend	\$19,659	2.40
11	Internal Medicine	Blend	\$22,162	2.70
12	Osteopathic Manipulative Medicine	Blend	\$8,201	1.00
13	Neurology	Major Surgery	\$106,815	13.02
13	Neurology	No Surgery	\$20,156	2.46
14	Neurosurgery	Major Surgery	\$87,458	10.66
15	Speech Language Pathology	Blend	\$8,201	1.00
16	Obstetrics & Gynecology	Major Surgery	\$37,091	4.52

Specialty Code	Specialty Name	Final Surgery Class	Population-Weighted National Average Premium	Risk Factor
16	Obstetrics & Gynecology	Major with Obstetrics	\$71,104	8.67
16	Obstetrics & Gynecology	No Surgery	\$13,036	1.59
17	Hospice and Palliative Care	Blend	\$8,201	1.00
18	Ophthalmology	Major Surgery	\$17,749	2.16
18	Ophthalmology	No Surgery	\$8,447	1.03
19	Oral Surgery (Dentist only)	Major Surgery	\$40,398	4.93
20	Orthopedic Surgery	Major Surgery	\$50,979	6.22
21	Cardiac Electrophysiology	Blend	\$15,587	1.90
22	Pathology	Blend	\$13,136	1.60
23	Sports Medicine	Major Surgery	\$30,521	3.72
23	Sports Medicine	No Surgery	\$14,776	1.80
24	Plastic and Reconstructive Surgery	Major Surgery	\$40,398	4.93
25	Physical Medicine and Rehabilitation	Blend	\$12,197	1.49
26	Psychiatry	Blend	\$10,445	1.27
27	Geriatric Psychiatry	Blend	\$10,445	1.27
28	Colorectal Surgery (Proctology)	Major Surgery	\$34,331	4.19
29	Pulmonary Disease	Blend	\$14,922	1.82
30	Diagnostic Radiology	Blend	\$23,087	2.82
32	Anesthesiology Assistant	Blend	\$21,137	2.58
33	Thoracic Surgery	Major Surgery	\$49,719	6.06
34	Urology	Major Surgery	\$24,355	2.97
34	Urology	No Surgery	\$13,650	1.66
35	Chiropractic	Blend	\$8,201	1.00
36	Nuclear Medicine	Blend	\$23,087	2.82
37	Pediatric Medicine	Blend	\$14,893	1.82
38	Geriatric Medicine	Blend	\$12,451	1.52
39	Nephrology	Blend	\$12,779	1.56
40	Hand Surgery	Major Surgery	\$50,979	6.22
41	Optometry	Blend	\$8,201	1.00
42	Certified Nurse Midwife	Major Surgery	\$37,091	4.52
42	Certified Nurse Midwife	Major with Obstetrics	\$71,104	8.67
42	Certified Nurse Midwife	No Surgery	\$13,036	1.59

Specialty Code	Specialty Name	Final Surgery Class	Population-Weighted National Average Premium	Risk Factor
43	Certified Registered Nurse Anesthetist (CRNA)	Blend	\$21,137	2.58
44	Infectious Disease	Blend	\$16,633	2.03
46	Endocrinology	Blend	\$14,386	1.75
48	Podiatry	Blend	\$22,750	2.77
50	Nurse Practitioner	Blend	\$15,959	1.95
60	Public Health and Welfare Agency	Blend	\$8,201	1.00
62	Psychologist	Blend	\$8,201	1.00
64	Audiologist	Blend	\$8,201	1.00
65	Physical Therapist in Private Practice	Blend	\$8,201	1.00
66	Rheumatology	Blend	\$12,973	1.58
67	Occupational Therapist in Private Practice	Blend	\$8,201	1.00
68	Psychologist, Clinical	Blend	\$8,201	1.00
71	Registered Dietitian or Nutrition Professional	Blend	\$11,207	1.37
72	Pain Management	Major Surgery	\$29,930	3.65
72	Pain Management	No Surgery	\$21,773	2.65
76	Peripheral Vascular Disease	Major Surgery	\$54,681	6.67
77	Vascular Surgery	Major Surgery	\$54,681	6.67
78	Cardiac Surgery	Major Surgery	\$56,322	6.87
79	Addiction Medicine	Blend	\$8,201	1.00
80	Licensed Clinical Social Worker	Blend	\$8,201	1.00
81	Critical Care (Intensivists)	Blend	\$14,922	1.82
82	Hematology	Blend	\$14,545	1.77
83	Hematology-Oncology	Blend	\$15,139	1.85
84	Preventive Medicine	Blend	\$9,404	1.15
85	Maxillofacial Surgery	Major Surgery	\$40,398	4.93
86	Neuropsychiatry	Blend	\$10,445	1.27
89	Certified Clinical Nurse Specialist	Major Surgery	\$30,521	3.72
89	Certified Clinical Nurse Specialist	No Surgery	\$14,776	1.80
90	Medical Oncology	Blend	\$14,905	1.82
91	Surgical Oncology	Major Surgery	\$35,420	4.32
92	Radiation Oncology	Blend	\$23,087	2.82

