Average Beneficiary CMS Hierarchical Condition Category (HCC) Risk Scores for Rural and Urban Providers

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What are HCC Risk Scores?

In some payment models, payers reimburse providers a flat rate per patient (capitation), and in others, payers assess penalties or provide bonuses based on cost or quality of care outcomes (pay-for-performance). In such payment models, risk adjustment is important. Risk adjustment mechanisms predict whether a given patient, or group of patients, is likely to be more or less costly to treat than the average population and provides a way to adjust payment accordingly. Risk adjustment compensates health plans and providers for treating sicker patients, and reduces their incentives to select healthy or less costly patients.

KEY FINDINGS

- Rural providers serve Medicare beneficiaries with lower average CMS-HCC risk scores than urban providers—1.43 compared to 1.75, respectively. Lower risk scores suggest relatively better health and lower expected cost.

- Average CMS-HCC risk scores are lower for rural providers than they are for urban providers across multiple provider characteristics including specialty, geographic region, and eligibility to participate in value-based payment.

- Lower average CMS-HCC risk scores of beneficiaries served by rural providers is contrary to extensive previous research that shows rural are less healthy than urban populations. Future studies will explore potential drivers of these risk score differences, including variation in coding practices.

In 2004, to adjust capitated payments for Medicare Advantage (MA), or Medicare Part C, the Centers for Medicare & Medicaid Services (CMS) modified a previously developed risk adjustment model.[1] This new model uses hierarchical condition categories (HCCs), along with demographic information, to predict a beneficiary's expected Medicare spending in the next year compared to the average expected spending for the entire Medicare population through an associated risk score. The risk adjustment model incorporates the health risk of beneficiaries by using multiple factors that influence health. These factors include the beneficiary's age; sex; eligibility for Medicaid; initial reason for Medicare qualification; residence in an institution such as a long-term care facility; and the diagnoses assigned to the beneficiary in inpatient, outpatient and office-based settings during a base year.[2]

Diagnoses are classified into approximately 70 disease HCCs. The HCCs group related diseases and, within each disease, rank different manifestations by severity to reflect expected differences in treatment, and therefore cost. For example, a beneficiary that is assigned multiple diagnosis codes that fall within a single disease category, such as diabetes, would be assigned only one HCC for diabetes that reflects the highest level of diabetes severity experienced by the beneficiary. However, if that beneficiary also had an unrelated disease, such as a head injury, (s)he would receive a second HCC so that cost estimates reflect increments for each disease.[3]

The CMS-HCC risk score for a beneficiary is the sum of the score or weight attributed to each of the demographic factors and HCCs within the model. The CMS-HCC model is normalized to 1.0. Beneficiaries would be considered relatively healthy, and therefore less costly, with a risk score less than 1.0.

Why Do HCC Risk Scores Matter?

Risk scores matter because they affect payment. Initially, the CMS-HCC risk adjustment model was used solely to adjust capitated payments to MA plans.[2] However, since 2004, its use has expanded to other Medicare payment programs, including those for smaller groups of physicians. HCCs are incorporated throughout the Medicare Access and CHIP Reauthorization Act (MACRA) of 2015 payment mechanisms, which are designed to push traditional Medicare toward performance-based payment. These payment mechanisms began with the interim Value-Based Payment Modifier as part of the Medicare Physician and Other Health Professional Payment System[4] (2015-2018). This

payment system will be consolidated with other quality-incentive programs and replaced by the Merit-based Incentive Payment System (MIPS) of the Quality Payment Program (QPP) in 2019. The QPP requires providers to join either the MIPS or a qualified Advanced Alternative Payment Model (APM), both of which incorporate HCC risk adjustment (see Appendix A for details).[5]

