

Medicare Data for the Geographic Variation Public Use File: A Methodological Overview July 2012 Update

Introduction

Federal policymakers and health researchers have long recognized that the amount and quality of the health care services that Medicare beneficiaries receive vary substantially across different regions of the United States. Much of that variation does not appear to be caused by differences in beneficiaries' health, and one widely-publicized estimate asserted that as much as 30 percent of Medicare expenditures may be unnecessary.¹

The Policy & Data Analysis Group (PDAG) within the Office of Information Products and Data Analytics (OIPDA) at the Centers for Medicare & Medicaid Services (CMS) has developed the Geographic Variation Public Use File (GV PUF) to support further analysis of this important issue. The July 2012 update to the GV PUF includes additional years of data (2007, 2009-2010) and several revisions to the CMS methodology. This update supersedes the data that we posted in July 2011.

This overview is divided into the following seven sections:

1. Key data sources
2. Study population
3. Geographic variables
4. Disease variables
5. Utilization measures
6. Quality measures
7. Changes from the original July 2011 PUF to the July 2012 update

1. Key Data Sources

The primary data source for these data is CMS's Chronic Condition Data Warehouse (CCW). The CCW contains 100 percent of Medicare claims for beneficiaries who are enrolled in the fee-for-service (FFS) program as well as enrollment and eligibility data.

The detailed nature of the CCW claims data makes it possible to analyze differences in utilization for specific settings of care or types of services. Some of the settings include inpatient hospital, outpatient hospital, multiple post-acute care settings (long-term care hospital, inpatient rehabilitation facility, skilled nursing facility, and home health agency), hospice, physicians, laboratories, and suppliers of durable medical equipment.

Physician services are defined using the Berenson-Eggers Type of Service (BETOS) classification scheme, which groups services into six major categories: physician evaluation and

¹ John Wennberg et al. *Tracking the Care of Patients with Severe Chronic Illness – The Dartmouth Atlas of Health Care 2008*, The Dartmouth Institute for Health Policy and Clinical Practice.

management, physician procedures, imaging, laboratory tests, durable medical equipment, and other. The total number of distinct BETOS codes is much larger – about 120 – when you count the numerous sub-groupings within those major categories.

We also incorporated several quality measures into the data. Those measures were derived from two publicly available sets of quality measures:

- Hospital Compare (HC), which was developed by CMS and uses data from hospitals and Medicare claims to create measures on inpatient processes, readmissions, and mortality.
- Prevention Quality Indicators (PQIs), which is software developed by the Agency for Healthcare Research and Quality (AHRQ) that uses administrative data to measure hospital admission rates for ambulatory care sensitive conditions.

Both sets of measures are well-known to health care researchers and have been endorsed by the National Quality Forum.

In addition to the quality measures described above, we also calculated the number of times that Medicare beneficiaries visited hospital emergency departments and all-cause hospital readmission rates.

2. Study Population

Our primary goal in developing the GV PUF was to allow users to analyze differences in health care utilization, prevalence of chronic conditions, and quality of care for Medicare beneficiaries living in different parts of the United States. We excluded certain categories of Medicare beneficiaries from our calculations to make those comparisons as meaningful as possible.

Table 1 shows the number and percent of beneficiaries excluded, by year. We applied the same exclusions to each year of the data. Note that whether individual beneficiaries were part of the study population could vary from year to year, depending on whether and when one of the exclusions described below applied to them.

First, we excluded beneficiaries who were enrolled at any point during the year in a Medicare Advantage (MA) plan. (There were 12.7 million beneficiaries in MA plans in 2010, about 25 percent of the overall total.) CMS began collecting encounter information for MA beneficiaries starting in January 2012, but the data is not ready for analysis yet.

Second, we excluded beneficiaries who first became eligible for Medicare after January of the calendar year (2.4 million) and thus have less than a full year of spending in our data.

Third, we excluded beneficiaries who were enrolled in Part A only or Part B only (3.6 million). Since those beneficiaries are enrolled in only one part of Medicare, their per-capita spending cannot be compared directly to spending for beneficiaries that are enrolled in both Part A and Part B.

Finally, we excluded beneficiaries who were under the age of 65 and received Medicare because they were either disabled or had end-stage renal disease (5.4 million).² We excluded those beneficiaries because they differ in numerous respects from the over-65 population and could have different health service needs that are difficult to adjust for across geographic regions.

