Geographic Variation in Hospital Admission Rates in the Medicare Population

3M Clinical and Economic Research

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Executive Summary

Health care expenditures continue to steadily increase with hospital stays making up about one-third of health care expenditures. A well-functioning delivery system within a managed care plan or a geographic region should be able to minimize the need for hospitalizations. In this 3M Clinical and Economic Research report, the Potentially Preventable Admissions (PPAs) methodology was used to identify hospital admissions that may be potentially preventable. If there are an excess number of PPAs compared to a national norm within a managed care plan or geographic region, it is likely the excess PPAs represent hospital admissions that could be avoided if the delivery system functioned effectively.

The study used a random data sample of five percent of Medicare fee-for-service (FFS) beneficiaries contained in the Medicare Standard Analytic Files for calendar year 2017 and 2018. The data from 2017 was used to determine the burden of chronic disease for each beneficiary and to risk adjust PPA rates in the 2018 data.

After excluding FFS beneficiaries who were not enrolled in part A and B for the full three-year period, 1,388,114 beneficiaries remained in the analysis database. These beneficiaries experienced 379,814 hospital admissions of which 85,974 were considered a PPA (22.6 percent of admissions). Extrapolated to the entire Medicare population, the 85,974 PPAs represent $33.3 billion in annual FFS Medicare expenditures.

Based on a risk-adjusted national norm, the analysis found considerable PPA performance variation across census regions, states and Core Based Statistical Areas (CBSAs). Across states, PPA performance compared to the risk-adjusted national norm varied from 32.66 percent below expected for Hawaii to 47.62 percent above expected for Arkansas.

A best practice PPA norm was determined using 40 percent of the CBSAs with the best PPA performance that had at least 1,500 beneficiaries in the analysis data. To achieve PPA best practice performance nationally, overall PPA performance would need to improve by 14.85 percent which would result in an annual reduction in Medicare expenditures of $4.3 billion (12.9 percent of the $33.3 billion in PPA expenditures).

If there are an excess number of Potentially Preventable Admissions (PPAs) compared to a national norm within a managed care plan or geographic region, it is likely the excess PPAs represent hospital admissions that could be avoided if the delivery system functioned effectively.

9.0 percent of the PPAs were followed by one or more potentially preventable readmissions and 30.5 percent of PPAs were low severity medical admission through the emergency department (ED). Across states, PPA performance was correlated with readmission performance (r=0.694) and ED admission performance (r=0.566). The interdependence of PPAs with potentially preventable readmission and low severity medical admissions through the ED can provide useful insights for targeted quality improvement initiatives aimed at reducing PPAs.

PPA performance can be an effective measure of delivery system performance within a managed care plan or geographic region. The extent of PPA performance variation indicates that there are PPA performance improvement opportunities in many geographic areas. The $4.3 billion annual Medicare expenditure reduction gained through PPA best practice provides an achievable PPA quality improvement target.

Introduction

Health care expenditures represent about 18 percent of the US gross domestic product and are steadily increasing. Hospital stays make up about one-third of healthcare expenditures.[1] To the extent that hospital care can be shifted to the outpatient setting or avoided altogether, the cost of health care can be reduced.[2] Studies have documented not only that preventable hospitalizations exist, but that they can be reduced by specific interventions. For example, guidelines implemented in nursing homes have been shown to decrease the rate of hospital admissions.[3] Patients with chronic obstructive pulmonary disease (COPD) who were provided a higher level of continuity of care have been shown to have a significantly lower likelihood of avoidable hospitalizations.[4]

The objective of this report is to determine for Medicare beneficiaries the extent of geographic variation in the rate of hospital admissions that are potentially preventable and to quantify the financial impact of excess potentially preventable hospital admissions.

Potentially Preventable Admissions (PPAs)

A well-functioning delivery system within a managed care plan or geographic region should be able to minimize the need for hospitalizations. Potentially Preventable Admissions (PPAs) are hospital admissions that can often be avoided. The occurrence of an excess number of PPAs is indicative of an ineffective delivery system. Of course, not every PPA can be prevented. But if there are an excess number of PPAs compared to national benchmarks within a managed care plan or geographic region, it is likely that the excess PPAs represent hospital admissions that could be avoided if the delivery system functioned more effectively. There are six broad categories of PPAs:

- Admissions for chronic disease management that could potentially have been managed in the outpatient setting (e.g., asthma)
- Admissions for acute diseases that could potentially have been managed in the outpatient setting (e.g., viral pneumonia)
- Admissions for a procedure that could be done in an outpatient setting (e.g., cardiac catheterization for non-acute disease such as atherosclerosis)
- Admissions for a procedure for which there is a less invasive alternative procedure (e.g., percutaneous coronary angioplasty with a stent instead of coronary bypass surgery[5])
- Admissions for a procedure that research has shown to be prone to overuse (e.g., spinal procedures for back pain[6])
- Admissions that could potentially have been avoided for residents of a residential care facility such as a skilled nursing facility (e.g., trauma due to a fall)

The most prevalent PPAs will be for medical management of chronic and acute diseases. These hospital admissions may result from hospital or ambulatory care inefficiency, lack of adequate access to outpatient care, or inadequate coordination of ambulatory care services. In many cases, PPAs are for flare-ups of chronic conditions (e.g., heart failure) for which adequate monitoring and follow-up, such as proper medication management, could have avoided the need for hospitalization. As such, the occurrence of high rates of PPAs within a managed care plan or geographic region may represent a failure of the ambulatory care delivery system.

> The most prevalent PPAs will be for medical management of chronic and acute diseases. These hospital admissions may result from hospital or ambulatory care inefficiency, lack of adequate access to outpatient care, or inadequate coordination of ambulatory care services.

The PPAs associated with medical management of chronic and acute diseases are more comprehensive than the U.S. Department of Health and Human Services (HHS) Agency for Healthcare Research and Quality (AHRQ) list of ambulatory care sensitive conditions initially defined in the 1980s, and more comprehensive than the list of AHRQ Preventable Quality Indicators (PQIs).[7] PPAs focus on potentially preventable hospital admissions and exclude admissions that are not considered preventable. The PPA methodology takes three factors into consideration when assessing the potential preventability of PPAs for medical management of chronic and acute disease: the length of the required care coordination time period, acuteness of the reason for admission and living arrangement at the time of admission.

Length of the required care coordination time period

Potential preventability is assessed relative to the care given in the immediate period preceding a hospital admission (months). Conditions that require an extended period of coordinated and integrated care are not considered potentially preventable. For example, an admission for chronic renal failure is not considered a PPA because it is not preventable unless appropriate care has been given for several years before the admission making it difficult to judge potential preventability based solely on the care given in the immediate period preceding the admission.

Acuteness of the reason for admission

Preventability is also assessed based on the relative acuteness of the reason for the admission. For example, an admission for a cardiac catheterization is considered potentially preventable for patients with a diagnosis of coronary atherosclerosis, but not preventable for patients with an acute myocardial infarction or unstable angina. The rate of PPAs is risk adjusted for the complexity of the patient population whereas the AHRQ PQIs do not include any risk adjustment. For example, the AHRQ PQIs include all patients admitted with diabetes irrespective of the severity of the patient. A diabetic who is diet controlled has a different probability of hospital admission as compared to a diabetic patient who is on dialysis, thereby necessitating that any comparison of admission rates be risk adjusted.

Living arrangement at the time of admission

Medicare beneficiaries living in residential care facilities such as a skilled nursing facility (SNF) or nursing home generally are expected to be receiving a higher level of coordinated care than beneficiaries living at home. Many conditions such as fever, urinary tract infections, metabolic disturbances and pneumonia can often be managed in a residential care facility, thereby avoiding the need for hospitalization. Other conditions such as diseases of the skin and injuries due to falls should be more readily avoided in a residential care facility setting. In determining whether an admission is potentially preventable, PPAs apply a broader list of conditions that are considered potentially preventable when a beneficiary is living in a residential care facility.

Appendix A contains PPA research articles and studies using PPAs and Appendix B contains a more detailed description of the PPA methodology.

By assessing potential preventability based on the length of the required care coordination time period, acuteness of the reason for admission and living arrangement at the time of admission and by risk adjusting PPA rates, the hospital admissions included in the PPAs can be more comprehensive than the AHRQ ambulatory care sensitive conditions and the AHRQ PQIs. A comprehensive evaluation of potentially preventable admissions can provide a more complete assessment of the continuity of care and of the functioning of the health care delivery system within a managed care plan or geographic region.

Risk Adjusting PPAs

Clinical Risk Groups (CRGs) are a categorical clinical model that uses historical claims data to assign beneficiaries to a single mutually exclusive category that defines a beneficiary's chronic disease burden.[8] The CRGs (Version 2.1) are composed of 332 base CRGs that describe the beneficiary's most significant chronic conditions and explicit severity levels that distinguish differences in disease burden due to severity of illness resulting in 1,414 individual CRGs. The individual CRGs are aggregated into nine health statuses ranging from catastrophic to healthy.

Status 1 – Healthy
Status 2 – History of Acute Disease e.g., Chest Pain
Status 3 – Single Minor Chronic Disease e.g., Migraine
Status 4 – Minor Chronic Disease in Multiple Organ Systems e.g., Migraine and BPH
Status 5 – Single Dominant or Moderate Chronic Disease e.g., CHF
Status 6 - Dominant or Moderate Chronic Disease in Multiple Organ Systems, e.g., CHF, COPD
Status 7 - Dominant Chronic Disease in Three or More Organ Systems, e.g., CHF, COPD, DM
Status 8 - Malignancy, Under Active Treatment, e.g., Lung Cancer
Status 9 - Catastrophic Conditions, e.g., Major Organ Transplant

Based on the severity levels of the chronic conditions that comprise each status, beneficiaries in the nine statuses are assigned a severity level between one and six resulting in 53 aggregated CRG risk categories. Six of the aggregated CRGs in statuses 1 and 2 relate to pregnancy and delivery. Because this report analyzed Medicare data, the pregnancy and delivery CRGs were very low volume and were excluded from the analysis, resulting in the 47 CRG risk categories that were utilized to risk adjust the PPAs.

The CRGs are a transparent system with a definition manual available for inspection. Appendix A contains CRG research articles and studies using CRGs and Appendix C contains a more detailed description of the CRG methodology.

Interrelationship of PPAs with Other Quality Performance Measures

PPAs represent an evaluation of hospital admitting performance within a population and reflect the impact of adequate access to ambulatory care and/or the adequate coordination of ambulatory care services. Readmissions and hospital admissions through the ED primarily reflect the performance of hospitals and have a direct impact on PPA performance. While, in general, managed care plans primarily focus on and are measured on population management performance, they are highly dependent on hospital performance to achieve better overall population PPA performance. Because of this interdependence, managed care plans will often provide incentive plans to hospitals to improve hospital admission performance. Managed care plans must understand and quantify the impact of hospital performance on population performance to develop an effective incentive plan for hospitals. The interrelationship between PPAs and hospital readmissions and admissions through the ED was examined using the following two performance measures.

Potentially Preventable Readmissions (PPRs)

Potentially Preventable Readmissions (PPRs) are return hospitalizations within 30 days following a prior hospitalization.[9] PPRs may result from deficiencies in the process of care (readmission for a surgical wound infection) or inadequate post-discharge follow-up (prescription not filled) rather than unrelated events that occur post discharge (broken leg due to trauma). Readmissions may result from actions taken or omitted during the initial hospital stay, such as incomplete treatment or poor care of the underlying problem, or from poor coordination of services at the time of discharge and afterwards, such as incomplete discharge planning or inadequate access to care. The admissions considered at risk for a PPR and the clinical circumstances under which a subsequent readmission is considered potentially preventable are specified in the PPR methodology logic. The PPR designation is assigned to any admission that was followed by one or more potentially preventable readmissions during the 30 days following a hospital discharge. Appendix A contains PPR research articles and studies using PPRs.

Hospital Admissions from the ED

The ED Admit measure identifies hospital admissions that are a low-severity medical admission from the ED. Patients that died, those admitted for surgical procedures, those admitted for conditions that are inherently high risk (e.g., AMI), those at high severity and those covered by medical necessity considerations (e.g., behavioral health) are excluded from the ED Admit measure. High severity is defined using the APR DRG methodology as discussed below. The ED visits that are not excluded are the at-risk population for the ED Admit measure. For the at-risk ED visits, the ED Admit rate is the sum of ED visits that were admitted divided by the sum of ED visits that were admitted plus the ED visits that were not admitted.

Risk Adjusting PPRs and Hospital Admissions from the ED

All Patient Refined Diagnosis Related Groups (APR DRGs) are a categorical clinical model composed of base categories (base APR DRGs) that are subdivided into four severity of illness subclasses.[10] These subclasses are unique to each base APR DRG and are based on the extent of physiologic decompensation or organ system loss of function. The four severity of illness subclasses are numbered sequentially from 1 to 4 indicating respectively, minor, moderate, major, and extreme severity of illness. The combination of the base APR DRGs and the four severity of illness subclasses constitute a system of patient risk classes. The APR DRG based risk classes are exhaustive and mutually exclusive resulting in a patient being assigned to one and only one risk class.

APR DRG assignment is computed both at the time of admission and at the time of discharge. At the time of admission, the Present on Admission (POA) indicator field on the UB04 is used to exclude complications and other conditions that arise after admission from the APR DRG assignment. The POA indicator became a required reporting element for both principal and secondary diagnoses on hospital claims submitted for payment after October 1, 2007.[11] The APR DRGs and severity of illness subclasses are used for performance reporting in five U.S. states and as the basis of payment adjustments in 30 states. The APR DRG methodology is a transparent system with a full definition manual.

For the ED Admit measure, all hospital admissions from the ED are assigned to an APR DRG. The APR DRG is used to identify the at-risk ED visits (e.g., exclude surgical admissions). Admissions assigned to APR DRG severity of illness level 3 and 4 are considered high severity and are excluded from the ED Admit measure. Any comparison of PPR and ED Admit rates requires that the rates be risk adjusted. The APR DRGs are used to risk adjust PPR rates and ED Admit rates. PPRs use the APR DRG assigned at the time of discharge from the hospital admission that initiated the subsequent readmission. For ED Admit, the APR DRG assigned at the time of hospital admission from the ED is used.