The goal of risk adjustment is to appropriately reimburse for intensive health care interventions and reduce barriers to treating patients needing complicated treatment. However, if CMS-HCC risk scores do not accurately reflect patient health status because of factors such as coding practices[6] or capacity, then payments may not be associated with the true cost of treatment. Existing evidence suggests that there may be cause for concern. Rural populations experience worse health outcomes than their urban counterparts based on metrics such as mortality,[7,8] activity limitations due to chronic conditions, and having a diagnosable severe mental illness.[9] By contrast, rural Medicare beneficiaries have lower average CMS-HCC risk scores than urban beneficiaries,[10] suggesting that rural beneficiaries are healthier and less costly. Additionally, preliminary analyses suggest that smaller physician practices, which are disproportionately located in rural areas,[11] have the lowest average CMS-HCC risk scores.[12] On the other hand, rural Medicare beneficiaries are younger than urban beneficiaries,[13] and it may be the case that patients with more complexity systematically seek care in urban areas. To further investigate potential differences in urban and rural CMS-HCC risk scores at the provider's patient panel level, we used the 2015 Medicare Physician and Other Supplier Public Use File,[14,15] to compare patient panel CMS-HCC risk scores between urban and rural providers across provider specialties, census divisions, and MIPS participation requirements.

METHODS

Data regarding the CMS-HCC risk scores and providers were obtained from the 2015 Medicare Physician and Other Supplier Public Use File.[15] This is the most recent available version of this file. The data in this report came from a portion of the file that aggregates Medicare fee-for-service beneficiary administrative data to the provider level.[15] The file also incorporates provider location and specialty from the National Plan & Provider Enumeration System. CMS-HCC risk scores in this file represent the average risk score of the Medicare beneficiaries seen by the provider. Because the payment and risk score data are aggregated to the physician level based on Medicare claims, a single beneficiary can be included in the patient panel of more than one provider. Detailed provider specialty categories were aggregated using the method from the Medicare Data on Provider Practice and Specialty User Documentation.[16] Providers were assigned to rural versus urban locations by geocoding[17] the street address provided in the Public Use File and the definition of rural from the Federal Office of Rural Health Policy, which includes nonmetropolitan counties and areas of metropolitan counties with Rural-Urban Commuting Area (RUCA) codes of 4 or greater. Using MIPS years 1 and 2 eligibility criteria, we determined which providers were likely to participate in MIPS based on the provider type, the number of unique Medicare beneficiaries, and Medicare's allowed charge amount per provider (see Appendix B for details).

We excluded all providers not within the 50 U.S. states or the District of Columbia (6,189); any providers that do not participate in Medicare (837); any organizational, rather than individual, NPIs (61,794); and observations where rural status could not be determined (87). Because CMS-HCC risk scores are calculated at the individual beneficiary level and aggregated at the provider level, we weighted the averages depicted in Figures 1 and 2 by the number of unique beneficiaries in each provider's patient panel.

RESULTS

Table 1 shows descriptive data on all individual providers that met the stated eligibility criteria for the first year of MIPS based on measures available in the public use file. Providers practicing in rural locations treat beneficiaries with a lower average CMS-HCC risk score as compared to providers practicing in urban locations, and the difference is statistically significant (average CMS-HCC risk score of 1.43 for rural vs. 1.75 for urban). Rural providers also have smaller patient panels on average: 535 vs. 568 unique Medicare beneficiaries per provider. A larger percentage of rural providers are primary care (33.0% vs. 25.4%) or non-physician practitioners like physician assistants or nurse practitioners (28.5% vs. 15.3%) as compared to urban providers. By contrast, a larger percentage of urban providers are hospital-based (21.9% vs. 13.8%) or medical specialties (19.3% vs. 9.0%) as compared to rural providers. The distribution of rural and urban providers varies by census division. For example, 12.2 percent of urban providers are located in the Pacific division while only 6.0 percent of rural providers are located in this same division. Conversely, 14.2 percent of rural providers are located in the East South Central division as compared to 5.4 percent of urban providers.