Specialty Code	Specialty Name	Final Surgery Class	Population-Weighted National Average Premium	Risk Factor
93	Emergency Medicine	Major Surgery	\$41,277	5.03
93	Emergency Medicine	No Surgery	\$18,761	2.29
94	Interventional Radiology	Blend	\$23,087	2.82
97	Physician Assistant	Blend	\$8,201	1.00
98	Gynecological Oncology	Major Surgery	\$55,375	6.75
99	Undefined Physician type	Blend	\$15,982	1.95
C0	Sleep Medicine	Major Surgery	\$30,521	3.72
C0	Sleep Medicine	No Surgery	\$14,776	1.80

APPENDIX B: DATASETS USED FOR MP RVU CALCULATIONS

In addition to the datasets described in Section 4 for the specialty risk factor update, Acumen used the following datasets when modeling impacts on MP RVUs: the Medicare PFS (MPFS) Relative Value, the Clinical RVUs, and Discounted Utilization Files. Each dataset is described in turn below.

B.1 Medicare PFS (MPFS) Relative Value File

The MPFS file contains information on services covered by the CY 2016 Medicare PFS. The file contains the associated RVUs for practitioner services, a fee schedule status indicators, and various payment policy indicators needed for payment adjustment (i.e., payment of assistant at surgery, team surgery, bilateral surgery, etc.). Acumen used modifier codes in the MPFS file to classify CPT data as PC, TC, or global. The CY 2015 update used MPFS data from the CY 2015 Proposed Rule, and the modeled MP RVUs in this report used 2017 MPFS data.

B.2 Clinical Labor RVUs File

The clinical labor RVUs file contains information on the facility and non-facility PE clinical labor RVUs associated with a range of HCPCS service codes. Acumen used this file to determine the associated risk for each CPT code if the clinical labor RVU for a procedure is higher than the work RVU or if the work RVU is unavailable (i.e., for TC modifiers). The CY 2015 update relied on 2015 clinical labor RVUs, and the MP RVUs presented in this report were derived from 2017 clinical labor RVUs.

B.3 Discounted Utilization Files

The Discounted Utilization files contain information on service counts (MTUS) at the specialty and CPT levels. Acumen used three-year averages from the 2015, 2016, and 2017 Discounted Utilization files to weight specialty risk factors. Moreover, the 2016 Discounted Utilization file is used to derive the MTUS count of the numerator of the budget neutralization factor while the 2017 utilization file is used in the denominator.

APPENDIX C: SURGICAL CODES OUTSIDE 10000-69999 RANGE

Table C.1 shows surgical cardiology codes and surgical G codes outside of the 10000-69999 CPT range. G0105 and G0121 have modifier 53; the remainder of the CPT codes in Table C.1 do not have a modifier.