We would like to note that our analytic files do include beneficiaries who died during the calendar year (about 5 percent of the study population) as long as they were not excluded for one of the reasons outlined above.

Table 2 provides some basic demographic information about the beneficiaries.

3. Geographic Variables

After considering a variety of alternatives, we decided to use hospital referral regions (HRRs), individual states, and the United States as a whole as the geographic units of analysis in the GV PUF. HRRs were developed by the Dartmouth Atlas of Health Care to delineate regional health care markets in the United States. See Appendix 1 for a complete list of HRRs.

The Dartmouth Atlas constructed HRRs by grouping ZIP codes together based on the referral patterns for tertiary care for Medicare beneficiaries. HRRs also had to have a minimum overall population of 120,000, and the residents of each HRR had to receive at least 65 percent of their hospitalizations within the HRR. There are 306 HRRs in the United States, and their boundaries often cross state lines. For example, the HRR for Memphis, Tennessee, includes parts of southeastern Missouri, eastern Arkansas, and northern Mississippi.

We assigned Medicare spending to HRRs and states based on where beneficiaries live, rather than where they received care. Although HRRs are smaller than states, they are large enough to encompass most of the care received by beneficiaries, even if they obtain care in multiple localities or counties. (We analyzed Medicare expenditure data and found that 80 percent of Medicare expenditures in 2010 occurred in the same HRR where the beneficiary lived.) Furthermore, HRRs generally have populations that are large enough to generate stable averages for comparisons of cost and utilization, even for narrowly defined combinations of conditions and services.

4. Disease Variables

The geographic variation in Medicare spending may be due, at least in part, to regional differences in the prevalence of particular diseases (or combinations of diseases). For example, Medicare spending in a particular area could be higher because the beneficiaries who live there are more likely to suffer from an expensive condition such as heart failure.

² Beneficiaries that are age 65 or older and originally qualified for Medicare on the basis of disability or ESRD are included in our study population.

Table 1: Study Population in the GV PUF

	2007		2008		2009		2010	
	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
Total Medicare beneficiaries	46,694,639	100.0%	47,850,425	100.0%	48,922,869	100.0%	50,043,200	100.0%
Beneficiaries excluded:								
Any enrollment in MA	9,592,587	20.5%	11,010,040	23.0%	12,061,222	24.7%	12,672,827	25.3%
First eligible after January	2,406,185	5.2%	2,410,137	5.0%	2,393,259	4.9%	2,400,978	4.8%
Part A only or Part B only	3,385,279	7.2%	3,506,402	7.3%	3,601,425	7.4%	3,639,412	7.3%
Younger than 65	5,060,431	10.8%	5,090,926	10.6%	5,177,593	10.6%	5,370,361	10.7%
Total excluded beneficiaries	20,444,482	42.7%	22,017,505	46.0%	23,233,499	48.6%	24,083,578	50.3%
Study population	26,250,157	56.2%	25,832,920	54.0%	25,689,370	52.5%	25,959,622	51.9%
Beneficiaries in study population that died in the year	1,374,679	5.2%	1,365,882	5.3%	1,307,640	5.1%	1,326,808	5.1%

Note: Percentages may not sum to totals because of rounding.

Table 2: Demographics of Beneficiaries in the GV PUF

	2007		2008		2009		2010	
	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
Total Medicare beneficiaries	26,250,157	100.0%	25,832,920	100.0%	25,689,370	100.0%	25,959,622	100.0%
By age:								
65 to 74	12,041,327	45.9%	12,012,203	46.5%	12,068,703	47.0%	12,304,079	47.4%
75 to 84	9,764,643	37.2%	9,375,944	36.3%	9,134,544	35.6%	9,076,776	35.0%
85 to 94	4,032,296	15.4%	4,027,912	15.6%	4,060,200	15.8%	4,137,177	15.9%
95+	411,891	1.6%	416,861	1.6%	425,923	1.7%	441,590	1.7%
By gender:								
Female	15,251,821	58.1%	14,953,519	57.9%	14,828,128	57.7%	14,925,092	57.5%
Male	10,998,336	41.9%	10,879,401	42.1%	10,861,242	42.3%	11,034,530	42.5%
By race/ethnicity:								
White, non-Hispanic	22,252,913	84.8%	21,845,113	84.6%	21,628,907	84.2%	21,739,980	83.7%
African-American	1,923,772	7.3%	1,878,094	7.3%	1,898,906	7.4%	1,946,697	7.5%
Hispanic	1,277,330	4.9%	1,283,506	5.0%	1,305,119	5.1%	1,342,213	5.2%
Asian/Pacific Islander	531,566	2.0%	552,533	2.1%	570,092	2.2%	595,601	2.3%
Other	264,576	1.0%	273,674	1.1%	286,346	1.1%	335,131	1.3%