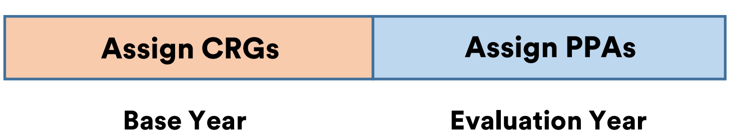
Overlap Between PPAs, PPRs and ED Admit

An admission can simultaneously be a PPA, PPR and an ED Admit. If an admission is both a PPA and a PPR (i.e., a PPA that initiates a sequence of one or more readmissions), the admission is still considered a PPA because it is likely associated with a lack of adequate access to ambulatory care and/or the adequate coordination of ambulatory care services and is a population performance issue. However, the subsequent readmissions that follow the PPA/PPR are not eligible to be a PPA because those readmissions are more likely to be associated with the care and follow-up provided by the hospital and therefore reflect a hospital performance issue. Identification of a PPA as an ED Admit does not affect the PPA or PPR assignment, but the overlap does provide useful insight into the source of some PPAs.

National and Best Practice Norms

Each Medicare beneficiary is assigned to a CRG risk class based on their disease burden, which is determined from claims history data for the year preceding the year in which PPAs are assigned, as illustrated in Figure 1.

Figure 1: CRG and PPA assignment periods



Within each CRG risk class a PPA relative weight is computed that reflects the PPA rate (frequency) and the case mix (relative costliness) of the PPAs being admitted. Thus, a higher weight for a CRG risk class can be the result of a high rate of occurrence of PPAs or that the mix of PPAs being admitted is of higher severity and therefore more costly. To determine the severity of the mix of PPAs within a CRG risk class, each PPA is assigned to an APR DRG and the standard APR DRG relative resource weights are used to measure the case mix (relative costliness) of the PPAs in the CRG risk class.

National Norm

A national norm is calculated by summing the APR DRG relative resource weights for all PPAs identified in the evaluation year within a CRG risk category—and across all beneficiaries assigned to the CRG risk category for the base year—and computing the mean value per beneficiary (referred to as the PPA national norm value). The end result is that each CRG risk class is assigned a PPA relative weight that can be used to compute expected PPA performance. The expected PPA value (E) for any subset of beneficiaries is the number of beneficiaries in each CRG risk category times the PPA norm value for the CRG risk category and summed overall CRG risk categories (indirect rate standardization).

For any subset of beneficiaries, such as beneficiaries in a specific geographic region, the PPA actual value in a CRG risk category is computed by summing all the APR DRG relative resource weights of the PPAs for beneficiaries assigned to the CRG risk category. By summing all the PPA relative resource weights across all beneficiaries across all CRG risk categories, the actual value (A) is determined. The actual value (A) represents good performance if (A-E) is negative (A<E) and poor performance if (A-E) is positive (A>E). The %(A-E)/E is the percent that actual performance is below expected (%(A-E)/E is negative) or above expected (%(A-E)/E is positive).

Best Practice Norm

In addition to the national PPA norm, this report also determined a "best practice" norm. Using the metropolitan areas identified in the Core Based Statistical Areas (CBSAs) from the Office of Management and Budget, PPA performance across metropolitan areas was examined. Using the national norm, the (A/E) for each CBSA with at least 1,500 beneficiaries is used to determine the subset of CBSAs with the best PPA performance and that constitutes 40 percent of the beneficiaries in the Medicare FFS population sample included in the analysis. This subset of CBSAs is referred to as the PPA best practice CBSAs. For the PPA best practice CBSAs, the overall A/E is computed. The A/E ratio for the PPA best practice CBSAs is less than one and is a measure of the level of relative performance achieved by PPA best practice hospitals. For example, an A/E ratio of 0.8 for the PPA best practice CBSAs means that in these CBSAs, the PPA performance is 20 percent (1 - 0.8) lower than would be expected compared to all CBSAs. The value of the PPA relative weight in each CRG risk category in the PPA national norm is multiplied by the A/E ratio for the PPA best practice CBSAs to create a PPA best practice norm. Rather than selecting an arbitrary performance percentile as a best practice norm, using a PPA best practice norm created in this way represents a performance level that is actually being achieved in a substantial number of geographic areas and represents an achievable performance improvement level.

PPA Financial Impact

A PPA financial conversion factor is computed based on allowed Medicare payments (the amount actually paid by Medicare). The financial conversion factor is used to express PPA actual performance (A) and PPA expected performance (E) in financial terms so that the financial impact of a PPA performance difference (A-E) can be determined. By comparing the financial impact of PPAs at the level of each clinically meaningful CRG risk category, the clinical and financial aspects of care are linked, which can facilitate behavior change and performance improvement initiatives.

The Medicare savings estimated in this report is conservative because it is based solely on the (A-E) difference. Thus, the underlying rate of PPAs as measured by E is accepted as a baseline level of underlying quality performance and only the PPA (A-E) difference is viewed as the basis for potential savings. The magnitude of the PPA (A-E) differences is directly related to the level of variation in PPAs across geographic regions. The greater the variation in PPAs across geographic regions, the greater the opportunity for savings. Thus, if there is little variation in PPAs across geographic regions, this analysis will conclude there is little opportunity for improvement and savings, essentially accepting the status quo as an acceptable level of performance.

Data

The study used data in the Medicare Standard Analytic Files (Limited Data Set (LDS)) for calendar year 2017 and 2018. The LDS files contain 100 percent of Medicare fee-for-service (FFS) claims data for inpatient, outpatient, skilled nursing facilities and home health agencies. The LDS carrier file contains Medicare FFS claims data for professional providers, including physicians, physician assistants, clinical social workers, and nurse practitioners for a random sample of five percent of Medicare beneficiaries. The LDS Master Beneficiary Summary File (MBSF) contains enrollment data on all Medicare beneficiaries enrolled in or entitled to Medicare within a given calendar year.

> By comparing the financial impact of PPAs at the level of each clinically meaningful CRG risk category, the clinical and financial aspects of care are linked, which can facilitate behavior change and performance improvement initiatives.

To identify the burden of chronic disease and to assign CRGs, it was necessary to build a complete longitudinal record of all FFS claims for each Medicare beneficiary. Because the LDS carrier file was limited to a five percent sample of Medicare beneficiaries, the data in this study was limited to the beneficiaries in the LDS carrier file. The carrier file is a sample across all types of beneficiaries including beneficiaries in Medicare Advantage plans. To create a sample of FFS beneficiaries, the following edits were applied:

- Exclude beneficiaries who were not enrolled in both Part A and B for the full two-year time period (i.e., newly enrolled, disenrolled or reported died)
- Exclude beneficiaries who were enrolled in a managed care plan for one or more months
- Exclude beneficiaries who were enrolled in hospice

Calendar year 2017 was used to assign the CRG to each beneficiary and calendar year 2018 was used to assign the PPAs to each beneficiary. After these exclusions were applied, there were 1,388,114 beneficiaries in the analysis data.

PPA Results by Risk Categories

For the 1,388,114 beneficiaries, there were 379,841 hospital admissions of which 85,974 were a PPA (22.6 percent of admissions). Based on each beneficiary's claim history from 2017, beneficiaries were assigned to one of 47 CRG risk categories. Beneficiaries in each CRG risk category who had a PPA were identified using the 2018 data. Beneficiaries assigned to CRG status 3-9 all had at least one chronic disease. Table 1 contains summary data by CRG risk category for the beneficiaries with at least one chronic disease.

Table 1: PPA data by CRG risk category for beneficiaries with at least one chronic disease

			Severity Level					
	CRG Status		1	2	3	4	5	6
3	Single Minor Chronic Disease	Beneficiaries	65,271	15,539				
		Admissions	5,328	1,885				
		PPAs	747	256				
		PPAs/1,000	11.44	16.47				
		Days/PPA	3.74	3.90				
		PPA APR CMI	1.3272	1.2890				
		PPA Weight	0.0165	0.0247				
		PPA $ Weight	201.23	301.24				
4	Minor Chronic Disease in Multiple Organ Systems	Beneficiaries	29,906	15,467	21,184	6,120		
		Admissions	2,416	1,359	2,583	877		
		PPAs	311	144	352	125		
		PPAs/1,000	10.40	9.31	16.62	20.42		
		Days/PPA	3.43	3.36	3.38	4.18		
		PPA APR CMI	1.4411	1.3754	1.3251	1.0413		
		PPA Weight	0.0172	0.0172	0.0227	0.0274		
		PPA $ Weight	209.77	209.77	276.85	334.17		
5	Single Dominant or Moderate Chronic Disease	Beneficiaries	188,238	92,835	51,829	19,500	5,672	304
		Admissions	23,015	15,360	10,742	6,041	2,129	84
		PPAs	3,628	2,829	2,094	1,235	453	15
		PPAs/1,000	19.27	30.47	40.40	63.33	79.87	49.34
		Days/PPA	3.65	3.79	4.27	4.49	4.75	3.00
		PPA APR CMI	1.2144	1.2213	1.2527	1.1958	1.0994	0.9293
		PPA Weight	0.0259	0.0425	0.0536	0.0838	0.1092	0.1092
		PPA $ Weight	315.88	518.33	653.71	1,022.02	1,331.80	1,331.80
6	Dominant or Moderate Chronic Disease in Multiple Organ Systems	Beneficiaries	131,904	116,473	98,172	78,452	54,610	36,839
		Admissions	20,941	26,619	28,813	30,694	28,315	27,623
		PPAs	4,066	5,564	6,157	7,238	7,003	7,045
		PPAs/1,000	30.83	47.77	62.72	92.26	128.24	191.24
		Days/PPA	3.78	4.01	3.97	4.14	4.29	4.59
		PPA APR CMI	1.3460	1.2248	1.2000	1.1119	1.0491	1.0353
		PPA Weight	0.0456	0.0649	0.0860	0.1186	0.1584	0.2442
		PPA $ Weight	556.14	791.52	1,048.86	1,446.45	1,931.85	2,978.26
7	Dominant Chronic Disease in Three or More Organ Systems	Beneficiaries	27,445	31,652	17,434	14,431	13,916	17,017
		Admissions	8,245	16,226	12,481	13,170	15,760	27,664
		PPAs	2,010	4,592	3,459	3,778	4,538	7,997
		PPAs/1,000	73.24	145.08	198.41	261.80	326.10	469.94
		Days/PPA	4.49	4.28	4.42	4.64	4.74	5.25
		PPA APR CMI	1.0812	1.0696	1.0456	1.0709	1.0341	1.0858
		PPA Weight	0.0935	0.1808	0.2389	0.3355	0.4241	0.6722
		PPA $ Weight	1,140.33	2,205.04	2,913.62	4,091.76	5,172.32	8,198.15
8	Malignancy under Active Treatment	Beneficiaries	3,205	3,975	4,156	2,170	542	
		Admissions	803	1,648	2,405	1,928	602	
		PPAs	129	308	477	451	138	
		PPAs/1,000	40.25	77.48	114.77	207.83	254.61	
		Days/PPA	3.86	4.18	4.29	4.62	4.41	
		PPA APR CMI	1.0897	1.0559	1.0547	0.9649	0.9819	
		PPA Weight	0.0563	0.0882	0.1285	0.2163	0.3363	
		PPA $ Weight	686.63	1,075.69	1,567.19	2,637.99	4,101.51	
9	Catastrophic Conditions	Beneficiaries	977	2,379	2,664	3,702	7,341	7,037
		Admissions	233	862	1,430	3,394	7,406	13,885
		PPAs	34	172	300	853	1,557	3,135
		PPAs/1,000	34.80	72.30	112.61	230.42	212.10	445.50
		Days/PPA	3.00	4.27	4.32	5.45	4.46	4.84
		PPA APR CMI	0.8330	1.1204	1.0206	1.2429	1.2299	1.2568
		PPA Weight	0.0612	0.0867	0.1555	0.3259	0.3259	0.7411
		PPA $ Weight	746.40	1,057.39	1,896.48	3,974.68	3,974.68	9,038.46

There is a 50-fold difference in the number of PPAs per 1000 beneficiaries across CRG risk category ranging from 9.31 to 469.94. The bed days per PPA (average LOS) varies from 3.00 days to 5.45 with a general increase at the higher statuses and severity levels. Using standard relative resource weights available with the APR DRGs, a case mix index (CMI) was computed for the PPAs in each CRG risk class. While the APR DRG CMI varied from 0.83 to 1.44, the APR DRG CMI tended to be higher for the lower statuses and lower severity levels. This means that at the higher CRG statuses and severity levels, beneficiaries tend to be more frequently admitted for less serious conditions and tend to stay longer in the hospital than expected. This pattern may reflect a tendency to treat beneficiaries with a high chronic illness burden more conservatively resulting in more admissions and bed days for less serious reasons for admission.

In general, PPAs tend to be admissions for less serious conditions. The overall APR DRG CMI across all admissions is 1.31 and for PPAs is 1.14. This is expected because most surgical admissions and most admissions for extreme acute events like an AMI are not a PPA.

The PPA relative weight for each CRG risk category reflects the combined impact of the frequency of admission and the relative costliness of the PPAs being admitted. The relative expected costliness of PPAs in each CRG risk category is determined by multiplying the PPA relative weight by the financial conversion factor of $12,196. The product of the number of admissions in each CRG risk category and the PPA relative expected costliness for the CRG risk category summed over all CRG risk categories determines the expected PPA cost for any subset of beneficiaries.

At the higher CRG statuses and severity levels, beneficiaries tend to be more frequently admitted for less serious conditions and tend to stay longer in the hospital than expected. This pattern may reflect a tendency to treat beneficiaries with a high chronic illness burden more conservatively resulting in more admissions and bed days for less serious reasons for admission.