Table C.1 Surgical Codes Outside 10000-69999 Range

HCPCS Code			
92920	93456	93640	G0343
92921	93457	93641	G0364
92924	93458	93642	G0412
92925	93459	93650	G0413
92928	93460	93653	G0414
92929	93461	93654	G0415
92933	93462	93655	G0429
92934	93503	93656	G0460
92937	93505	93657	
92938	93530	93563	
92941	93531	93564	
92943	93532	93565	
92944	93533	93566	
92961	93580	93567	
92970	93581	93568	
92971	93582	93571	
92973	93583	93572	
92974	93600	G0101	
92975	93602	G0104	
92977	93603	G0105	
92978	93609	G0121	
92979	93610	G0127	
92986	93612	G0168	
92987	93613	G0186	
92990	93618	G0268	
92997	93619	G0269	
92998	93620	G0278	
93451	93621	G0283	
93452	93622	G0288	
93453	93623	G0289	
93454	93624	G0341	
93455	93631	G0342	

APPENDIX D: IMPACT ANALYSIS SPECIALTY CROSSWALK

Several low volume specialties were grouped with higher volume specialties for the purpose of assessing and reporting the impacts of the modelled MP RVUs in Section 5. Table D.1 details how specialties were grouped.

Table D.1 Specialty Group Crosswalk for Impact Analysis

Specialty Group Name	Specialty Code	Group Number
Allergy/Immunology	03	01
Anesthesiology	05	02
Cardiac Surgery	78	03
Cardiology	06	04
Cardiology	21	04
Cardiology	C3	04
Colon and Rectal Surgery	28	05
Critical Care	81	06
Dermatology	07	07
Emergency Medicine	93	08
Endocrinology	46	09
Family Practice	08	10
Family Practice	23	10
Gastroenterology	10	11
General Practice	01	12
General Surgery	02	13
General Surgery	91	13
Geriatrics	38	14
Hand Surgery	40	15
Hematology/Oncology	82	16
Hematology/Oncology	83	16
Hematology/Oncology	90	16
Infectious Disease	44	17
Internal Medicine	11	18
Internal Medicine	84	18
Interventional Pain Management	09	19
Interventional Pain Management	72	19
Interventional Radiology	94	20
Multispecialty Clinic/ Other Phys	12	21
Multispecialty Clinic/ Other Phys	17	21

Specialty Group Name	Specialty Code	Group Number
Multispecialty Clinic/ Other Phys	70	21
Multispecialty Clinic/ Other Phys	99	21
Nephrology	39	22
Neurology	13	23
Neurosurgery	14	24
Nuclear Medicine	36	25
Obstetrics/Gynecology	16	27
Obstetrics/Gynecology	42	27
Obstetrics/Gynecology	98	27
Ophthalmology	18	28
Orthopedic Surgery	20	29
Otolaryngology	04	30
Pathology	22	31
Pediatrics	37	32
Physical Medicine	25	33
Plastic Surgery	24	34
Psychiatry	26	35
Psychiatry	27	35
Psychiatry	86	35
Pulmonary Disease	29	36
Radiology	30	38
Rheumatology	66	39
Thoracic Surgery	33	40
Urology	34	41
Vascular Surgery	76	42
Vascular Surgery	77	42
Audiologist	64	43
Chiropractor	35	44
Clinical Psychologist	62	45
Clinical Psychologist	68	45
Clinical Social Worker	80	46
Diagnostic Testing Facility	45	47
Diagnostic Testing Facility	47	47
Independent Laboratory	69	48
Independent Laboratory	75	48
Nurse Anesthesiologist/ Anesthesiologist Assistant	32	49
Nurse Anesthesiologist/ Anesthesiologist Assistant	43	49

Specialty Group Name	Specialty Code	Group Number
Nurse Practitioner	50	50
Nurse Practitioner	89	50
Optometry	41	51
Oral/Maxillofacial Surgery	19	52
Oral/Maxillofacial Surgery	85	52
Physical /Occupational Therapist	15	53
Physical /Occupational Therapist	65	53
Physical /Occupational Therapist	67	53
Physician Assistant	97	54
Podiatry	48	55
Portable X-Ray Suppler	63	56
Other	58	58
Other	60	58
Other	71	58
Other	73	58
Other	79	58
Other	87	58
Other	88	58
Other	A5	58
Other	C0	58
Radiation Oncology /Therapy Centers	74	59
Radiation Oncology /Therapy Centers	92	59

APPENDIX E: MALPRACTICE PREMIUM DATA AVAILABILITY BY SPECIALTY

The number of states with malpractice premium data for the major surgery, no surgery, and unspecified surgery classifications varied somewhat between CY 2015 and CY 2018. Table E.1 compares the count of states with malpractice premium data for each specialty and surgery type in CY 2015 with the updated data collected for the CY 2018 update.