Note: "Other" includes American Indian/Alaskan Native, other race, and unknown.

For this reason, we also include data on prevalence of disease for 14 different chronic conditions that are a standard part of the CCW data. Those conditions are:

- Acute myocardial infarction (heart attack)
- Asthma
- Atrial fibrillation
- Chronic kidney disease
- Chronic obstructive pulmonary disease
- Colorectal cancer
- Depression
- Diabetes
- Female breast cancer
- Heart failure
- Hypertension (high blood pressure)
- Ischemic heart disease
- Lung cancer
- Prostate cancer

The conditions listed above are not mutually exclusive, so they are best suited for measuring the overall prevalence of a particular condition within the Medicare population. At the same time, beneficiaries can (and often do) have more than one condition, and those additional conditions can cause substantial variation in utilization patterns.

5. Utilization measures

We created the GV PUF to analyze underlying differences in utilization among Medicare beneficiaries in different parts of the country. Those differences reflect variation in such factors as physicians' practice patterns and beneficiaries' ability and willingness to obtain care. We used the claims-level data from the CCW to generate three different types of utilization measures for each geographic region:

- The *number of times* that the beneficiaries in our study population used a particular service, expressed in terms of usage per 1,000 beneficiaries. We calculated these figures across all beneficiaries in our study population, not just the beneficiaries who used that particular service. The metrics that we used to measure utilization varied by the type of service and are described in more detail below.
- The *number of beneficiaries* in our study population who used a particular service
- The *percentage of beneficiaries* in our study population who used a particular service

We generated these utilization measures for 19 major service categories. Those categories are listed below, grouped by the units of measurement that we used for each service:

- Number of admissions, number of days of care³
 - Inpatient acute care hospitals paid under the prospective payment system (PPS)
 - Critical access hospitals (CAHs)
 - Other inpatient hospital care⁴
 - Inpatient hospital care (use of any type of hospital listed above)
 - Long-term care hospitals (LTCHs)
 - Inpatient rehabilitation facilities (IRFs)
 - Skilled nursing facilities (SNFs)
 - Hospice
- Number of episodes, number of visits
 - Home health
- Number of visits
 - Hospital outpatient services
 - Outpatient dialysis facilities
 - Clinics (federally-qualified health centers and rural health centers)
- Number of claims filed
 - Ambulatory surgical centers (ASCs)
 - Physician evaluation and management services
 - Physician procedures
 - Laboratory tests
 - Non-laboratory tests
 - Imaging
 - Durable medical equipment (DME)

We also generated figures for the number and percentage of beneficiaries using three other service categories: all post-acute care (comprising any use of LTCHs, IRFs, SNFs, or home health), prescription drugs covered under Part B, and other Part B services (which covers a range of services such as outpatient rehabilitation facilities, comprehensive outpatient rehabilitation facilities, community mental health centers, anesthesia, ambulances, chiropractors, and parenteral nutrition). We did not calculate the number of times that beneficiaries used those service categories because of the difficulty in devising a standard way to measure their utilization.

Finally, we also calculated four metrics on all-cause hospital readmissions⁵ and emergency room (ER) use:

- Total number of all-cause hospital readmissions
- All-cause hospital readmission rate (i.e., the number of readmissions divided by the total number of index admissions)

³ Our calculations for all hospital-related and SNF services were based only on Medicare-covered days.

⁴ This category includes hospitals such as inpatient psychiatric facilities and cancer hospitals.

⁵ We used all readmissions that took place within 30 days of the initial discharge.

- Total number of ER visits
- Total number of ER visits per 1,000 beneficiaries

6. Quality measures

The relationship between the quality and use of health care is an important element to consider when analyzing the geographic variation in Medicare utilization. For example, do areas with above-average utilization also provide high-quality care, or is there little correlation between the two?