Table 2 contains summary data by CRG risk category for beneficiaries who do not have a chronic disease. Status 1 is for beneficiaries who are healthy and have no significant acute diseases in their history. Healthy nonusers with no significant contact with the health care system and healthy beneficiaries who had a mention of a chronic disease in their history but no subsequent treatment (potentially a rule out diagnosis) are assigned to separate CRGs. Across these three healthy Status 1 CRG categories, the PPAs per 1,000 varied from 11.23 to 19.02.

There are four CRG risk categories in Status 2 for beneficiaries with a history of acute disease. The four significant acute CRG risk categories are for beneficiaries with significant acute disease, multiple or reoccurring significant disease, major trauma or major acute disease and significant acute disease with a mention of a chronic disease in their history but no subsequent treatment. Across these four significant acute Status 2 CRG categories, the PPAs per 1,000 varied from 13.79 to 22.43. While the variation in PPA/1,000 for status 1 and 2 was modest, status 1 and 2 had 199,756 of the beneficiaries (14.4 percent) and 2,784 of the PPAs (3.2 percent).

Table 2: PPA data by CRG risk category for beneficiaries with no chronic diseases

CRG Status			
1	Healthy	Beneficiaries	67,482
		Admissions	4,881
		PPAs	758
		PPAs/1,000	11.23
		Days/PPA	4.20
		PPA APR CMI	1.2185
		PPA Weight	0.0155
		PPA $ Weight	189.04
1	Healthy Nonuser	Beneficiaries	79,613
		Admissions	6,475
		PPAs	1,086
		PPAs/1,000	13.64
		Days/PPA	5.16
		PPA APR CMI	1.3370
		PPA Weight	0.0196
		PPA $ Weight	239.04
1	Healthy with Unconfirmed Chronic Disease	Beneficiaries	20,921
		Admissions	2,314
		PPAs	398
		PPAs/1,000	19.02
		Days/PPA	4.44
		PPA APR CMI	1.1859
		PPA Weight	0.0281
		PPA $ Weight	342.71
2	Multiple or Reoccurring Significant Acute Disease	Beneficiaries	6,187
		Admissions	446
		PPAs	86
		PPAs/1,000	13.90
		Days/PPA	3.69
		PPA APR CMI	1.1484
		PPA Weight	0.0164
		PPA $ Weight	200.01
2	Significant Acute Disease	Beneficiaries	13,124
		Admissions	1,119
		PPAs	86
		PPAs/1,000	13.90
		Days/PPA	3.69
		PPA APR CMI	1.1484
		PPA Weight	0.0178
		PPA $ Weight	217.09
2	Major Trauma Or Major Acute Disease	Beneficiaries	2,363
		Admissions	387
		PPAs	53
		PPAs/1,000	22.43
		Days/PPA	3.68
		PPA APR CMI	0.8607
		PPA Weight	0.0238
		PPA $ Weight	290.26
2	Significant Acute Disease With Unconfirmed Chronic Disease	Beneficiaries	10,066
		Admissions	1,253
		PPAs	222
		PPAs/1,000	22.05
		Days/PPA	3.72
		PPA APR CMI	1.2039
		PPA Weight	0.0295
		PPA $ Weight	359.78

PPA Results by Geographic Region

PPA %(A-E)/E and $(A-E) by Census Region

Table 3 contains the PPA %(A-E)/E and $(A-E) by census region for the national norm and best practice norm. Across census regions the PPAs/1,000 beneficiaries ranged from 42.9 for the mountain census region to 70.32 for the east south central census region. The %(A-E)/E with the national norm ranged from 13.20 percent below expected for the mountain census region to 6.6 percent above expected for the east north central census region. The %(A-E)/E with the best practice norm ranged from 0.30 percent below expected for the mountain census region to 22.43 percent above expected for the east north central census region.

To achieve best practice across all regions, overall PPA performance would need to improve by 14.85 percent, which would generate $154.5 million in reduced Medicare expenditures. The 1,388,114 beneficiaries in the analysis data represent 3.59 percent of the 38,665,082 Medicare FFS beneficiaries in 2018.[12] Extrapolating the reduction in Medicare expenditures from these beneficiaries to the full Medicare FFS population results in an estimated annual reduction of Medicare expenditures of $4.3 billion, assuming PPA performance is improved by the 14.85 percent needed to achieve best practice nationally. It is important to keep in mind the $4.3 billion represents a reduction in expenditures from achieving best practice $(A-E). The 85,974 PPAs represent $1.2 billion in Medicare expenditures ($A) which extrapolated to the full Medicare FFS population is $33.3 billion. While the $33.3 billion reflect Medicare expenditures associated with PPAs, only the $4.3 billion reduction is viewed as achievable in the short term. Approximately one-third of Medicare beneficiaries are enrolled in a Medicare Advantage (MA) Plan. The PPA performance in MA plans may differ from Medicare FFS so MA plan beneficiaries are not included in the estimated PPA reduction in Medicare expenditures.

Table 3: PPA %(A-E)/E and $(A-E) by Census Region

Region		Count Benef	Count PPAs	PPAs per 1000 Benef	%(A-E)/E PPA Nat Norm	%(A-E)/E PPA BP Norm	PPA $(A-E) Nat Norm (000)	PPA $(A-E) BP Norm (000)
New England	ME, VT, NH, CT, MA, RI	78,205	5,059	64.69	-2.08	12.46	-1,364	7,121
Middle Atlantic	NY, NJ, PA	174,276	11,568	66.38	1.04	16.04	1,592	21,456
South Atlantic	FL, GA, SC, NC, VA, WV, DC, MD, DE	305,134	19,113	62.64	0.70	15.66	1,880	36,532
E North Central	IL, WI. MI, IN. OH	212,275	14,618	68.86	6.60	22.43	12,525	37,050
E South Central	KY, TN, AL, MS	97,793	6,877	70.32	3.41	18.77	2,993	14,342
W South Central	TX, OK, AR, LA	148,401	9,885	66.61	4.02	19.47	5,387	22,698
W North Central	MN, IA, MO, KS, NE, SD, ND	100,994	6,237	61.76	1.84	16.96	1,532	12,311
Mountain	AZ, NM, UT, CO, NV, WY, ID, MT	96,064	4,043	42.09	-13.20	-0.30	-9,629	-194
Pacific	CA, OR, WA, HI, AK	174,972	8,574	49.00	-10.65	2.62	-14,915	3,199
TOTAL		1,388,114	85,974	61.94	0.00	14.85	0	154,514

PPA %(A-E)/E and $(A-E) by State

Table 4 contains the PPA %(A-E)/E and $(A-E) by state for the national norm and best practice norm. The PPAs/1,000 beneficiaries ranged from 24.9 for Hawaii to 77.1 for Louisiana. The %(A-E)/E with the national norm ranged from 41.37 percent below expected for Hawaii to 28.54 percent above expected for Arkansas. The %(A-E)/E with the best practice norm ranged from 32.66 percent below expected for Hawaii to 47.62 percent above expected for Arkansas.

Table 4: PPA %(A-E)/E and $(A-E) by State

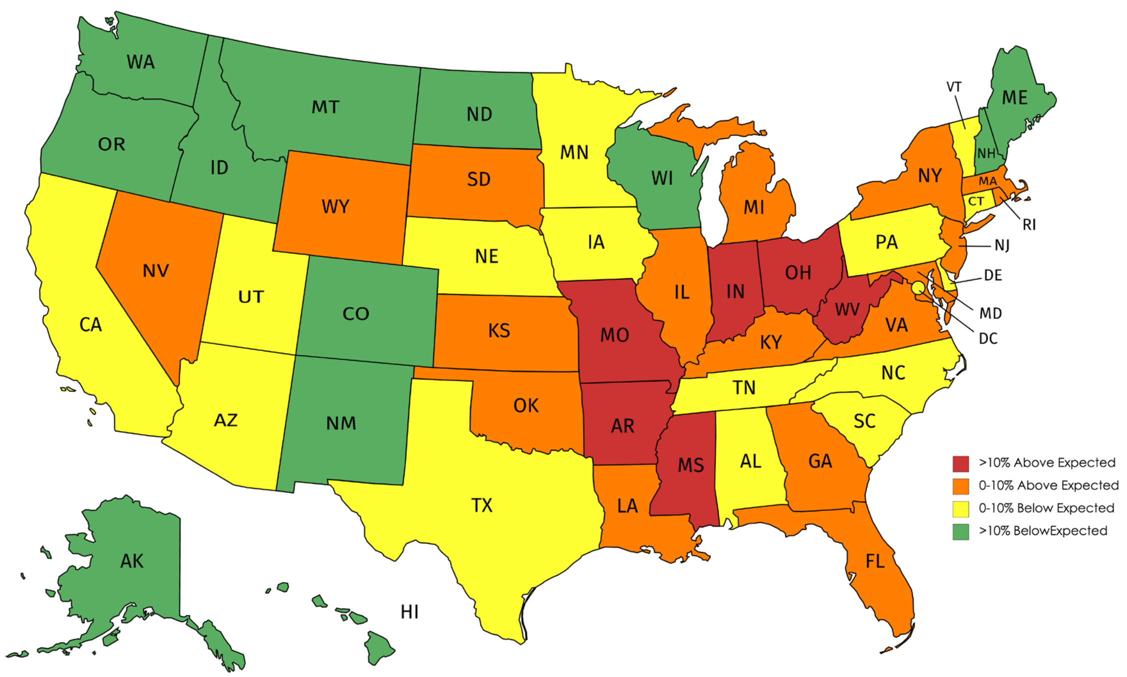
State	Count Benef	Count PPAs	PPAs per 1000 Benef	%(A-E)/E PPA Nat Norm	%(A-E)/E PPA BP Norm	$(A-E) PPA Nat Norm	$(A-E) PPA BP Norm
Alabama	23,675	1,641	69.31	-0.17	14.65	-36,868	2,727,524
Alaska	3,451	108	31.30	-22.55	-11.05	-530,889	-226,531
Arizona	28,123	1,175	41.78	-9.66	3.76	-2,079,309	705,052
Arkansas	18,214	1,255	68.90	28.54	47.62	4,221,112	6,133,685
California	117,877	6,418	54.45	-6.40	7.51	-6,273,495	6,410,243
Colorado	19,223	720	37.46	-20.59	-8.80	-2,982,488	-1,109,843
Connecticut	14,634	911	62.25	-7.54	6.20	-999,917	715,885
Delaware	6,878	440	63.97	-1.29	13.37	-76,723	691,636
DC	2,475	158	63.84	-6.02	7.93	-139,515	160,014
Florida	92,161	6,331	68.70	1.26	16.30	1,079,425	12,123,494
Georgia	38,527	2,483	64.45	1.07	16.08	368,458	4,806,034
Hawaii	4,573	114	24.93	-41.37	-32.66	-1,462,204	-1,005,195
Idaho	8,253	301	36.47	-19.87	-7.96	-1,243,747	-434,202
Illinois	59,705	4,366	73.13	9.42	25.66	4,889,734	11,604,882
Indiana	33,376	2,399	71.88	10.64	27.07	3,197,630	7,082,246
Iowa	19,369	1,008	52.04	-9.03	4.48	-1,398,225	604,782
Kansas	16,784	1,075	64.05	5.24	20.87	705,514	2,445,295
Kentucky	24,386	1,787	73.28	3.80	19.21	855,654	3,768,621
Louisiana	20,150	1,554	77.12	9.29	25.52	1,795,574	4,293,812
Maine	8,616	401	46.54	-16.10	-3.64	-1,093,884	-215,527
Maryland	32,329	1,987	61.46	2.61	17.85	717,605	4,275,276
Massachusetts	36,477	2,712	74.35	6.59	22.42	2,070,316	6,133,272
Michigan	45,595	3,139	68.85	4.04	19.49	1,738,087	7,298,814
Minnesota	14,387	808	56.16	-7.88	5.80	-948,116	607,135
Mississippi	18,922	1,435	75.84	14.26	31.23	2,377,027	4,531,692
Missouri	30,072	2,231	74.19	14.78	31.83	3,991,268	7,482,111
Montana	6,784	270	39.80	-20.96	-9.23	-997,135	-382,088
Nebraska	11,224	617	54.97	-5.47	8.57	-471,139	643,024
Nevada	11,432	648	56.68	0.08	14.94	7,174	1,226,875
New Hampshire	9,480	487	51.37	-18.81	-6.75	-1,338,470	-418,308
New Jersey	44,306	2,933	66.20	1.66	16.76	654,102	5,745,736
New Mexico	9,431	373	39.55	-27.40	-16.62	-1,955,110	-1,032,630
New York	73,425	4,876	66.41	2.46	17.68	1,568,093	9,802,926
North Carolina	48,553	2,867	59.05	-3.47	10.86	-1,476,760	4,018,381
North Dakota	4,079	224	54.92	-11.25	1.93	-349,646	52,197
Ohio	48,376	3,382	69.91	11.97	28.60	5,287,637	10,998,705
Oklahoma	21,991	1,419	64.53	2.26	17.45	445,818	2,996,599
Oregon	16,311	674	41.32	-11.05	2.16	-1,322,841	224,711
Pennsylvania	56,545	3,759	66.48	-1.25	13.42	-630,071	5,907,083
Rhode Island	3,902	275	70.48	7.04	22.94	239,345	678,753
South Carolina	29,366	1,526	51.96	-4.25	9.96	-1,003,090	2,045,445
South Dakota	5,079	274	53.95	0.06	14.92	2,124	476,951
Tennessee	30,810	2,014	65.37	-0.75	13.99	-202,701	3,313,891
Texas	88,046	5,657	64.25	-1.34	13.31	-1,075,957	9,273,909
Utah	8,651	348	40.23	-8.57	5.00	-556,272	282,673
Vermont	5,096	273	53.57	-6.66	7.20	-241,529	227,206
Virginia	43,229	2,506	57.97	3.57	18.95	1,270,442	5,875,288

State	Count Benef	Count PPAs	PPAs per 1000 Benef	%(A-E)/E PPA Nat Norm	%(A-E)/E PPA BP Norm	$(A-E) PPA Nat Norm	$(A-E) PPA BP Norm
Washington	32,760	1,260	38.46	-22.06	-10.49	-5,325,206	-2,204,467
West Virginia	11,616	815	70.16	10.55	26.97	1,139,722	2,535,972
Wisconsin	25,223	1,332	52.81	-12.61	0.36	-2,588,152	64,910
Wyoming	4,167	208	49.92	6.16	21.92	177,600	550,501

Figure 2 is a U.S. map with the %(A-E)/E for the national norm by state color coded as follows:

Green: %(A-E)/E >10% below expected – 12 states
Yellow: %(A-E)/E 0-10% below expected – 16 states
Orange: %(A-E)/E 0-10% above expected – 17 states
Red: %(A-E)/E >10% above expected – 6 states

Figure 2: PPA %(A-E)/E performance by state



Wide PPA performance variation is not only across states but also within states. The state of residency of the beneficiary data was used to assign beneficiaries to a state in Table 4. Using the metropolitan areas identified in the Core Based Statistical Areas (CBSAs) from the Office of Management and Budget, Appendix E contains PPA %(A-E)/E and $(A-E) for the national norm and best practice for each CBSA with at least 1,000 beneficiaries in the analysis database. Some CBSAs encompass multiple states. For example, the Philadelphia metropolitan area encompasses parts of New Jersey, Delaware and Maryland. When a CBSA encompassed more than one state, the CBSA in Appendix E was assigned to the primary state associated with the CBSA (the Philadelphia metropolitan area was assigned to Pennsylvania).