Table E.1 Number of States with Data for Each MP Premium Type by Specialty in CY 2015 and 2018

CMS Spec Code	CMS Specialty Name	Number of States with Data for Each MP Premium Type					
		CY 2018			CY 2015		
		Major Surgery	No Surgery	Unspecified	Major Surgery	No Surgery	Unspecified
01	General Practice	44	51	26	41	45	26
02	General Surgery	52	22	14	50	3	2
03	Allergy/ Immunology	0	51	0	0	20	46
04	Otolaryngology	51	39	0	49	41	29
05	Anesthesiology	24	52	0	18	0	48
06	Cardiovascular Disease (Cardiology)	12	50	0	41	38	39
07	Dermatology	24	43	0	26	37	38
08	Family Practice	45	52	23	42	48	16
09	Interventional Pain Management	36	28	0	20	0	7
10	Gastroenterology	12	41	0	34	35	27
11	Internal Medicine	4	52	2	3	39	40

		Number of States with Data for Each MP Premium Type					
		CY 2018			CY 2015		
CMS Spec Code	CMS Specialty Name	Major Surgery	No Surgery	Unspecified	Major Surgery	No Surgery	Unspecified
12	Osteopathic Manipulative Medicine	0	6	0	0	0	6
13	Neurology	30	52	0	43	36	31
14	Neurosurgery	52	0	1	24	4	0
15	Speech Language Pathology	0	0	0	0	0	0
16	Obstetrics & Gynecology	52	41	0	10	12	42
17	Hospice and Palliative Care	0	6	0	0	1	7
18	Ophthalmology	42	49	0	49	48	20
19	Oral Surgery (Dentist only)	3	23	0	6	0	1
20	Orthopedic Surgery	52	20	1	50	21	1
21	Cardiac Electrophysiology	0	0	0	0	0	0
22	Pathology	0	51	0	0	31	40
23	Sports Medicine	0	19	0	0	8	2
24	Plastic and Reconstructive Surgery	52	2	0	49	6	0
25	Physical Medicine and Rehabilitation	21	51	0	10	19	46
26	Psychiatry	0	51	0	1	24	45
27	Geriatric Psychiatry	0	1	0	0	0	0

		Number of States with Data for Each MP Premium Type					
		CY 2018			CY 2015		
CMS Spec Code	CMS Specialty Name	Major Surgery	No Surgery	Unspecified	Major Surgery	No Surgery	Unspecified
28	Colorectal Surgery (Proctology)	50	2	0	43	3	0
29	Pulmonary Disease	3	43	0	2	35	33
30	Diagnostic Radiology	0	51	5	2	34	39
32	Anesthesiology Assistant	0	2	0	0	0	0
33	Thoracic Surgery	50	5	1	48	3	0
34	Urology	48	26	0	42	22	20
35	Chiropractic	0	18	0	0	1	32
36	Nuclear Medicine	0	20	0	2	14	39
37	Pediatric Medicine	20	50	1	19	40	27
38	Geriatric Medicine	3	45	0	27	32	17
39	Nephrology	18	40	0	24	35	16
40	Hand Surgery	31	2	0	48	1	4
41	Optometry	0	17	0	0	0	36
42	Certified Nurse Midwife	0	3	0	0	0	0
43	Certified Registered Nurse Anesthetist (CRNA)	0	21	0	0	0	0
44	Infectious Disease	0	45	0	0	29	22
46	Endocrinology	4	46	0	25	33	20
48	Podiatry	16	10	0	33	19	33