The statistics on hospital readmissions and ER visits discussed above are useful in examining some issues related to the quality of care, such as continuity of care and access to primary care. We have supplemented those metrics by adding dozens of other quality-related measures to support additional analyses. We first selected individual quality measures from two different measure sets:

- Hospital Compare (HC), which was developed by CMS and uses data from hospitals and Medicare claims to measure processes and outcomes for hospital care for heart attack, heart failure, pneumonia, and surgical care.
- Prevention Quality Indicators (PQI), which is software developed by AHRQ that uses administrative data to measure hospital admission rates for ambulatory care sensitive conditions.

Those measure sets have been endorsed by the National Quality Forum and are well-known to health care researchers and quality improvement organizations. See Appendix 2 for a complete list of the measures in each measure set that we included in the data set.

Calculation of HRR-level and state-level scores for individual measures. The two data sets contain a total of 51 different measures. We decided not to use thirteen of those measures, either because they address issues that are not significant for the Medicare population (such as obstetric care and asthma) or because the sample size is too small. We then took the remaining 38 measures, which are usually reported for an individual ZIP code or provider, and aggregated them at the HRR and state level. We did so as follows:

- HC contains both process and outcomes measures. The process measures are based on a sample of each hospital's patients (both Medicare and non-Medicare); we used provider ZIP codes to identify the hospitals in each HRR or state and then calculated a weighted average for the HRR or state using each hospital's patient population for the three primary conditions measured (heart attack, heart failure, and pneumonia) as its weight.

The outcomes measures are based on each hospital's entire Medicare patient population. Those measures have underlying numerators and denominators. For example, the 30-day death rate for heart attack patients has the number of heart attack patients that died as the

numerator and the total number of heart attack patients as the denominator. We added the numerators for all hospitals in a given HRR or state and divided that figure by the sum of the denominators for those hospitals to generate the measure for the entire HRR or state.

- We downloaded the PQI software from the AHRQ website and applied it to inpatient claims. The software generates results by metropolitan statistical area; we then followed procedures developed by AHRQ to convert those results to the ZIP code level. We then added the results for all ZIP codes in each HRR or state.

We used AHRQ's software to calculate each PQI measure separately for beneficiaries between the ages of 65 and 74 and for those who were 75 or older.

7. Changes from the original July 2011 PUF to the July 2012 update

In July 2011 CMS posted a GV PUF with data for calendar year 2008. This July 2012 update provides data for 2007 to 2010 and reflects several revisions that we have made to our methodology since July 2011. Because we have changed our methodology, many of the 2008 values in the July 2012 update differ from those we provided earlier.

The overall impact of our revisions is shown in Appendix 3, which compares national-level figures for 2008 from the original July 2011 PUF and the July 2012 update. The following list provides an outline of the major methodological changes:

1. *Changes in how we identify beneficiaries with a given chronic condition.* A thorough review of the literature and consultation with experts identified several areas where the definitions for the CCW's chronic condition indicators could be improved. We applied these new definitions in the July update.
2. *Changes in how we assign beneficiaries to an HRR or state.*
 - a. *Changed the crosswalk for assigning beneficiaries to an HRR.* In July 2011, the 2008 HRR-to-ZIP code crosswalk was not available from the Dartmouth Atlas, so we used the 2007 file to assign beneficiaries to an HRR for 2008. For the July 2012 update, the 2008 crosswalk was available. Using the 2008 crosswalk resulted in minor changes in the counts of beneficiaries assigned to a given HRR for the 2008 file. (For 2007, 2009, and 2010 we used the crosswalk corresponding to the appropriate year.)
 - b. *Changed the method for assigning beneficiaries to a state.* In the July 2011 version, we assigned beneficiaries to a state using the first two digits of their Social Security Administration (SSA) state/county code and did not assign beneficiaries to counties. For this update, we wanted to build the capacity to do county-level analyses (although county-level data is not currently presented in publicly available data). Therefore, we assigned beneficiaries to both a state and a county, using the SSA state/county code. We used a crosswalk to identify the

state and county for each beneficiary's code, but some beneficiaries had codes (presumably incorrect) that did not appear in the crosswalk. In those cases, we gave the beneficiary both a missing state value and a missing county value. This resulted in more beneficiaries being assigned to a missing state (i.e., "XX"). Although the change impacted less than 0.1% of beneficiaries nationally, it had the largest impact in New Hampshire, where the number of beneficiaries decreased by 2.7%.