Table 5 contains the seven largest CBSAs in Florida. The PPA performance of the Miami and Tampa CBSAs is relatively consistent with the overall Florida state performance of 1.26 percent above expected for the PPA national norm. However, the Orlando and Jacksonville CBSAs have PPA performance well above expected (18.54 and 8.08 percent above expected for the PPA national norm) while the North Port/Sarasota, Cape Coral/Fort Myers and Deltona/Daytona Beach CBSAs have PPA performance well below expected (26.00, 9.78 and 23.22 percent below expected for the PPA national norm)

Table 5: PPA %(A-E)/E and $(A-E) for the seven largest CBSAs in Florida

CBSA	Count Benef	Count PPAs	PPAs per 1000 Benef	%(A-E)/E PPA Nat Norm	%(A-E)/E PPA BP Norm	PPA $(A-E) Nat Norm	PPA $(A-E) BP Norm
Florida	92,161	6,331	68.70	1.26	16.30	1,079,425	12,123,494
Miami-Fort Lauderdale-West Palm Beach	16,543	1,383	83.57	2.95	18.24	483,221	2,600,979
Tampa-St. Petersburg-Clearwater	11,547	982	85.02	2.38	17.58	278,229	1,790,407
Orlando-Kissimmee-Sanford	7,859	749	95.31	18.54	36.14	1,428,600	2,425,079
Jacksonville	6,999	580	82.81	8.08	24.13	528,718	1,374,349
North Port-Sarasota-Bradenton	6,535	320	49.00	-26.00	-15.01	-1,372,219	-689,799
Cape Coral-Fort Myers	4,825	299	61.93	-9.78	3.62	-394,988	127,275
Deltona-Daytona Beach-Ormond Beach	3,563	199	55.78	-23.22	-11.82	-733,138	-324,908

PPA Frequency

Table 6 contains the APR DRG assigned to the 23 PPAs comprising at least one percent of the PPAs. As expected, the highest volume PPAs are for medical management of chronic diseases (heart failure, COPD) and acute diseases (non-bacterial pneumonia and urinary tract infections). Spinal procedures and cardiac catheterization were the most frequent PPAs for admissions related to procedures.

Table 6: APR DRG of the 23 PPAs comprising at least one percent of the PPAs

	APR DRG of PPA	Count	Percent
194	HEART FAILURE	14,780	17.2
139	OTHER PNEUMONIA	10,196	11.9
140	CHRONIC OBSTRUCTIVE PULMONARY DISEASE	8,436	9.8
463	KIDNEY & URINARY TRACT INFECTIONS	7,530	8.8
304	DORSAL & LUMBAR FUSION PROC EXCEPT FOR CURVATURE OF BACK	3,899	4.5
720	SEPTICEMIA & DISSEMINATED INFECTIONS	2,914	3.4
192	CARDIAC CATHETERIZATION FOR NON-CORONARY CONDITIONS	2,823	3.3
249	OTHER GASTROENTERITIS, NAUSEA & VOMITING	2,739	3.2
113	INFECTIONS OF UPPER RESPIRATORY TRACT	2,199	2.6
254	OTHER DIGESTIVE SYSTEM DIAGNOSES	2,055	2.4
422	HYPOVOLEMIA & RELATED ELECTROLYTE DISORDERS	1,992	2.3
199	HYPERTENSION	1,842	2.1
53	SEIZURE	1,838	2.1
166	CORONARY BYPASS W/O AMI OR COMPLEX PDX	1,709	2.0
420	DIABETES	1,447	1.7
198	ANGINA PECTORIS & CORONARY ATHEROSCLEROSIS	1,321	1.5
144	RESPIRATORY SIGNS, SYMPTOMS & MINOR DIAGNOSES	1,312	1.5
175	PERCUTANEOUS CORONARY INTERVENTION W/O AMI	1,292	1.5
383	CELLULITIS & OTHER SKIN INFECTIONS	990	1.2
351	MUSCULOSKELETAL SYSTEM & CONNECTIVE TISSUE DIAGNOSES	964	1.1
203	CHEST PAIN	943	1.1
141	ASTHMA	858	1.0

Overlap Between PPAs, PPRs and ED Admits

Of the 1,388,114 beneficiaries, 227,138 had one or more hospital admissions (16.4 percent), resulting in a total of 379,841 admissions. 17,032 of those admissions were considered potentially preventable readmissions based on PPRs and were not eligible to be a PPA, resulting in 362,809 admissions being eligible to be a PPA. Of the 379,841 admissions:

- 85,974 admissions are a PPA (22.6 percent)
- 25,370 are an admission that initiated one or more readmissions (6.7 percent)
- 69,611 are low severity medical admissions from the ED (18.3 percent)

Any admission can simultaneously be a PPA, PPR and/or an ED Admit. The Venn diagram in Appendix D contains the details of the overlap among PPAs, PPRs and ED admits. Of the 85,974 PPAs:

- 42,314 are only a PPA (49.2 percent)
- 7,739 are a PPA that is followed by one or more PPRs (9.0 percent)
- 26,243 are both a PPA and an ED Admit (30.5 percent)
- 1,992 are a PPA, an ED Admit and are followed by one or more PPRs (2.3 percent)

The overlap among PPAs, PPRs and ED Admits is important because it can help focus quality improvement efforts. For example, the 7,739 PPAs that are followed by one or more PPRs results in 9,982 additional readmissions, which substantially increases the downstream impact of the initial PPA. Quality improvement initiatives need to focus on preventing the PPA admission as well as preventing the subsequent readmissions.

The 26,243 admissions that are both a PPA and an ED Admit require a focus on the admission criteria in the ED for low severity medical admissions. Since the overlap between PPAs and low severity medical admissions through the ED (30.5 percent) is so substantial, any quality improvement initiative directed at lowering the hospital PPA rate in a population of Medicare beneficiaries should evaluate ED admission performance and practices.

To illustrate the relationship between PPAs, PPRs and ED Admits, the %(A-E)/E was computed for PPRs and ED Admits for 2018 using all hospitalization from 2018 and not just the hospitalizations in the 5 percent analysis data.

Table 6 contains the %(A-E)/E for PPAs, PPRs and ED Admits by state. The state assignment for PPAs may differ slightly from the state assignment for PPRs and ED Admits; for PPAs the state is assigned based on the state of residence of the beneficiary, but for PPRs and ED Admits the state is assigned based on the location of the hospital. The %(A-E)/E for PPAs, PPRs and ED Admits across states are correlated as follows:

		Correlation
PPAs	PPRs	0.694
PPAs	ED Admits	0.566
PPRs	ED Admits	0.763

The significant correlation among PPA, PPR and ED Admit performance across states indicates that hospital performance on PPRs and ED Admits impacts the PPA performance of the Medicare population in a state. PPA, PPR and ED Admit performance provide insights into the functioning of the health care delivery system in a state and illustrates the interdependence of these performance measures.

Summary and Conclusions

The 1,388,114 beneficiaries in the analysis database had 379,841 hospital admissions of which 85,974 were a PPA (22.6 percent of admissions). The 85,974 PPAs represent $33.3 billion in annual FFS Medicare expenditures. If PPA best practice was achieved nationally, overall PPA performance would need to improve by 14.85 percent, which would result in an annual reduction in Medicare expenditures of $4.3 billion (12.9 percent of the $33.3 billion in PPA expenditures).

There was significant PPA performance variation across census regions, states and CBSAs. Across states, PPA performance based on a national norm varied from 32.66 percent below expected for Hawaii to 47.62 percent above expected for Arkansas. Nine percent of the PPAs were followed by one or more readmissions (PPRs), 30.5 percent of PPAs were a low severity medical admission through the ED and 2.3 percent of PPAs were a low severity medical admission through the ED that was followed by one or more readmissions. Across states PPR and ED Admit performance (%(A-E)/E) was associated with PPA performance with a PPA/PPR performance correlation of 0.694 and a PPA/ED Admit performance correlation of 0.566.

PPA performance is an effective measure of delivery system performance in a managed care plan or geographic region. The extent of PPA performance variation across states indicates there are PPA performance improvement opportunities in many geographic areas. The interdependence of PPAs with PPRs and ED Admits can provide useful insights for targeted quality improvement initiatives aimed at reducing PPAs.

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Appendix A: Bibliography of Publicly Available Articles and Reports on PPAs, CRGs, PPRs, APR DRGs

All articles and reports are publicly available and are listed in chronological order. The opinions and conclusions in these articles and reports are solely those of the authors.

Potentially Preventable Admissions (PPAs)

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Appendix B: Potentially Preventable Admissions (PPAs)

This Appendix gives an overview of the Potentially Preventable Admissions (PPAs), a methodology that can be used to determine the amount of variability in hospital admissions and to estimate the potential magnitude of avoidable hospitalizations.

Assign APR DRG

Each inpatient admission is assigned to an All Patient Refined Diagnosis Related Group (APR DRG). APR DRGs classify patients according to their reason for admission and severity of illness.[1] APR DRGs assign patients to a 'base APR DRG' that is determined either by the principal diagnosis, or, for surgical patients, the most important surgical procedure performed in an operating room. The base APR DRG represents the underlying reason for the hospital admission and is used in the PPA logic to identify patients that had candidate PPA events.

Determine if reason for the inpatient admission is an ambulatory care sensitive condition

Hospital admissions make a large contribution to rising healthcare costs. To the extent that hospital care can be shortened, shifted to the outpatient setting, or eliminated altogether, the cost of healthcare can be reduced.

PPAs are hospital admissions for conditions and procedures that could potentially have been dealt with in the outpatient setting. Many PPAs result from inefficiency, lack of adequate access to outpatient care, or inadequate coordination of ambulatory care services. In many cases PPAs are for flare-ups of chronic conditions (e.g., asthma) for which adequate monitoring and follow-up, such as proper medication management, could have avoided. As such, the occurrence of high rates of PPAs within a region or a healthcare system may represent a failure of the ambulatory care system.

Inadequate care leading to preventable hospitalizations can occur among individuals living at home and not participating in an integrated delivery system, or among those cared for in a longer term primary care relationship, such as a capitation-based program, accountable care organization, or medical home. Integrated delivery systems should be better able to provide adequate access and coordination over a period of several years and therefore could be expected to have an impact on the rate of hospitalizations for long-term complications, such as chronic renal failure, vision loss, and vascular disease in diabetic patients. In the absence of such long-term arrangements, only acute complications (e.g. asthma) or potentially preventable interventions (such as back procedures for disc rupture) that would not have required years of good quality care might be expected to be preventable.

Studies have documented not only that preventable hospitalizations exist, but also that they can be reduced by specific interventions. Guidelines implemented in nursing homes have been shown to decrease the rate of hospital admissions.[2] Patients with COPD with higher continuity of care have been shown to have a significantly lower likelihood of avoidable hospitalization.[3]

The PPA list of 3M™ All Patient Refined Diagnosis Related Groups (APR DRGs) considered as ambulatory sensitive conditions is more comprehensive than the Agency for Healthcare Research and Quality (AHRQ) list of Prevention Quality Indicators (PQIs). PPAs focus on the potentially preventable aspect and are a fairer representation because they exclude those admissions that are not preventable without years of coordinated and integrated care. For example, surgery for vascular complications of diabetes (e.g., amputations) are not included because they are not preventable unless appropriate care is given for several years before the admission. These surgeries, in particular, consume significant dollars but neither newly initiated managed care nor can hospitals under any circumstances be held responsible for these procedures. The rate of PPAs are adjusted for the complexity of the patient population whereas the AHRQ Prevention Quality Indicators (PQIs)[4] include all patients admitted with diabetes irrespective of the severity of the patient. It is clear that a diabetic who is diet controlled has a different probability of hospital admission as compared to a diabetic patient who is on dialysis.

There are two aspects of the increased comprehensiveness of the PPAs: a larger number of diagnoses that are similar to each other (the PPAs consist of similar diagnoses within a specific APR DRG) and a longer list of conditions (e.g., spinal surgery, which is frequently avoidable with medical treatment). In addition, PPAs are more comprehensive than the PQIs in large part because of advances in our understanding of the role coordinated care can play in avoiding admissions together with an appreciation of the fact that the preventability of these admissions should be adjusted for the overall burden of illness of the individual patient. Further, as described below, a focus on identifying excess PPAs by comparing risk adjusted rates of PPAs across providers allows a wider range of conditions to be identified as a PPA. PPA-based initiatives are readily suited for scaling should healthcare entities, such as Accountable Care Organizations (ACOs), with the full responsibility for coordination and preventive services become more commonplace.

Further, 3M PPAs evaluate at the diagnosis codes within an APR DRG as preventable or not preventable. For example, cardiac catheterization is considered potentially preventable for patients with a diagnosis of coronary atherosclerosis, but not preventable for patients with an acute myocardial infarction or unstable angina.