**Table 1: Average CMS-HCC Risk Score, Specialty and Census Division: Rural Versus Urban Providers, 2015**

Variable	Value	Rural	Urban	P-value
Number of Providers		59,270	449,284	
Average CMS-HCC Risk Score of Beneficiaries, mean (SD)		1.43 (0.50)	1.75 (0.76)	<0.001
Number of Medicare Beneficiaries, mean (SD)		535 (590.29)	568 (705.24)	<0.001
Providers by Broad Specialty Group	Hospital-based	8,189 (13.8%)	98,573 (21.9%)	<0.001
	Medical specialty	5,349 (9.0%)	86,882 (19.3%)	
	Non-physician	16,894 (28.5%)	68,533 (15.3%)	
	Obstetrics-Gynecology	539 (0.9%)	4,451 (1.0%)	
	Other	12 (<1%)	189 (<1%)	
	Primary care	19,570 (33.0%)	114,202 (25.4%)	
	Psychiatry	816 (1.4%)	7,743 (1.7%)	
	Surgery specialty	7,892 (13.3%)	68,681 (15.3%)	
Providers by Census Division	New England	3,528 (6.0%)	29,338 (6.5%)	<0.001
	Mid Atlantic	4,705 (7.9%)	73,509 (16.4%)	
	East North Central	10,711 (18.1%)	70,304 (15.6%)	
	West North Central	7,393 (12.5%)	27,999 (6.2%)	
	South Atlantic	10,232 (17.3%)	96,746 (21.5%)	
	East South Central	8,396 (14.2%)	24,461 (5.4%)	
	West South Central	6,473 (10.9%)	45,000 (10.0%)	
	Mountain	4,259 (7.2%)	26,965 (6.0%)	
	Pacific	3,573 (6.0%)	54,962 (12.2%)	

P-values less than or equal to 0.05 are statistically significant. Provider categories were aggregated using Medicare Data on Provider Practice and Specialty User Documentation. "Other" provider types include those identified as multispecialty clinics/group practices and unknown physician specialty.

Rural-Urban Differences in Average CMS-HCC Risk Scores by Provider Specialty

Figure 1 shows that, for each provider specialty grouping, rural providers serve panels of beneficiaries with lower average CMS-HCC risk scores as compared to their urban counterparts. The largest differences are found for non-physician providers (1.31 for rural providers vs. 1.62 for urban providers) and medical specialties (1.66 for rural vs. 1.93 for urban). The smallest differences are in obstetrics-gynecology (0.97 for rural vs. 1.03 for urban) and surgery specialties (1.30 for rural vs. 1.43 for urban). Beneficiary average CMS-HCC risk scores also vary by provider specialty: Medical specialties serve patient panels with the highest average CMS-HCC risk scores, and providers in obstetrics-gynecology serve those with the lowest average CMS-HCC risk scores.