3. *Changes in the way we categorized claims into services.*

- a. *Categorized cancer hospitals as "Other Inpatient" rather than "Inpatient PPS Hospital".* We mistakenly included cancer hospitals in the figures for inpatient PPS hospitals in the July 2011 version. In this version, we fixed this error and categorized cancer hospitals as "Other Inpatient" instead. This change led to an increase in utilization in "Other Inpatient" and a small decrease in "Inpatient PPS Hospital." This change also led to a small decrease in the count of readmissions, because we exclude the "Other Inpatient" hospitals from our calculations.
- b. *Categorized all ASC claims as ASC.* In the July 2011 version, we categorized line items on ASC claims as "Other Part B" if they were not paid based on the ASC fee schedule. In this version, we have corrected this and now categorize all ASC claims as "ASC." This led to a small increase in ASC utilization.
- c. *Categorized all imaging services, including drugs, as "Imaging."* In the new version, we categorized imaging drugs as "Imaging." In the July 2011 PUF, we categorized imaging drugs as "Part B Drugs." This change resulted in a small increase in "Imaging" utilization and a decrease in "Part B Drugs."
- d. *Categorized all DME, including hospital beds and orthotic devices, as "DME."* In the July 2011 PUF, we categorized some DME services as "Other Part B." For this update, we categorized all DME services as "DME." This change resulted in a small increase in "DME" utilization and a decrease in "Other Part B."
- e. *Categorized anesthesia as "Other Part B."* In the July 2011 PUF, we included anesthesia services (services with a BETOS code of P0) in the "Procedures" category. For this update, we categorized anesthesia as "Other Part B." This change resulted in an increase in "Other Part B" utilization and a decrease in "Procedures."
- f. *Divided institutional Part B claims into three separate categories.* In the July 2011 version, we categorized all institutional Part B claims as "Hospital Outpatient." For this update, we broke this category into three smaller buckets: (1) hospital outpatient services (claims paid under the Outpatient Prospective Payment System and outpatient claims in a CAH), (2) outpatient dialysis facilities, and (3) clinics (FQHCs/RHCs). We took any institutional Part B claims

that did not fit into those buckets and combined them with other non-institutional Part B claims into a category called “Other Part B Services.”

4. *Changes in how we calculate ER visits.* In the initial version of this file, we did not include inpatient claims where Medicare made no payment when counting ER visits. For this update, we began counting ER visits on those claims, resulting in an increase in ER visits.
5. *Changes in how we calculate Hospital Compare results.* The July 2011 version of this file included Hospital Compare results for fiscal year 2008. Since the rest of the data we are releasing is for calendar year 2008, for this update we started calculating Hospital Compare results for the calendar year.
6. *Used AHRQ PQI Version 4.3 to calculate PQI rates.* AHRQ updated the methodologies for some of the PQIs in version 4.3 of its software.
 - a. *PQI 05 changed from “COPD” to “COPD or Asthma in Older Adults”.* This measure was limited to adults over 40 and changed to include asthma as well as COPD. The change led to an increase in the number of events.
 - b. *PQI 10 – Dehydration.* The logic was expanded to also include some secondary diagnosis codes when accompanied by a specific primary diagnosis. The change led to an increase in the number of events.
 - c. *PQI 15 changed from “Asthma” to “Asthma in Younger Adults”.* This measure was modified to only include admissions for asthma in adults age 18 to 40. Since the population for this data set is 65 and older, this measure was dropped.
 - d. *PQI 16 – Lower Extremity Amputation for Diabetics.* Cases with a toe amputation procedure are excluded. The change led to a decrease in the number of events.
7. *Dropped AHRQ Patient Safety Indicators (PSIs).* PSIs are a set of indicators providing information on potential in hospital complications and adverse events. After reviewing the PSI results using our data, we determined that the frequency of events was too low to report at an HRR or state level.

Appendix 1 - Hospital Referral Regions

We list HRRs by state and the name of the primary city or county within each HRR. For maps that show the specific boundaries for each HRR, please go to:

<http://www.dartmouthatlas.org/downloads/methods/geogappdx.pdf>.