In summary, the following PQIs have limited utilization in the PPA algorithm:

- **Long term diabetes complications.** While in the long term these conditions could be included in the PPA list, they should not be included in the initial efforts as decrease in these admissions pertain to care that has occurred for years (not just one) before this admission. These are considered to be potentially preventable in settings of integrated or accountable care.
- **Lower extremity amputation among patients with diabetes.** Same as previous indicator. These are considered to be potentially preventable in settings of integrated or accountable care.
- **Perforated appendix.** While perforated (vs. non perforated) appendix does represent an issue pertaining to access to appropriate outpatient services, there are few dollars that can be saved here as these individuals would have had, in any event, an appendectomy.
- **Low birth weight infants.** The empirical data is not as well developed for this indicator.[5] This indicator could be added over time and is especially relevant for outcomes management for Medicaid Managed Care organizations, medical homes/accountable care organizations that provide prenatal care.

The following PPAs are not included in the Prevention Quality Indicators (PQI) list. A summary of the literature providing support for the inclusion of each PPA is appended.

- **Seizures.** Recent studies have shown that non-adherence to medication, which could be corrected for many individuals with closer follow-up and better education, appears to be associated with serious outcomes, increased utilization and costs of inpatient and Emergency Department (ED) services.[6]

- **Migraines.** This is an infrequent cause for hospitalization and can be often avoided with appropriate prophylactic and timely therapeutic interventions.
- **Cardiac catheterization.** Many researchers have documented that, "cardiac catheterization is substantially underused among higher-risk patients with acute myocardial infarction (AMI) with appropriate indications but overused among patients with inappropriate indications."[7] In addition, most of the time when appropriate, these procedures can be done on an outpatient basis.
- **Chest pain and abdominal pain.** For both chest and abdominal pain there is considerable variation in practice patterns with respect to the necessity of hospitalizations. Many consensus document have been published for the most appropriate evaluation approach for both of these conditions; particularly chest pain.[8]
- **Back procedures for discogenic pain.** There is considerable variation in practice patterns for this procedure. It is clear that many of these procedures could be avoided altogether. There is little evidence that treatment interventions work for most individuals with this very common illness.[9]
- **Sickle cell anemia crisis.** Recent literature reports on variation in readmissions and the impact of interventions. These interventions include establishment of a dedicated outpatient clinic for adults (Lanzkron et al) and educational interventions (Shahine et al). While the most recent article by Lanzkron from May 2015 was done with adult patients who had sickle cell, an article by Raphael et al from 2013 documented the positive impact of a day hospital on a pediatric sickle cell population.[10]
- **Mental Health and Substance Abuse (MH/SA) disorders.** There is ample evidence indicating that adequate outpatient services decreases hospital use.[11] We are not including MH/SA admissions for initial inclusion in the PPA list as very often these patients are only admitted once. We are including these APR DRGs for another potentially preventable event, Potentially Preventable Readmissions (PPRs). However MH/SA admissions are included in settings of integrated or accountable care.
- **Coronary angioplasty, Coronary Artery Bypass Grafts (CABG), other types of angioplasties and grafts.** For more than a quarter century, there has been extensive documentation of the variation in practice patterns in these procedures. Among many others, Saleh, Hannan and Ting documented this variation in 2005[12]. Most recently, research on this variation has focused on socioeconomic disparities and the importance of risk adjustment. In addition, a recent article published in 2014 documented the impact that providing data can have on the performance on angioplasties. The same article noted that there are ongoing significant opportunities for improvement.[13]

Determine if patient was admitted from a residential nursing care facility

Additional assignment criteria specific to patients admitted directly from a residential nursing care facility for identifying patients with candidate PPA events. Fever, chest pain, heart disease (mainly heart failure), mental status changes, gastrointestinal bleeding, urinary tract infections, metabolic disturbances, pneumonia, diseases of the skin, and injuries due to falls have been identified as reasons for potentially preventable events. Researchers argue that some of these conditions, such as urinary tract infections, could be more appropriately treated in the nursing home. Other conditions, such as those related to falls or pneumonia may have been avoided by preventing the adverse health event itself. Decreasing potentially preventable events may reduce healthcare costs, lessen trauma or complications resulting from medical treatment for nursing home residents, and improve quality of care. Refer to the APR DRG section of this manual for a list of residential nursing care facility sensitive conditions. Patients admitted directly from a residential nursing care facility and assigned to an APR DRG that is on the list of APR DRG residential nursing care facility sensitive conditions are identified as PPA candidates.

Residential nursing care facilities are designated as one of the following places of service: SNF, nursing home, Intermediate Care Facility/Individuals with Intellectual Disabilities, residential substance abuse treatment facility, psychiatric residential treatment center, comprehensive inpatient rehabilitation facility. Refer to the place of service section of this manual for detailed logic for residential nursing care facility identification.

Determine if the patient was part of an Integrated Delivery System (IDS)

PPAs now include additional criteria for patients that belong to an Integrated Delivery System. Reducing potentially preventable admissions to hospitals using Integrated Delivery Systems using a bundled approach is another opportunity for better care coordination and lower spending. It is designed to encourage accountability for cost and quality across a spectrum of care. With bundled payments, fewer potentially preventable admissions will result due to improved transitions between healthcare settings. Providers will need to carefully consider the correct post acute care that their patients would benefit from without compromising patient care. This method eliminates incentive to provide more services that increase revenue and result in fragmented care.

A significantly greater number of hospitalizations are potentially preventable if the population is managed by a well-established Integrated Health Delivery System. Coronary artery bypass grafts (CABG) and other vascular interventions such as lower extremity revascularization and lower extremity amputations from peripheral vascular disease. These are considered potentially preventable for two reasons in established integrated delivery systems. First, with population healthcare management and, for example, better diabetes control, fewer vascular interventions are needed. Secondly, for many vascular interventions such as CABGs it is well documented that a percentage of these interventions are completely avoidable.[14] Coronary artery bypass grafts and percutaneous cardiac interventions are therefore considered potentially preventable, although whether the patient care organization responsible is judged to be providing inadequate care will depend on how its rates compare with peer organizations. Similarly, mental health admissions are considered potentially preventable, with assessments of quality depending on the rates of those admissions.

Established vs. newly formed Integrated Delivery System (IDS)

One cannot expect a newly formed IDS to provide coordinated care when first established. For example, one should not expect coordinated care for the chronically mentally disabled in the early stages of a newly formed IDS. In addition, certain complications of chronic illnesses, such as the vascular complications of diabetes, cannot be addressed without years of coordinated care. On the other hand, with expert coordinated care one should expect lower rates of complications from many chronic illnesses. As a consequence, a newly formed IDS should refer to the General Population PPA preventability status.

Potentially preventable admissions (PPA) output

Potentially Preventable Admissions (PPA) contain a number of outputs including risk status and reason. There are two risk (R) statuses for PPA: At Risk Potentially Preventable (RP) and At Risk Not Potentially Preventable (RN). Inpatient admissions identified as potentially preventable are assigned a single reason that best conveys the cause of the PPA assignment. Further detail on the rationale associated with each reason is provided at the end of this section.

Potentially Preventable (RP)

21	Potentially Preventable

PPA Reasons

0	Not Potentially Preventable
2	Other Facility – Quality Indicator
3	Other Facility – Patient Safety
4	Other Facility – Potential Area of Overuse
5	Other Facility – Coordination – Mental Health
12	Other Facility – Coordination – Substance Abuse
7	Other Facility – Primary Care Accessibility/Coordination/Management
8	Primary Care Accessibility/Outpatient Coordination/Management
10	Potential area of overuse
50	Established Integrated Delivery System – Potential area of Overuse
51	Established Integrated Delivery System – Primary Care Accessibility Coordination/Management
52	Established Integrated Delivery System – Coordination – Substance Abuse
53	Established Integrated Delivery System – Coordinated – Mental Health

For PPA, there are specific APR DRGs that require additional code level detail to determine the potential preventability of an admission. For these APR DRGs, the principal diagnosis is required to make a final determination. If the principal diagnosis for the claim is not considered potentially preventable, the claim will be returned with a status of RN. If the principal diagnosis is considered potentially preventable, the claim will be returned with a status of RP and the relevant reason assigned.

Additionally, for APR DRGs that require code level detail, a PPA may not be assigned in some cases due to diagnosis specific age criteria. If the principal diagnosis is potentially preventable but is associated with specific age criteria, the admission is not considered potentially preventable if the patient's age falls within that range. In this case, the claim will be returned with a status of RN.

Grouper assignment to one of the following APR DRGs is not compatible with PPA and will output an error return (RX):

APR DRG 955 Principal diagnosis invalid as discharge diagnosis
APR DRG 956 Ungroupable

While Potentially Preventable Admissions are assigned to categories, it should be emphasized that there is cross-over and that some PPAs can belong to more than one category. Some PPAs fit nicely into single category. For example, potentially preventable surgical procedures for back pain secondary to disc rupture clearly belong to the Potential Overuse category, while a hospital admission from a nursing home for trauma clearly belongs to the Patient Safety category. Other PPAs do not fit so clearly into a single category. For example, pulmonary edema/respiratory failure is categorized as a potentially preventable nursing home quality indicator, but could also represent an opportunity for improvement in coordination.

Several categories of preventable admissions are labeled as applying to Integrated Delivery Systems that could be expected to implement practices and procedures to optimize care for more complex illnesses. Severe mental health conditions, for example, can be difficult to manage by themselves, and can make care for other coexisting chronic illness much more difficult than usual, and can benefit from coordinated care delivered by integrated systems. (Ultimately, we would like to see all individuals become members of Integrated Delivery Systems that link behavioral and physical care together – not separately as is too often the case today.) Patients with chest pain can be difficult to deal with in a cost-effective manner, and their care can benefit from a greater degree of coordination and clear communication, so that many such patients can be appropriately treated in an outpatient setting.

- **Outpatient Coordination Management.** Providing medical care for chronic illness is often complex, and failure to deal with complexity with a coordinated approach to care can result in a preventable admission. Patients require multiple resources, treatments, and providers that, in many healthcare settings, are not integrated into a coherent system of care. This fragmentation puts patients with serious or multiple chronic illnesses at risk of experiencing inadequate quality of care and makes their healthcare expenditures substantially higher than for those who have minor or no chronic conditions. Outpatient Coordination and Management refers to services such as case management that serve to streamline these complex services and in so doing improve outcomes and decrease potentially preventable admissions. For example, there is a great deal of literature documenting the positive impact of case management services on hospital admissions for heart failure.
- **Potential Overuse.** Potentially unnecessary healthcare (overutilization, overtreatment) is healthcare provided for conditions and in situations for which its effectiveness has not been proved, or for which evidence has shown a lack of effectiveness. Similarly, overtreatment refers to unnecessary medical interventions. These can include treatment of a self-limited condition, or extensive treatment for a condition that requires only limited treatment. Over diagnosis, when patients are given a diagnosis that will cause no symptoms or harm, can lead to overtreatment.
- **Primary Care Accessibility.** Primary care accessible services can be manifested by short waiting times for urgent needs, extended service hours, around-the-clock telephone or electronic access to a member of the care team, and alternative methods of communication such as email and telephone care. The medical home practice is responsive to patients' preferences regarding access. With accessible services, infections of the upper respiratory tract which can develop into pneumonia can be effectively treated in the outpatient setting.
- **Quality Indicator.** There are circumstances when where the patient has received treatment influences the preventability. If a patient has received treatment in a nursing/psych or rehab facility within 30 days prior to the admission being evaluated for a PPA, then some conditions may be a result of a quality deficit from that previous facility. As per the Institute of Medicine definition quality is defined as the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge. Septicemia or infection in the blood could result from deficiencies in several different categories and thus is placed in the general quality category.
- **Patient Safety**. Patient Safety refers to the reporting, analysis, and prevention of medical error that often leads to adverse healthcare events. Trauma that occurs in the nursing home clearly represents a patient safety issue.

Proper application of Potentially Preventable Admissions

For potentially preventable event measures to be effectively and fairly used in performance reporting and/or pay for performance programs, the measurement tools, scoring methodology, program design and program applications must meet a number of core requirements. The classification methodologies underlying the measurement tools must be clinically precise, comprehensive, have a uniform and consistent structure, and be transparently available to affected providers. The tools must generate information at multiple levels: individual provider, service line, major diagnostic category and at the hospital or health system level. Comparative provider performance must be risk adjusted to account for the severity of patient illness and patient chronic illness burden. Providers should not be evaluated on a case-by-case basis, but via a rate-based approach which motivates providers to achieve performance levels being achieved by their peers. Inpatient expenditures can be reduced by: (1) communicating actionable risk-adjusted comparative performance information to providers, and (2) by creating financial incentives focused on reducing the rates of excess potentially preventable admissions.[15] The state agency must involve providers and other stakeholders in program design. Finally, patients and their families should be meaningfully engaged in care decisions.