		Number of States with Data for Each MP Premium Type					
		CY 2018			CY 2015		
CMS Spec Code	CMS Specialty Name	Major Surgery	No Surgery	Unspecified	Major Surgery	No Surgery	Unspecified
49	Ambulatory Surgical Center	3	0	0	0	0	0
50	Nurse Practitioner	0	39	19	0	0	0
55	Individual Certified Orthotist	0	1	0	0	0	0
56	Individual Certified Prosthetist	0	1	0	0	0	0
58	Medical Supply Company with Pharmacist	0	5	0	0	0	0
59	Ambulance Service Provider	0	3	0	0	0	0
60	Public Health or Welfare Agency	0	0	0	0	0	0
62	Psychologist	0	2	0	0	0	6
64	Audiologist	0	4	0	0	0	0
65	Physical Therapist in Private Practice	0	10	0	0	0	2
66	Rheumatology	0	49	0	0	35	21
67	Occupational Therapist in Private Practice	0	6	0	0	0	19
68	Psychologist, Clinical	0	25	0	0	0	0
71	Registered Dietitian or Nutrition Professional	0	42	0	0	15	33
72	Pain Management	28	36	0	21	14	18

		Number of States with Data for Each MP Premium Type					
		CY 2018			CY 2015		
CMS Spec Code	CMS Specialty Name	Major Surgery	No Surgery	Unspecified	Major Surgery	No Surgery	Unspecified
76	Peripheral Vascular Disease	0	5	0	0	0	0
77	Vascular Surgery	51	5	0	46	2	0
78	Cardiac Surgery	52	0	1	48	3	0
79	Addiction Medicine	0	13	0	0	0	12
80	Licensed Clinical Social Worker	0	6	0	0	0	0
81	Critical Care (Intensivists)	0	15	0	4	0	35
82	Hematology	0	44	0	2	31	10
83	Hematology-Oncology	3	49	0	1	13	4
84	Preventive Medicine	0	51	0	1	31	26
85	Maxillofacial Surgery	3	0	0	19	0	0
86	Neuropsychiatry	1	0	2	0	0	0
87	All Other Suppliers	0	10	3	0	0	0
88	Unknown Supplier/Provider Specialty	0	19	25	0	0	0
89	Certified Clinical Nurse Specialist	0	3	0	0	0	0
90	Medical Oncology	5	46	0	1	33	19
91	Surgical Oncology	35	0	0	25	0	0
92	Radiation Oncology	1	23	0	3	32	39

		Number of States with Data for Each MP Premium Type					
		CY 2018			CY 2015		
CMS Spec Code	CMS Specialty Name	Major Surgery	No Surgery	Unspecified	Major Surgery	No Surgery	Unspecified
93	Emergency Medicine	29	35	19	33	16	41
94	Interventional Radiology	4	18	5	5	3	29
95	Advance Diagnostic Imaging	0	1	0	0	0	0
96	Optician	0	2	0	0	0	0
97	Physician Assistant	5	13	33	3	1	43
98	Gynecological Oncology	34	0	0	0	0	0
99	Undefined Physician type	6	47	25	6	30	36
A5	Pharmacy	0	10	0	0	0	0
B4	End-Stage Renal Disease Facility	0	1	0	0	0	0
C0	Physician, Sleep Medicine	0	11	0	0	0	8
C3	Interventional Cardiology	5	2	0	0	0	0

APPENDIX F: DATA SOURCES FOR MODELLED MP RVUS

In addition to the data sources used to compute national average premiums and specialty risk factors, Acumen used several data sources to produce the modelled MP RVUs for CY2018. These data sources are listed in Table F.1 and compared with the data sources that were used for the CY2015 MP RVU update.

Table F.1 Comparison of Specialty Risk Factor Data Sources for CY 2015 and 2018 MP RVUs

Risk Factor Calculation Data Source	Source	CY 2018 Update	CY 2015 Update
Malpractice Premiums	State Departments of Insurance	2014 – 2015	2011 - 2012
Locality RVUs and Services	CMS	2015	2013
National PFS Relative Value File	CMS	2017	2015
Clinical Labor RVUs	CMS	2017	2015
Discounted Utilization Files	CMS	2016 - 2017	2014 - 2015
American Community Survey (ACS) Population Estimates	U.S. Census Bureau	2015	N/A
Current Procedural Terminology RVUs and Services (CRS) File	CMS	2015	2013
Geographic Practice Cost Index	CMS	2017	2014