Figure 1: Average CMS-HCC Risk Scores by Specialty: Rural Versus Urban Providers, 2015
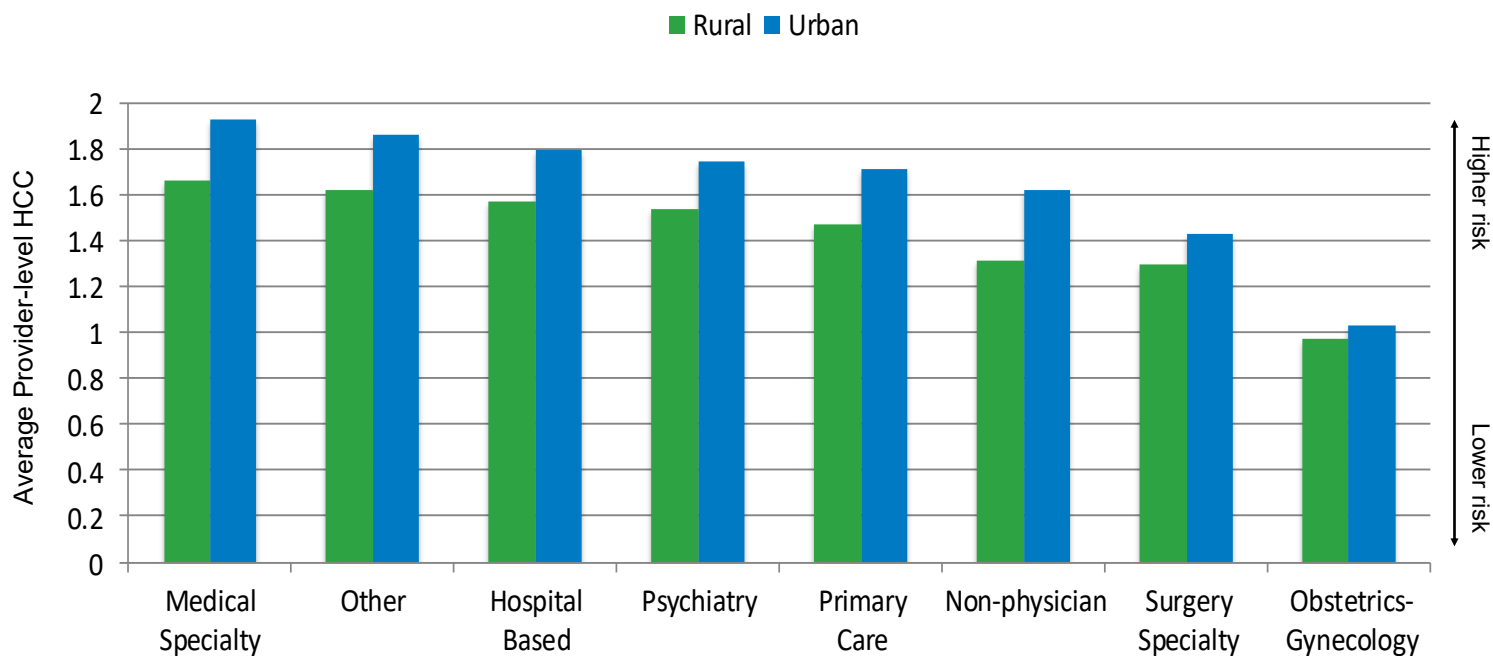
Rural-Urban Differences in CMS-HCC Risk Scores by Census Division

Figure 2 shows that in every census division, rural providers serve patient panels that have lower average CMS-HCC risk scores than urban providers. The lowest average CMS-HCC risk scores for both urban and rural providers are found in the Mountain division (1.59 and 1.28, respectively). Rural providers serving patient panels with the highest average CMS-HCC risk scores are in the South Atlantic division (1.54) while urban providers serving patient panels with the highest risk scores are in the West South Central division (1.84).