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Appendix C: Description of CRG Logic

Clinical Risk Groups (CRGs) are a categorical clinical model that uses historical claims data to assign individuals to a single mutually exclusive category that defines an individual's chronic disease burden (Hughes, 2004). Each CRG is composed of a base CRG that describes the patient's most significant chronic conditions and two to six explicit severity levels that distinguish differences in disease burden due to severity of illness (e.g., a patient with diabetes and congestive heart failure at severity level 3). The CRG logic follows the logical progression of a disease. The CRG assignment process is as follows:

Phase 1: Categorize diagnoses and procedures

- All diagnoses are assigned to an MDC (Major Diagnostic Category)
- Within each MDCs diagnoses are assigned to one of 557 EDCs (Episode Diagnostic Categories)
- All procedures are assigned to one of 640 EPCs (Episode Procedure Category)
- Each EDC is categorized as dominant chronic, moderate chronic, minor chronic, chronic manifestation, significant acute or minor acute
- Only one diagnosis from an inpatient admission is needed to establish an EDC
- Two diagnoses from different days are needed to establish an EDC for outpatient visits except for diagnoses for selected conditions and diagnosis codes which are in fact procedures (e.g., history of a heart transplant)
- For inpatient services diagnoses from physician and other professional claims are not used (i.e., only the hospital claim is used).
- Diagnoses from "other" providers (e.g., ambulances, freestanding laboratory, etc.) are not used.
- Some diagnosis codes create multiple EDCs. (e.g., the diabetic neuropathy code creates both the chronic disease EDC for diabetes and the chronic manifestation EDC for diabetic neuropathy EDC).
- Conditionality rules are also applied and affect diagnosis or severity assignment:
  - Persistence and recurrence rules (e.g., hypertension must persist over a period of time to be considered an established diagnosis)
  - Demographic (e.g., congestive heart failure among children vs. adults)
- The temporal relationship between EDCs and EPCs is used to establish final EDCs
  - EDCs can cause other EDCs to be "ignored"
    - Acquired hemiplegia removes stroke from contributing to the severity of illness rating
  - EPCs can cause EDC and EPCs to be "ignored"
    - Angioplasty removes Angina from the severity logic
    - Kidney transplant causes renal dialysis to be removed from the severity logic

Phase 2: Identify chronic illnesses and specify their severity of illness

- Each MDC with a chronic EDC will be assigned a PCD (Primary Chronic Disease)

- Only one PCD can be assigned per MDC. If there is more than one EDC within an MDC, the PCDs will be selected in hierarchical order within the MDC (e.g., dominant chronic EDCs selected before moderate chronic EDCs)
- Some chronic EDCs cannot become PCDs if a certain other EDC is present (e.g., skin ulcers cannot be a PCD if diabetes is present)
- After a PCD is selected it is assigned a severity of illness level
- The severity level assignment for each PCD is establish by the presence of related conditions (e.g., skin ulcers in a diabetic)

Phase 3: Assign the CRG

- Assignment to one of 272 base CRGs based on the combination of PCDs that are present
- The highest volume diseases or combinations of diseases are assigned a unique base CRG, for example:
  - Diabetes
  - Diabetes with CHF
  - Diabetes with CHF and COPD
- All CRGs are assigned to one of nine hierarchical health statuses ranging from catastrophic to healthy

  Status 1 – Healthy
  Status 2 – History of Acute Disease e.g., Chest Pain
  Status 3 – Single Minor Chronic Disease e.g., Migraine
  Status 4 – Minor Chronic Disease in Multiple Organ Systems e.g., Migraine and BPH
  Status 5 – Single Dominant or Moderate Chronic Disease e.g., Diabetes
  Status 6 - Dominant or Moderate Chronic Disease in Multiple Organ Systems, e.g., Diabetes, and COPD
  Status 7 - Dominant Chronic Disease in Three or More Organ Systems, e.g., CHF, Diabetes, and COPD
  Status 8 - Malignancy, Under Active Treatment, e.g., Lung Cancer
  Status 9 - Catastrophic Conditions, e.g., Major Organ Transplant

- Assignment is done from most serious (catastrophic) to least serious (healthy)
- Each base CRG is subdivided into discrete severity subclasses based on the severity levels of the PCDs

The CRGs (Version 2.1) are composed of 332 base CRGs that describes the individual's most significant chronic conditions and explicit severity levels that distinguish differences in disease burden due to severity of illness resulting in 1,414 individual CRGs.

A more detailed description of CRGs is available at: https://apps.3mhis.com/docs/Groupers/Clinical_Risk_Grouping_CRG/methodology_overview/grp401_crg_v2.1_meth_overview.pdf

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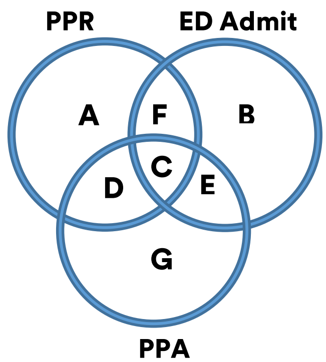
Appendix D: Overlap among PPAs, PPRs and ED Admits

Any admission can simultaneously be a PPA, PPR and/or an ED Admit. The following Venn diagram shows the overlap among PPAs, PPRs and ED admits.



The table below contains the counts for the subsets of admissions in the Venn diagram.

Venn Subsets	Description	Admissions	Percent of Admissions
C, D, E G	With a PPA	85,974	22.6
A, D, F, G	With a PPR	25,370	6.7
B, E, F, G	With a ED Admit	69,611	18.3
A	PPR Only	15,129	4.0
B	ED Admit Only	40,866	10.8
C	PPA Only	53,984	14.2
D	PPA and PPR Only	5,747	1.5
E	PPA and ED Admit Only	24,251	6.4
F	PPR and ED Admit Only	2,502	0.7
G	PPA and PPR and ED Admit	1,992	0.5
Empty Subset	No PPA, PPR or ED Admit	235,370	62.0
A-G + Empty	Total Admissions	379,841	100.0

Appendix E: PPA %(A-E)/E and $(A-E) by CBSA

State	CBSA	Count Benef	Count PPAs	PPAs per 1000 Benef	%(A-E)/E PPA Nat Norm	$(A-E) PPA Nat Norm	%(A-E)/E PPA BP Norm	$(A-E) PPA BP Norm
Alabama	Birmingham-Hoover, AL	3,829	282	73.74	-3.58	-127,929	10.74	333,868
Alabama	Huntsville, AL	2,163	147	68.14	-8.07	-157,852	5.58	94,984
Alabama	Montgomery, AL	1,410	122	86.66	18.91	237,018	36.57	399,050
Alabama	Mobile, AL	1,331	103	77.66	-4.30	-56,609	9.91	113,722
Alabama	Daphne-Fairhope-Foley, AL	1,084	54	49.53	-30.13	-282,387	-19.75	-161,200
Alabama	Tuscaloosa, AL	1,072	108	100.38	27.52	283,178	46.45	416,247
Alabama	Florence-Muscle Shoals, AL	1,002	73	72.61	5.28	44,489	20.91	153,467
Alabama	Rural Alabama	4,471	293	65.59	-8.84	-346,696	4.70	160,558
Alabama	Aggregate small CBSAs	7,009	553	78.90	6.94	437,483	22.82	1,252,932
Alaska	Anchorage, AK	1,820	69	37.86	-35.74	-467,532	-26.20	-298,408
Alaska	Rural Alaska	967	37	37.98	-25.45	-152,912	-14.38	-75,219
Alaska	Aggregate small CBSAs	668	44	65.62	17.05	77,852	34.43	136,907
Arizona	Phoenix-Mesa-Scottsdale, AZ	15,542	868	55.85	-13.45	-1,644,575	-0.59	-63,125
Arizona	Tucson, AZ	3,968	225	56.82	-3.92	-112,109	10.35	257,941
Arizona	Prescott, AZ	2,166	130	59.94	1.80	27,964	16.92	229,069
Arizona	Lake Havasu City-Kingman, AZ	1,712	98	57.29	-13.94	-193,833	-1.16	-14,100
Arizona	Rural Arizona	789	51	64.43	5.53	32,490	21.20	108,452
Arizona	Aggregate small CBSAs	3,832	222	58.06	-5.31	-152,172	8.75	218,359
Arkansas	Little Rock-North Little Rock-Conway, AR	4,175	299	71.73	11.91	388,651	28.53	810,631
Arkansas	Fayetteville-Springdale-Rogers, AR-MO	2,043	146	71.23	3.80	64,895	19.21	285,994
Arkansas	Fort Smith, AR-OK	1,545	114	73.75	-1.99	-28,288	12.56	155,060
Arkansas	Rural Arkansas	4,490	469	104.47	60.47	2,155,664	84.30	2,616,613
Arkansas	Aggregate small CBSAs	6,947	605	87.02	28.23	1,623,434	47.28	2,366,882
California	Los Angeles-Long Beach-Anaheim, CA	31,567	2,655	84.11	8.68	2,587,016	24.82	6,439,549
California	San Francisco-Oakland-Hayward, CA	14,178	812	57.24	-9.04	-983,679	4.47	423,317
California	San Diego-Carlsbad, CA	8,500	520	61.15	-5.13	-343,080	8.95	520,903
California	Riverside-San Bernardino-Ontario, CA	8,090	563	69.57	-4.97	-358,693	9.15	575,192
California	Sacramento--Roseville--Arden-Arcade, CA	7,090	393	55.47	-16.59	-954,344	-4.21	-210,765
California	San Jose-Sunnyvale-Santa Clara, CA	5,096	245	48.06	-20.09	-750,832	-8.22	-267,561
California	Oxnard-Thousand Oaks-Ventura, CA	3,486	181	51.81	-23.27	-667,941	-11.87	-296,763
California	Fresno, CA	3,223	212	65.65	-3.02	-80,311	11.38	263,754
California	Bakersfield, CA	2,427	169	69.74	-6.60	-145,915	7.27	139,858
California	Santa Maria-Santa Barbara, CA	2,425	122	50.17	-14.72	-256,123	-2.06	-31,171
California	Stockton-Lodi, CA	2,251	120	53.20	-22.82	-431,905	-11.36	-187,229
California	Salinas, CA	2,249	121	53.69	-10.84	-179,023	2.40	34,538
California	San Luis Obispo-Paso Robles-Arroyo Grande, CA	2,116	69	32.70	-39.48	-550,588	-30.50	-370,282
California	Santa Rosa, CA	2,038	91	44.52	-29.80	-469,674	-19.37	-265,882
California	Visalia-Porterville, CA	1,977	163	82.47	11.74	208,937	28.33	439,045
California	Chico, CA	1,949	124	63.84	-6.17	-99,851	7.76	109,279
California	Redding, CA	1,840	96	52.29	-8.87	-114,170	4.67	52,309

State	CBSA	Count Benef	Count PPAs	PPAs per 1000 Benef	%(A-E)/E PPA Nat Norm	$(A-E) PPA Nat Norm	%(A-E)/E PPA BP Norm	$(A-E) PPA BP Norm
California	Santa Cruz-Watsonville, CA	1,740	57	32.69	-40.20	-466,326	-31.32	-316,334
California	Modesto, CA	1,583	84	53.05	-23.96	-322,706	-12.67	-148,560
California	Vallejo-Fairfield, CA	1,521	75	49.31	-23.23	-276,851	-11.83	-122,773
California	Merced, CA	1,224	89	72.42	6.94	70,151	22.82	200,862
California	Yuba City, CA	1,118	72	64.03	-8.31	-79,103	5.31	44,015
California	Eureka-Arcata-Fortuna, CA	1,093	31	28.44	-50.09	-380,468	-42.68	-282,263
California	Rural California	2,571	147	57.10	-2.06	-37,571	12.49	198,781
California	Aggregate small CBSAs	6,725	352	52.37	-17.14	-888,236	-4.83	-218,029
Colorado	Denver-Aurora-Lakewood, CO	6,741	347	51.53	-21.68	-1,173,007	-10.05	-473,537
Colorado	Colorado Springs, CO	2,801	124	44.25	-28.80	-611,402	-18.23	-336,912
Colorado	Fort Collins, CO	1,527	67	43.70	-20.34	-207,753	-8.51	-75,670
Colorado	Boulder, CO	1,039	54	52.25	-6.34	-44,811	7.57	46,592
Colorado	Rural Colorado	2,390	157	65.62	10.28	178,247	26.65	402,499
Colorado	Aggregate small CBSAs	4,707	182	38.71	-35.62	-1,229,291	-26.06	-783,021
Connecticut	Hartford-West Hartford-East Hartford, CT	4,391	301	68.61	-10.05	-410,576	3.31	117,590
Connecticut	Bridgeport-Stamford-Norwalk, CT	4,009	219	54.61	-20.08	-671,103	-8.22	-239,058
Connecticut	New Haven-Milford, CT	3,514	300	85.32	9.02	302,425	25.21	736,091
Connecticut	Norwich-New London, CT	1,260	99	78.24	-1.93	-23,684	12.63	134,843
Connecticut	Aggregate small CBSAs	970	65	67.36	-4.67	-39,066	9.48	69,022
Delaware	Salisbury, MD-DE	3,928	224	57.05	-17.78	-591,131	-5.57	-161,324
Delaware	Dover, DE	1,300	90	69.09	-10.81	-132,751	2.44	26,060
Delaware	Rural Delaware	7	0	0.00	-100.00	-6,824	-100.00	-5,942
District of Columbia	Washington-Arlington-Alexandria, DC-VA-MD-WV	24,047	1,538	63.96	-1.19	-224,977	13.49	2,229,621
Florida	Miami-Fort Lauderdale-West Palm Beach, FL	16,543	1,383	83.57	2.95	483,221	18.24	2,600,979
Florida	Tampa-St. Petersburg-Clearwater, FL	11,547	982	85.02	2.38	278,229	17.58	1,790,407
Florida	Orlando-Kissimmee-Sanford, FL	7,859	749	95.31	18.54	1,428,600	36.14	2,425,079
Florida	Jacksonville, FL	6,999	580	82.81	8.08	528,718	24.13	1,374,349
Florida	North Port-Sarasota-Bradenton, FL	6,535	320	49.00	-26.00	-1,372,219	-15.01	-689,799
Florida	Cape Coral-Fort Myers, FL	4,825	299	61.93	-9.78	-394,988	3.62	127,275
Florida	Deltona-Daytona Beach-Ormond Beach, FL	3,563	199	55.78	-23.22	-733,138	-11.82	-324,908
Florida	Palm Bay-Melbourne-Titusville, FL	3,413	277	81.08	5.55	177,539	21.23	590,941
Florida	Port St. Lucie, FL	3,002	240	79.81	9.44	252,106	25.69	597,338
Florida	Naples-Immokalee-Marco Island, FL	2,951	196	66.32	5.94	133,884	21.67	425,215
Florida	Pensacola-Ferry Pass-Brent, FL	2,621	150	57.39	-24.73	-602,727	-13.55	-287,583
Florida	Lakeland-Winter Haven, FL	2,583	202	78.24	-0.87	-21,673	13.85	299,799
Florida	Ocala, FL	2,346	170	72.37	-1.59	-33,480	13.02	238,575
Florida	The Villages, FL	1,777	108	60.74	-13.61	-207,287	-0.78	-10,290
Florida	Crestview-Fort Walton Beach-Destin, FL	1,733	111	63.78	-15.06	-239,083	-2.45	-33,860
Florida	Punta Gorda, FL	1,726	101	58.46	-23.47	-377,437	-12.11	-169,508
Florida	Homosassa Springs, FL	1,447	119	82.35	15.97	200,156	33.19	362,191
Florida	Sebastian-Vero Beach, FL	1,430	77	53.72	-21.38	-254,793	-9.71	-100,716
Florida	Gainesville, FL	1,288	109	84.24	14.47	167,243	31.47	316,719