Alabama (6)	Birmingham, Dothan, Huntsville, Mobile, Montgomery, Tuscaloosa
Alaska (1)	Anchorage
Arizona (4)	Mesa, Phoenix, Sun City, Tucson
Arkansas (5)	Fort Smith, Jonesboro, Little Rock, Springdale, Texarkana
California (24)	Alameda County, Bakersfield, Chico, Contra Costa County, Fresno, Los Angeles, Modesto, Napa, Orange County, Palm Springs, Redding, Sacramento, Salinas, San Bernadino, San Diego, San Francisco, San Jose, San Luis Obispo, San Mateo County, Santa Barbara, Santa Cruz, Santa Rosa, Stockton, Ventura
Colorado (7)	Boulder, Colorado Springs, Denver, Fort Collins, Grand Junction, Greeley, Pueblo
Connecticut (3)	Bridgeport, Hartford, New Haven
Delaware (1)	Wilmington
District of Columbia (1)	Washington
Florida (18)	Bradenton, Clearwater, Fort Lauderdale, Fort Myers, Gainesville, Hudson, Jacksonville, Lakeland, Miami, Ocala, Orlando, Ormond Beach, Panama City, Pensacola, Sarasota, St. Petersburg, Tallahassee, Tampa
Georgia (7)	Albany, Atlanta, Augusta, Columbus, Macon, Rome, Savannah
Hawaii (1)	Honolulu
Idaho (2)	Boise, Idaho Falls
Illinois (13)	Aurora, Bloomington, Blue Island, Chicago, Elgin, Evanston, Hinsdale, Joliet, Melrose Park, Peoria, Rockford, Springfield, Urbana
Indiana (9)	Evansville, Fort Wayne, Gary, Indianapolis, Lafayette, Muncie, Munster, South Bend, Terre Haute
Iowa (8)	Cedar Rapids, Davenport, Des Moines, Dubuque, Iowa City, Mason City, Sioux City, Waterloo
Kansas (2)	Topeka, Wichita
Kentucky (5)	Covington, Lexington, Louisville, Owensboro, Paducah
Louisiana (10)	Alexandria, Baton Rouge, Houma, Lafayette, Lake Charles, Metairie, Monroe, New Orleans, Shreveport, Slidell
Maine (2)	Bangor, Portland
Maryland (3)	Baltimore, Salisbury, Takoma Park
Massachusetts (3)	Boston, Springfield, Worcester
Michigan (15)	Ann Arbor, Dearborn, Detroit, Flint, Grand Rapids, Kalamazoo, Lansing, Marquette, Muskegon, Petoskey, Pontiac, Royal Oak, Saginaw, St. Joseph, Traverse City

Minnesota (5)	Duluth, Minneapolis, Rochester, St. Cloud, St. Paul
Mississippi (6)	Gulfport, Hattiesburg, Jackson, Meridian, Oxford, Tupelo
Missouri (6)	Cape Girardeau, Columbia, Joplin, Kansas City, Springfield, St. Louis
Montana (3)	Billings, Great Falls, Missoula
Nebraska (2)	Lincoln, Omaha
Nevada (2)	Las Vegas, Reno
New Hampshire (2)	Lebanon, Manchester
New Jersey (7)	Camden, Hackensack, Morristown, New Brunswick, Newark, Paterson, Ridgewood
New York (10)	Albany, Binghamton, Bronx, Buffalo, East Long Island, Elmira, Manhattan, Rochester, Syracuse, White Plains
New Mexico (1)	Albuquerque
North Carolina (9)	Asheville, Charlotte, Durham, Greensboro, Greenville, Hickory, Raleigh, Wilmington, Winston-Salem
North Dakota (4)	Bismarck, Fargo, Grand Forks, Minot
Ohio (10)	Akron, Canton, Cincinnati, Cleveland, Columbus, Dayton, Elyria, Kettering, Toledo, Youngstown
Oklahoma (3)	Lawton, Oklahoma City, Tulsa
Oregon (5)	Bend, Eugene, Medford, Portland, Salem
Pennsylvania (14)	Allentown, Altoona, Danville, Erie, Harrisburg, Johnstown, Lancaster, Philadelphia, Pittsburgh, Reading, Sayre, Scranton, Wilkes-Barre, York
Rhode Island (1)	Providence
South Carolina (5)	Charleston, Columbia, Florence, Greenville, Spartanburg
South Dakota (2)	Rapid City, Sioux Falls
Tennessee (7)	Chattanooga, Jackson, Johnson City, Kingsport, Knoxville, Memphis, Nashville
Texas (22)	Abilene, Amarillo, Austin, Beaumont, Bryan, Corpus Christi, Dallas, El Paso, Fort Worth, Harlingen, Houston, Longview, Lubbock, McAllen, Odessa, San Angelo, San Antonio, Temple, Tyler, Victoria, Waco, Wichita Falls
Utah (3)	Ogden, Provo, Salt Lake City
Vermont (1)	Burlington
Virginia (8)	Arlington, Charlottesville, Lynchburg, Newport News, Norfolk, Richmond, Roanoke, Winchester
West Virginia (3)	Charleston, Huntington, Morgantown
Wisconsin (8)	Appleton, Green Bay, La Crosse, Madison, Marshfield, Milwaukee, Neenah, Wausau
Washington (6)	Everett, Olympia, Seattle, Spokane, Tacoma, Yakima
Wyoming (1)	Casper