Figure 2: Average CMS-HCC Risk Scores by Census Division: Rural Versus Urban Providers, 2015
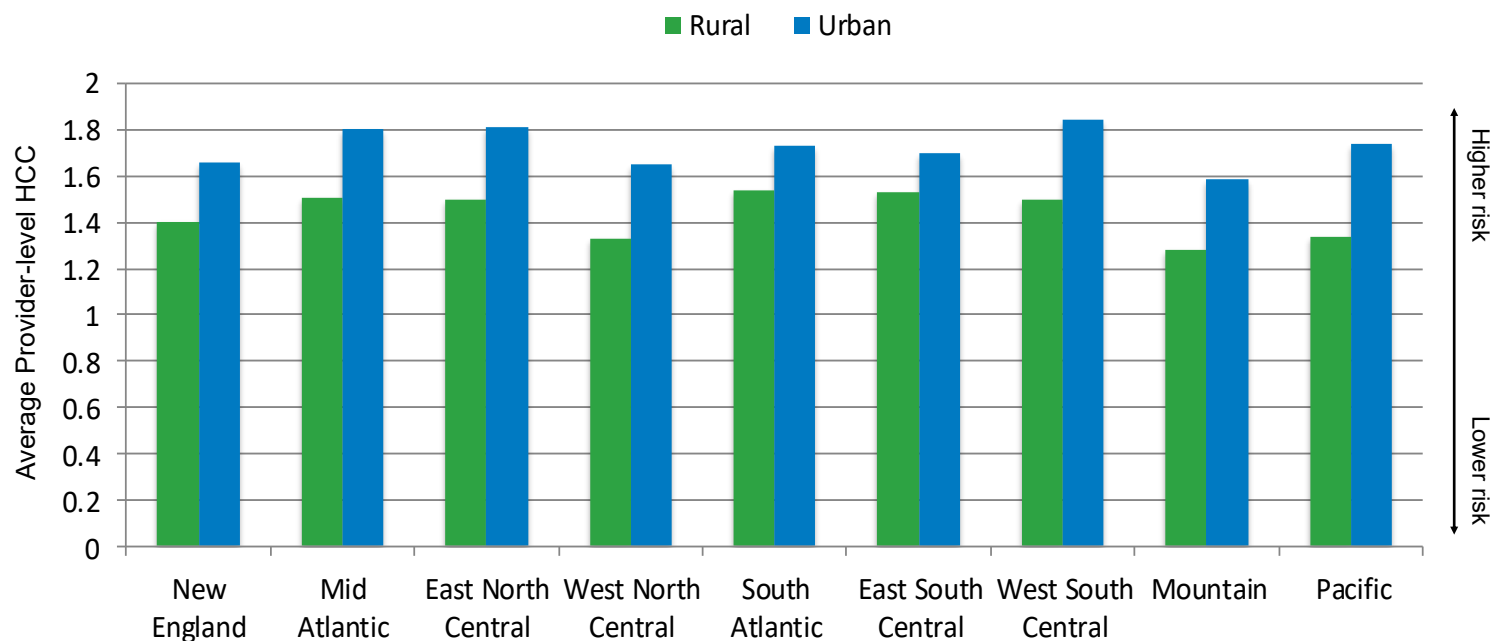
Rural-Urban Differences in CMS-HCC Risk Scores by Various MIPS Inclusion Criteria

In an attempt to avoid an unfair disadvantage to practices unable to successfully participate in quality-based payment, Medicare exempted certain provider types and practice sizes from MIPS (see Appendix B). However, over time, the provider type and size exemptions change. Table 2 shows average CMS-HCC risk scores for rural and urban providers using the various MIPS inclusion rules.[5] The definitions in the table are organized from the most inclusive to the least inclusive. Row one of the table shows all of the proposed provider types eligible in MIPS Years 3+ [18] with no size restrictions; the average CMS-HCC risk score is 1.35 for rural provider panels, compared to 1.63 for urban. Row two excludes the provider types expected to be eligible in years 3+, only including those provider types eligible in the first year, again with no size restrictions. The average CMS-HCC risk score increases slightly for rural (1.35 to 1.37) and for urban (1.63 to 1.67) providers. Using only the Year 1 eligible provider types and imposing size restrictions that remove the smallest providers (row 3) increases the CMS-HCC risk scores in both rural (1.37 to 1.43) and urban (1.67 to 1.75) provider panels, and the rural-urban difference remains.[19] Excluding additional small providers using the 2018 performance year size criteria[20] (row 4) only slightly increases the average CMS-HCC risk score for both rural (1.43 to 1.49) and urban (1.75 to 1.78) providers, and the rural-urban gap is maintained. Providers who would be excluded based on new size restrictions implemented in year 2 serve patient panels with slightly lower risk scores in both rural (1.38) and urban (1.71) locations as compared to those that were excluded based on year 1 size restrictions.

Table 2: CMS-HCC scores by MIPS definitions, 2015

MIPS Inclusion Rule	Rural			Urban		
	Mean HCC	Mean Number Medicare Beneficiaries	Number of Providers	Mean HCC	Mean Number Medicare Beneficiaries	Number of Providers
MIPS Providers Year 3+	1.35	319	114,776	1.63	342	835,388
MIPS Year 1 Providers	1.37	347	103,169	1.67	370	756,415
MIPS Year 1 Providers; Year 1 Size (Study sample from previous analyses)	1.43	535	59,270	1.75	568	449,284
MIPS Year 1 Providers; Year 2 Size	1.49	773	29,866	1.78	812	240,796
MIPS Year 1 Providers; Year 1 Size, not Year 2	1.38	294	29,404	1.71	285	208,488