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Florida	Panama City, FL	1,215	131	108.20	50.53	538,196	72.88	675,920
Florida	Tallahassee, FL	1,064	94	88.33	21.44	202,369	39.48	324,407
Florida	Rural Florida	2,319	240	103.70	32.80	724,333	52.52	1,009,888
Florida	Aggregate small CBSAs	3,010	256	84.99	10.21	288,930	26.57	655,008
Georgia	Atlanta-Sandy Springs-Roswell, GA	16,932	1,090	64.39	-7.40	-1,062,320	6.35	794,401
Georgia	Augusta-Richmond County, GA-SC	2,798	239	85.41	24.90	581,149	43.45	882,876
Georgia	Savannah, GA	1,425	60	42.22	-37.45	-439,277	-28.16	-287,611
Georgia	Columbus, GA-AL	1,334	65	48.75	-35.78	-441,881	-26.24	-282,188
Georgia	Macon, GA	1,053	126	119.54	54.91	544,184	77.92	672,321
Georgia	Rural Georgia	4,697	411	87.56	14.49	634,660	31.49	1,201,123
Georgia	Aggregate small CBSAs	11,002	879	79.90	3.87	399,913	19.30	1,734,475
Hawaii	Urban Honolulu, HI	2,851	118	41.43	-38.03	-884,221	-28.83	-583,620
Hawaii	Aggregate small CBSAs	1,734	53	30.45	-46.95	-570,006	-39.07	-413,034
Idaho	Boise City, ID	2,224	108	48.67	-23.42	-403,798	-12.05	-180,902
Idaho	Rural Idaho	1,347	69	51.26	-7.88	-72,075	5.79	46,126
Idaho	Aggregate small CBSAs	5,454	255	46.83	-25.39	-1,059,726	-14.30	-519,954
Illinois	Chicago-Naperville-Elgin, IL-IN-WI	39,412	3,192	81.00	13.11	4,511,393	29.90	8,962,364
Illinois	Peoria, IL	2,205	120	54.29	-22.88	-433,189	-11.43	-188,409
Illinois	Rockford, IL	1,705	133	78.29	6.16	94,463	21.93	292,737
Illinois	Ottawa-Peru, IL	1,120	53	47.50	-26.94	-239,259	-16.09	-124,428
Illinois	Springfield, IL	1,014	92	90.25	24.07	216,510	42.49	332,831
Illinois	Rural Illinois	4,682	375	80.18	12.56	510,749	29.27	1,036,702
Illinois	Aggregate small CBSAs	11,303	932	82.46	16.30	1,592,797	33.57	2,856,651
Indiana	Indianapolis-Carmel-Anderson, IN	8,320	596	71.65	-2.33	-173,145	12.18	789,326
Indiana	Evansville, IN-KY	1,795	177	98.47	32.08	523,521	51.69	734,550
Indiana	South Bend-Mishawaka, IN-MI	1,475	138	93.70	30.26	391,588	49.61	558,904
Indiana	Fort Wayne, IN	1,455	137	94.19	21.01	290,229	38.99	468,805
Indiana	Terre Haute, IN	1,143	99	86.67	5.30	60,838	20.94	209,195
Indiana	Rural Indiana	3,097	263	84.83	21.85	574,546	39.95	914,525
Indiana	Aggregate small CBSAs	10,953	836	76.37	4.99	485,252	20.59	1,741,549
Iowa	Omaha-Council Bluffs, NE-IA	4,183	278	66.40	0.81	27,055	15.77	461,581
Iowa	Des Moines-West Des Moines, IA	2,829	147	52.07	-17.37	-377,550	-5.09	-96,441
Iowa	Davenport-Moline-Rock Island, IA-IL	2,086	149	71.50	9.49	157,685	25.75	372,498
Iowa	Cedar Rapids, IA	1,380	68	49.41	-34.76	-443,128	-25.07	-278,296
Iowa	Rural Iowa	6,446	367	56.92	-11.91	-604,864	1.17	51,945
Iowa	Aggregate small CBSAs	6,613	383	57.91	-10.63	-555,495	2.64	120,237
Kansas	Wichita, KS	3,353	221	65.99	0.74	19,954	15.71	366,276
Kansas	Topeka, KS	1,702	106	62.25	-9.59	-137,044	3.84	47,747
Kansas	Rural Kansas	3,442	263	76.26	18.00	488,325	35.52	839,136
Kansas	Aggregate small CBSAs	5,532	383	69.27	2.19	100,058	17.36	691,420
Kentucky	Louisville/Jefferson County, KY-IN	6,103	473	77.58	4.75	261,952	20.31	974,756
Kentucky	Lexington-Fayette, KY	1,929	127	65.85	-5.53	-90,737	8.50	121,316
Kentucky	Rural Kentucky	7,098	589	82.95	7.22	483,381	23.14	1,349,361
Kentucky	Aggregate small CBSAs	7,564	585	77.32	3.77	259,360	19.18	1,148,150
Louisiana	New Orleans-Metairie, LA	3,355	306	91.24	15.43	499,090	32.57	917,277
Louisiana	Lafayette, LA	2,558	197	77.01	0.06	1,417	14.92	311,897
Louisiana	Shreveport-Bossier City, LA	2,382	204	85.63	7.30	169,299	23.24	469,046
Louisiana	Baton Rouge, LA	2,366	158	66.61	-15.24	-345,524	-2.65	-52,332
Louisiana	Lake Charles, LA	1,169	94	80.11	7.32	77,880	23.25	215,489

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Louisiana	Houma-Thibodaux, LA	1,146	102	88.79	13.11	143,846	29.91	285,712
Louisiana	Rural Louisiana	2,323	212	91.26	12.40	285,344	29.10	582,771
Louisiana	Aggregate small CBSAs	5,048	469	92.97	18.63	898,961	36.25	1,522,791
Maine	Portland-South Portland, ME	2,930	140	47.80	-22.82	-504,944	-11.36	-218,803
Maine	Bangor, ME	1,048	54	51.50	-28.20	-258,526	-17.54	-139,988
Maine	Rural Maine	3,354	207	61.70	-8.29	-228,137	5.33	127,699
Maine	Aggregate small CBSAs	1,311	68	51.98	-11.44	-107,320	1.72	14,027
Maryland	Baltimore-Columbia-Towson, MD	15,554	1,258	80.88	13.70	1,848,829	30.59	3,593,460
Maryland	Hagerstown-Martinsburg, MD-WV	1,565	99	62.95	-16.48	-237,096	-4.08	-51,081
Maryland	Rural Maryland	743	50	67.51	-5.61	-36,347	8.41	47,453
Maryland	Aggregate small CBSAs	2,265	136	59.96	-18.98	-387,898	-6.94	-123,595
Massachusetts	Boston-Cambridge-Newton, MA-NH	24,121	1,773	73.50	4.07	845,354	19.52	3,531,781
Massachusetts	Worcester, MA-CT	4,022	281	69.90	3.66	121,112	19.06	548,814
Massachusetts	Springfield, MA	3,433	222	64.80	-4.08	-115,340	10.17	250,363
Massachusetts	Barnstable Town, MA	2,484	179	71.90	6.67	136,300	22.52	400,330
Massachusetts	Pittsfield, MA	1,281	65	50.92	-23.65	-246,419	-12.31	-111,685
Massachusetts	Rural Massachusetts	65	2	28.32	-56.24	-28,855	-49.74	-22,221
Massachusetts	Aggregate small CBSAs	697	61	87.37	37.90	204,134	58.38	273,771
Michigan	Detroit-Warren-Dearborn, MI	17,843	1,756	98.43	17.31	3,160,121	34.73	5,521,220
Michigan	Grand Rapids-Wyoming, MI	2,932	209	71.22	-4.67	-124,673	9.49	220,753
Michigan	Lansing-East Lansing, MI	2,164	121	56.00	-26.34	-528,414	-15.40	-268,996
Michigan	Flint, MI	1,783	183	102.52	17.05	324,771	34.43	571,041
Michigan	Ann Arbor, MI	1,420	72	50.59	-27.30	-329,037	-16.51	-173,209
Michigan	Kalamazoo-Portage, MI	1,375	78	56.85	-13.18	-144,718	-0.29	-2,735
Michigan	Rural Michigan	5,223	409	78.34	14.49	631,375	31.49	1,194,965
Michigan	Aggregate small CBSAs	12,954	824	63.61	-12.89	-1,487,511	0.04	4,273
Minnesota	Minneapolis-St. Paul-Bloomington, MN-WI	7,327	468	63.90	-10.49	-668,938	2.81	155,848
Minnesota	Duluth, MN-WI	1,102	86	77.87	18.39	162,584	35.97	276,880
Minnesota	Rural Minnesota	2,287	148	64.62	1.25	22,225	16.28	252,412
Minnesota	Aggregate small CBSAs	5,946	357	60.08	-11.87	-586,772	1.22	52,395
Mississippi	Jackson, MS	2,825	231	81.80	16.64	402,053	33.96	714,467
Mississippi	Gulfport-Biloxi-Pascagoula, MS	2,053	193	93.78	23.62	448,637	41.98	694,247
Mississippi	Tupelo, MS	1,093	77	70.33	3.07	27,899	18.37	145,515
Mississippi	Rural Mississippi	5,165	422	81.66	13.14	597,340	29.94	1,185,215
Mississippi	Aggregate small CBSAs	6,225	535	85.97	17.97	994,123	35.49	1,709,471
Missouri	St. Louis, MO-IL	11,743	1,066	90.82	14.64	1,660,795	31.66	3,127,773
Missouri	Kansas City, MO-KS	8,499	716	84.24	20.50	1,485,706	38.40	2,422,569
Missouri	Springfield, MO	1,829	126	69.13	-2.20	-34,657	12.33	169,220
Missouri	Rural Missouri	6,300	567	90.05	32.59	1,700,690	52.28	2,375,447
Missouri	Aggregate small CBSAs	7,147	473	66.23	-7.78	-487,267	5.91	322,221
Montana	Rural Montana	2,731	118	43.19	-24.88	-476,510	-13.73	-228,902
Montana	Aggregate small CBSAs	4,049	194	47.93	-17.05	-486,338	-4.73	-117,417
Nebraska	Lincoln, NE	1,691	92	54.61	-6.95	-84,115	6.87	72,379
Nebraska	Rural Nebraska	3,005	186	61.89	-0.78	-17,944	13.95	277,671
Nebraska	Aggregate small CBSAs	3,035	170	55.97	-13.45	-321,895	-0.59	-12,377
Nevada	Las Vegas-Henderson-Paradise, NV	6,782	492	72.58	2.95	171,783	18.23	925,828
Nevada	Reno, NV	2,187	110	50.46	-20.26	-341,985	-8.42	-123,734
Nevada	Rural Nevada	233	11	45.97	-28.25	-51,426	-17.59	-27,884
Nevada	Aggregate small CBSAs	2,207	162	73.48	15.27	262,008	32.39	483,874
New Hampshire	Manchester-Nashua, NH	2,257	142	63.01	-0.58	-10,136	14.18	215,425