CONCLUSIONS

Providers in rural areas serve Medicare patient panels with lower average CMS-HCC risk scores than their urban counterparts, despite previous research demonstrating that rural populations are sicker than urban populations.[7,8,9] The CMS-HCC risk score differential holds across provider specialties, census divisions, and all groups of providers that are likely to be required to participate in MIPS. In future studies, we will begin to explore some potential drivers of these risk score differences. For example, we will investigate whether the HCCs that contribute to the risk scores differ among rural and urban beneficiaries, and whether there are differences in the numbers and types of claims per beneficiary, or in the number of diagnosis codes assigned to each claim. Evaluating possible non-health related drivers of CMS-HCC risk scores, such as those that might arise due to variations in coding practices, will contribute to understanding the extent to which the CMS-HCC risk adjustment model is achieving the desired goal of adjusting payments to reflect expected costs. As policy-makers consider how to risk adjust payments under MIPS and other alternative payment models—or even more broadly in Medicare Advantage and other payment models that affect post-acute care providers[21] and hospitals[22]—it will be important to consider the implications for rural providers.

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Appendix A: Additional Payment Inclusion Detail

Hierarchical Condition Code (HCC) scores, and related risk-adjustment models, are incorporated throughout Medicare including in Medicare Advantage (MA), CMS demonstrations, and in payment updates mandated by the Medicare and CHIP Reauthorization Act (MACRA). Because the analysis in this paper is at the individual provider level, this appendix focuses on payment changes expected to most directly affect individual providers.

In 2015, MACRA added three temporary policy adjustments to the Medicare Physician and Other Health Professional Payment System. One of these adjustments is called the value-based payment modifier. This value-modifier can adjust payments upward, downward, or neutrally based on a quality composite score and a cost composite score.[1] HCC scores factor into the risk adjustment of this model at the Tax Identification Number (TIN) level in multiple ways:

- In computing the cost composite measure, HCC scores are used to adjust the *per capita cost for all attributed beneficiaries,*[2] *per capita costs for beneficiaries with specific conditions*,[3] and a risk adjustment metric based on the HCC algorithm adjusts the *Medicare spending per beneficiary*.[4]

- For the overall value-modifier, TINs that will receive an upward payment adjustment are eligible for an additional upward adjustment if their population is in the top 25th percentile of Medicare beneficiary's HCC scores nationwide.[1]

The Quality Payment Program (QPP) will replace the value-based payment modifier beginning in 2019. The QPP will require most Medicare providers to participate in the Merit-based Incentive Payment System (MIPS) or a qualified advanced alternative payment model (APM). MIPS will be a point-based system that determines adjustments on final payments based on four categories: quality, cost, improvement activities, and advancing care information.[5] MIPS will incorporate risk scores in two ways, similarly to the value-based payment modifier:

- Beginning in the second year of MIPS, there will be a two-part cost component. HCC scores are used to adjust the *Total per capita cost*[6] measure, and a metric based on the HCC score will be used to adjust the *Medicare spending per beneficiary*[7] measure. An additional cost component measure will be added in MIPS year three, the *Episode-based cost* measure. HCC scores will also be used to risk-adjust this metric.[8]

- HCC scores will also be used to adjust the final number of points that a provider receives. For the first year, a clinician's or TIN's average HCC score will make the provider eligible for up to 3 (out of 100) points. Three points will be enough for a neutral adjustment in year 1. In year 2, the complex bonus could be up to 5 points and incorporates a dual eligibility ratio. In year 2, 15 points is enough for a neutral adjustment.[9]