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New Hampshire	Claremont-Lebanon, NH-VT	1,867	101	53.88	-6.93	-91,366	6.89	79,084
New Hampshire	Concord, NH	1,107	42	38.08	-38.09	-316,271	-28.89	-208,901
New Hampshire	Rural New Hampshire	550	28	51.03	-13.72	-54,422	-0.91	-3,127
New Hampshire	Aggregate small CBSAs	1,682	83	49.15	-16.32	-196,675	-3.90	-40,869
New Jersey	Allentown-Bethlehem-Easton, PA-NJ	4,637	412	88.93	14.77	647,207	31.81	1,213,790
New Jersey	Atlantic City-Hammonton, NJ	1,747	168	96.20	23.74	393,211	42.11	607,401
New Jersey	Trenton, NJ	1,610	169	105.15	39.77	587,459	60.52	778,473
New Jersey	Aggregate small CBSAs	1,809	118	65.02	-12.93	-213,071	0.00	-32
New Mexico	Albuquerque, NM	2,776	128	46.22	-24.13	-497,787	-12.87	-231,101
New Mexico	Rural New Mexico	852	34	39.66	-28.85	-167,120	-18.29	-92,223
New Mexico	Aggregate small CBSAs	5,780	262	45.37	-28.58	-1,279,654	-17.97	-700,650
New York	New York-Newark-Jersey City, NY-NJ-PA	80,297	5,938	73.96	3.72	2,597,689	19.12	11,626,310
New York	Albany-Schenectady-Troy, NY	3,426	225	65.66	-8.04	-239,727	5.62	146,006
New York	Buffalo-Cheektowaga-Niagara Falls, NY	2,952	198	67.13	-14.04	-394,766	-1.27	-31,203
New York	Rochester, NY	2,579	151	58.68	-19.90	-458,601	-8.01	-160,663
New York	Syracuse, NY	2,484	166	66.84	1.76	35,001	16.87	292,287
New York	Utica-Rome, NY	1,484	114	76.72	6.72	87,428	22.57	255,672
New York	Binghamton, NY	1,260	62	49.53	-22.60	-222,193	-11.10	-95,049
New York	Kingston, NY	1,140	79	69.71	8.11	72,708	24.17	188,618
New York	Rural New York	2,331	159	68.32	1.20	23,045	16.23	271,206
New York	Aggregate small CBSAs	7,449	459	61.63	-12.63	-809,208	0.35	19,394
North Carolina	Charlotte-Concord-Gastonia, NC-SC	9,587	645	67.25	-1.52	-121,001	13.11	911,389
North Carolina	Virginia Beach-Norfolk-Newport News, VA-NC	8,630	668	77.41	5.97	458,935	21.71	1,453,028
North Carolina	Raleigh, NC	4,508	226	50.21	-29.16	-1,136,093	-18.64	-632,285
North Carolina	Myrtle Beach-Conway-North Myrtle Beach, SC-NC	4,359	227	51.99	-16.74	-555,748	-4.38	-126,483
North Carolina	Asheville, NC	2,997	209	69.64	7.24	171,910	23.17	478,828
North Carolina	Greensboro-High Point, NC	2,374	157	66.27	-15.74	-358,379	-3.23	-63,947
North Carolina	Winston-Salem, NC	2,196	205	93.42	23.93	483,098	42.33	744,129
North Carolina	Durham-Chapel Hill, NC	2,166	120	55.37	-18.96	-342,163	-6.92	-108,801
North Carolina	Hickory-Lenoir-Morganton, NC	1,887	141	74.67	1.27	21,523	16.31	240,920
North Carolina	Wilmington, NC	1,797	129	71.82	3.37	51,245	18.71	248,154
North Carolina	Fayetteville, NC	1,624	139	85.69	7.97	125,341	24.01	328,586
North Carolina	New Bern, NC	1,092	94	85.92	19.94	190,223	37.75	313,578
North Carolina	Rocky Mount, NC	1,005	55	54.72	-28.88	-272,413	-18.32	-150,469
North Carolina	Rural North Carolina	4,746	352	74.15	2.11	88,724	17.27	632,185
North Carolina	Aggregate small CBSAs	12,950	983	75.91	3.09	359,146	18.40	1,862,860
North Dakota	Rural North Dakota	1,507	82	54.23	-8.03	-87,053	5.63	53,087
North Dakota	Aggregate small CBSAs	1,498	70	46.57	-23.92	-267,525	-12.62	-122,928
Ohio	Cleveland-Elyria, OH	8,433	736	87.27	15.23	1,186,322	32.34	2,193,468
Ohio	Cincinnati, OH-KY-IN	7,763	612	78.85	7.38	513,393	23.33	1,412,313
Ohio	Columbus, OH	6,168	453	73.46	-0.80	-44,609	13.93	675,713
Ohio	Dayton, OH	3,067	209	68.11	-10.55	-300,340	2.74	67,892
Ohio	Youngstown-Warren-Boardman, OH-PA	2,440	187	76.60	4.19	91,615	19.66	374,508
Ohio	Toledo, OH	2,401	245	101.94	37.70	817,296	58.15	1,097,603
Ohio	Akron, OH	2,243	158	70.62	-8.53	-180,242	5.05	92,845
Ohio	Canton-Massillon, OH	1,518	140	92.55	29.06	385,818	48.23	557,480

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Ohio	Rural Ohio	2,599	273	105.13	36.64	893,580	56.93	1,208,895
Ohio	Aggregate small CBSAs	14,764	1,299	87.99	16.34	2,224,955	33.61	3,985,816
Oklahoma	Oklahoma City, OK	6,195	412	66.51	-8.89	-490,519	4.64	222,676
Oklahoma	Tulsa, OK	4,527	339	74.84	1.32	53,795	16.37	581,076
Oklahoma	Rural Oklahoma	4,345	376	86.64	17.92	697,651	35.43	1,201,094
Oklahoma	Aggregate small CBSAs	6,311	479	75.85	3.63	204,765	19.02	933,179
Oregon	Portland-Vancouver-Hillsboro, OR-WA	5,438	297	54.70	-14.28	-604,350	-1.55	-57,140
Oregon	Eugene, OR	1,463	126	86.14	48.00	498,496	69.98	632,767
Oregon	Medford, OR	1,384	72	52.33	-9.13	-88,747	4.36	36,929
Oregon	Salem, OR	1,143	58	50.39	-20.58	-181,997	-8.79	-67,648
Oregon	Bend-Redmond, OR	1,113	40	35.79	-35.73	-270,101	-26.18	-172,355
Oregon	Rural Oregon	1,033	55	53.45	1.03	6,832	16.03	93,010
Oregon	Aggregate small CBSAs	5,823	286	49.10	-19.80	-861,128	-7.90	-298,911
Pennsylvania	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	28,551	2,126	74.46	1.77	450,854	16.88	3,745,115
Pennsylvania	Pittsburgh, PA	6,393	451	70.52	-2.22	-124,990	12.30	602,130
Pennsylvania	Scranton--Wilkes-Barre--Hazleton, PA	3,479	257	73.98	-1.53	-48,699	13.10	363,482
Pennsylvania	Lancaster, PA	2,469	143	57.76	-18.90	-405,230	-6.85	-127,929
Pennsylvania	Harrisburg-Carlisle, PA	2,300	186	81.04	11.44	233,370	27.99	497,124
Pennsylvania	York-Hanover, PA	2,092	149	71.27	-1.01	-18,486	13.69	219,019
Pennsylvania	Reading, PA	1,971	159	80.88	5.75	105,683	21.45	343,410
Pennsylvania	Erie, PA	1,120	73	65.22	-8.93	-87,348	4.60	39,141
Pennsylvania	Chambersburg-Waynesboro, PA	1,033	88	85.42	16.36	151,284	33.64	270,871
Pennsylvania	Rural Pennsylvania	2,649	152	57.25	-18.13	-409,624	-5.98	-117,528
Pennsylvania	Aggregate small CBSAs	10,476	757	72.30	-3.46	-331,110	10.88	906,135
Rhode Island	Providence-Warwick, RI-MA	7,654	629	82.18	10.93	755,779	27.40	1,650,013
South Carolina	Greenville-Anderson-Mauldin, SC	4,410	269	60.96	-7.29	-257,817	6.48	199,453
South Carolina	Columbia, SC	4,272	282	65.92	2.88	96,281	18.16	527,937
South Carolina	Charleston-North Charleston, SC	3,956	250	63.21	-6.23	-202,624	7.69	217,885
South Carolina	Hilton Head Island-Bluffton-Beaufort, SC	1,817	115	63.02	23.47	265,477	41.81	411,727
South Carolina	Spartanburg, SC	1,603	91	57.06	-19.91	-277,308	-8.02	-97,206
South Carolina	Florence, SC	1,310	80	60.92	-18.34	-218,625	-6.21	-64,500
South Carolina	Rural South Carolina	1,930	98	50.73	-25.91	-417,505	-14.90	-209,123
South Carolina	Aggregate small CBSAs	3,701	244	65.89	-3.04	-93,172	11.36	303,453
South Dakota	Sioux Falls, SD	1,190	84	70.26	20.01	170,025	37.83	279,882
South Dakota	Rural South Dakota	1,422	82	57.45	-3.32	-34,253	11.03	99,009
South Dakota	Aggregate small CBSAs	2,353	134	57.02	-4.03	-68,707	10.22	151,739
Tennessee	Nashville-Davidson--Murfreesboro--Franklin, TN	6,119	486	79.42	9.10	494,237	25.30	1,196,670
Tennessee	Memphis, TN-MS-AR	5,914	381	64.39	-9.46	-485,423	3.98	177,810
Tennessee	Knoxville, TN	4,020	308	76.54	6.16	217,810	21.93	674,828
Tennessee	Chattanooga, TN-GA	2,787	209	74.98	0.67	16,903	15.62	344,236
Tennessee	Kingsport-Bristol-Bristol, TN-VA	1,475	98	66.67	-11.72	-159,199	1.39	16,451
Tennessee	Clarksville, TN-KY	1,111	83	74.57	1.03	10,337	16.04	139,647
Tennessee	Rural Tennessee	4,372	351	80.20	6.91	276,323	22.78	793,492
Tennessee	Aggregate small CBSAs	8,239	583	70.79	-0.46	-32,600	14.33	891,352
Texas	Dallas-Fort Worth-Arlington, TX	20,062	1,506	75.09	-2.64	-498,342	11.82	1,941,539

State	CBSA	Count Benef	Count PPAs	PPAs per 1000 Benef	%(A-E)/E PPA Nat Norm	$(A-E) PPA Nat Norm	%(A-E)/E PPA BP Norm	$(A-E) PPA BP Norm
Texas	Houston-The Woodlands-Sugar Land, TX	15,102	1,212	80.26	8.48	1,156,171	24.59	2,918,059
Texas	San Antonio-New Braunfels, TX	7,788	449	57.66	-17.31	-1,146,230	-5.03	-289,834
Texas	Austin-Round Rock, TX	6,053	429	70.83	9.21	440,999	25.43	1,060,112
Texas	El Paso, TX	1,692	98	58.11	-19.95	-298,869	-8.06	-105,187
Texas	McAllen-Edinburg-Mission, TX	1,591	103	64.43	-31.71	-580,591	-21.57	-343,881
Texas	Killeen-Temple, TX	1,582	91	57.44	-21.22	-298,449	-9.52	-116,564
Texas	Beaumont-Port Arthur, TX	1,547	83	53.72	-34.96	-544,685	-25.30	-343,212
Texas	Corpus Christi, TX	1,351	108	79.85	5.14	64,294	20.75	226,097
Texas	Tyler, TX	1,184	71	59.89	-19.66	-211,585	-7.73	-72,416
Texas	Amarillo, TX	1,165	104	88.87	26.80	266,856	45.63	395,620
Texas	Brownsville-Harlingen, TX	1,157	161	139.06	43.32	593,093	64.60	770,122
Texas	Lubbock, TX	1,105	67	61.07	-22.88	-244,216	-11.43	-106,216
Texas	Longview, TX	1,082	104	95.84	34.02	321,049	53.92	443,062
Texas	Waco, TX	1,006	87	86.83	24.75	211,323	43.27	321,742
Texas	Rural Texas	9,249	652	70.53	-1.12	-89,976	13.57	950,334
Texas	Aggregate small CBSAs	14,744	1,086	73.68	-3.44	-472,573	10.89	1,301,571
Utah	Salt Lake City, UT	2,686	174	64.61	-1.62	-34,813	12.99	243,337
Utah	Ogden-Clearfield, UT	1,933	87	44.81	-24.51	-343,032	-13.30	-162,099
Utah	Provo-Orem, UT	1,099	57	51.44	-22.16	-196,323	-10.61	-81,797
Utah	St. George, UT	1,006	58	57.70	-5.70	-42,789	8.30	54,281
Utah	Rural Utah	913	72	78.47	50.24	292,175	72.55	367,368
Utah	Aggregate small CBSAs	732	39	53.24	-12.71	-69,173	0.26	1,223
Vermont	Burlington-South Burlington, VT	1,409	77	54.80	-6.24	-62,674	7.68	67,187
Vermont	Rural Vermont	1,370	63	45.85	-17.81	-166,000	-5.60	-45,481
Vermont	Aggregate small CBSAs	1,450	66	45.74	-22.58	-235,927	-11.09	-100,841
Virginia	Richmond, VA	6,227	483	77.62	12.41	650,747	29.10	1,328,785
Virginia	Roanoke, VA	2,110	134	63.27	-0.13	-2,183	14.70	208,632
Virginia	Lynchburg, VA	1,934	139	72.09	3.41	56,099	18.77	268,697
Virginia	Charlottesville, VA	1,495	114	76.50	24.06	270,511	42.48	415,886
Virginia	Blacksburg-Christiansburg-Radford, VA	1,053	73	69.06	-2.19	-19,894	12.33	97,361
Virginia	Rural Virginia	6,458	430	66.52	-3.10	-167,372	11.29	531,699
Virginia	Aggregate small CBSAs	5,270	374	70.90	-2.40	-112,126	12.09	491,587
Washington	Seattle-Tacoma-Bellevue, WA	12,412	612	49.29	-19.59	-1,817,238	-7.64	-617,546
Washington	Spokane-Spokane Valley, WA	2,968	128	43.26	-27.68	-599,354	-16.94	-319,374
Washington	Kennewick-Richland, WA	1,683	89	52.86	-21.17	-291,388	-9.46	-113,412
Washington	Bremerton-Silverdale, WA	1,573	84	53.10	-7.27	-79,866	6.50	62,171
Washington	Olympia-Tumwater, WA	1,348	87	64.66	14.27	132,767	31.24	253,054
Washington	Yakima, WA	1,289	101	78.23	22.73	227,806	40.96	357,370
Washington	Port Angeles, WA	1,004	27	26.88	-52.20	-359,409	-45.10	-270,380
Washington	Bellingham, WA	1,001	41	41.37	-26.91	-185,956	-16.06	-96,615
Washington	Rural Washington	1,845	53	28.89	-44.05	-511,818	-35.74	-361,585
Washington	Aggregate small CBSAs	6,155	232	37.62	-36.99	-1,658,178	-27.64	-1,078,620
West Virginia	Huntington-Ashland, WV-KY-OH	2,340	171	72.90	-7.65	-172,377	6.06	118,902
West Virginia	Charleston, WV	1,374	102	74.14	-2.75	-35,180	11.69	130,014
West Virginia	Rural West Virginia	2,982	250	83.97	18.87	484,752	36.52	816,935
West Virginia	Aggregate small CBSAs	3,411	336	98.52	22.16	743,351	40.30	1,177,153
Wisconsin	Milwaukee-Waukesha-West Allis, WI	5,564	372	66.84	-9.15	-456,772	4.34	188,748
Wisconsin	Madison, WI	2,978	144	48.32	-14.55	-298,926	-1.87	-33,364
Wisconsin	Green Bay, WI	1,033	59	57.10	-12.33	-101,188	0.69	4,909

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Wisconsin	Rural Wisconsin	4,706	228	48.45	-24.58	-906,148	-13.38	-429,399
Wisconsin	Aggregate small CBSAs	8,671	509	58.65	-12.36	-875,051	0.65	40,047
Wyoming	Rural Wyoming	1,483	83	56.19	-2.20	-22,846	12.33	111,521
Wyoming	Aggregate small CBSAs	2,555	155	60.54	5.19	93,116	20.81	324,997

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