The qualified APMs will also incorporate HCC scores into their payment methodologies. One example of a qualified APM is a Medicare Shared Savings Program (MSSP) Accountable Care Organization that takes on downside risk. MSSPs receive bonuses (or are assessed penalties) based on their population's spending under (or over) a benchmark. The benchmark is calculated based on a historical benchmark trended forward using national spending data. HCC scores are used to adjust the historical benchmark. Each year, as new beneficiaries are added to the MSSP, the historical benchmark is re-adjusted using these beneficiaries' HCC scores. For continuously aligned beneficiaries, the baseline is updated based on changing demographics, and can be adjusted downward, but not upward, based on a changing HCC score.[10]

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Appendix B: Provider Types Included for MIPS Year 1 and MIPS Years 3+, 2015

Provider Type	MIPS Y1	MIPS Y3+	Provider Type	MIPS Y1	MIPS Y3+
Addiction Medicine	Y	Y	Multispecialty Clinic/Group Practice	Y	Y
All Other Suppliers	N	N	Nephrology	Y	Y
Allergy/Immunology	Y	Y	Neurology	Y	Y
Ambulance Service	N	N	Neuropsychiatry	Y	Y
Anesthesiologist Assistant	Y	Y	Neurosurgery	Y	Y
Anesthesiology	Y	Y	Nuclear Medicine	Y	Y
Audiologist (billing independently)	N	Y	Nurse Practitioner	Y	Y
Cardiac Electrophysiology	Y	Y	Obstetrics/Gynecology	Y	Y
Cardiac Surgery	Y	Y	Occupational therapist	N	Y
Cardiology	Y	Y	Ophthalmology	Y	Y
Certified Clinical Nurse Specialist	Y	Y	Optometry	Y	Y
Certified Nurse Midwife	N	Y	Oral Surgery (dentists only)	Y	Y
Chiropractic	Y	Y	Orthopedic Surgery	Y	Y
Clinical Laboratory	N	N	Osteopathic Manipulative Medicine	Y	Y
Clinical Psychologist	N	Y	Otolaryngology	Y	Y
Colorectal Surgery	Y	Y	Pain Management	Y	Y
Critical Care (Intensivists)	Y	Y	Pathology	Y	Y
Certified Registered Nurse Anesthetist	Y	Y	Pediatric Medicine	Y	Y
Dermatology	Y	Y	Peripheral Vascular Disease	Y	Y
Diagnostic Radiology	Y	Y	Physical Medicine and Rehabilitation	Y	Y
Emergency Medicine	Y	Y	Physical Therapist	N	Y
Endocrinology	Y	Y	Physician Assistant	Y	Y
Family Practice	Y	Y	Plastic and Reconstructive Surgery	Y	Y
Gastroenterology	Y	Y	Podiatry	Y	Y
General Practice	Y	Y	Portable X-ray	N	N
General Surgery	Y	Y	Preventive Medicine	Y	Y
Geriatric Medicine	Y	Y	Psychiatry	Y	Y
Geriatric Psychiatry	Y	Y	Psychologist (billing Indep.)	N	N
Gynecological/Oncology	Y	Y	Public Health Welfare Agency	N	N
Hand Surgery	Y	Y	Pulmonary Disease	Y	Y
Hematology	Y	Y	Radiation Oncology	Y	Y
Hematology/Oncology	Y	Y	Registered Dietician	N	Y
Hospice and Palliative Care	Y	Y	Rheumatology	Y	Y
Independent Diagnostic Testing Fac.	N	N	Sleep Medicine	Y	Y
Infectious Disease	Y	Y	Slide Preparation Facility	N	N
Internal Medicine	Y	Y	Speech Language Pathologist	N	Y
Interventional Cardiology	Y	Y	Sports Medicine	Y	Y
Interventional Pain Management	Y	Y	Surgical Oncology	Y	Y
Interventional Radiology	Y	Y	Thoracic Surgery	Y	Y
Licensed Clinical Social Worker	N	Y	Unknown Physician Specialty	Y	Y
Mass Immunization Roster Biller	N	N	Unknown Supplier/Provider	N	N
Maxillofacial Surgery	Y	Y	Urology	Y	Y
Medical Oncology	Y	Y	Vascular Surgery	Y	Y