Appendix 2 – Quality Measures Included in the GV PUF

Hospital Compare (30 measures, calculated per 100 patients)

Heart attack patients given aspirin at arrival

Heart attack patients prescribed aspirin at discharge

Heart attack patients given ACE inhibitor or ARB for LVSD

Heart attack patients given smoking cessation advice / counseling

Heart attack patients given beta blocker at discharge

Heart attack patients given fibrinolytic medication within 30 minutes of arrival

Heart attack patients given PCI within 90 minutes of arrival

30-day death rate for heart attack patients

Hospital 30-day readmission rate for heart attack patients

Heart failure patients given discharge instructions

Heart failure patients given an evaluation of left ventricular systolic function

Heart failure patients given ACE inhibitor or ARB for LVSD

Heart failure patients given smoking cessation advice / counseling

30-day death rate for heart failure patients

Hospital 30-day readmission rate for heart failure patients

Pneumonia patients assessed and given pneumococcal vaccination

Pneumonia patients with initial ER blood culture performed prior to initial antibiotic in hospital

Pneumonia patients given smoking cessation advice / counseling

Pneumonia patients given initial antibiotic(s) within 6 hours of arrival

Pneumonia patients given the most appropriate initial antibiotic(s)

Pneumonia patients assessed and given influenza vaccination

30-day death rate for pneumonia patients

Hospital 30-day readmission rate for pneumonia patients

Surgery patients received preventative antibiotic(s) 1 hour before incision

Surgery patients received the appropriate preventative antibiotic(s) for their surgery

Surgery patients had preventative antibiotic(s) stopped within 24 hours after surgery

Cardiac surgery patients with controlled 6 AM postoperative blood glucose

Surgery patients with appropriate hair removal

Surgery patients whose doctors ordered VTE for certain types of surgeries

Surgery patients who received appropriate VTE within 24 hours before or after certain surgeries

Prevention Quality Indicators (8 measures, calculated per 100,000 beneficiaries age 65-74 and per 100,000 beneficiaries age 75+)

Diabetes long-term complications admission rate

Chronic obstructive pulmonary disease or asthma admission rate

Hypertension admission rate

Congestive heart failure admission rate

Dehydration admission rate

Prevention Quality Indicators, continued

Bacterial pneumonia admission rate

Urinary tract infection admission rate

Rate of lower extremity amputations among patients with diabetes

Readmissions and Emergency Room Use (4 measures)

Total number of hospital readmissions

Hospital readmission rate

Total number of emergency room visits

Total number of emergency room visits per 1,000 beneficiaries

Abbreviations: ACE = angiotensin-converting enzyme, ARB = angiotensin receptor blocker, ER = emergency room, LVSD = left ventricular systolic dysfunction, PCI = percutaneous coronary intervention, VTE = venous thromboembolism

Appendix 3 – Comparison of National-Level Figures for 2008 from the July 2011 PUF and the Revised July 2012 PUF

	July 2011 Data Set	July 2012 Data Set	Percent Change
<i>Demographics</i>			
Count of Medicare beneficiaries who have had a heart attack	275,532	273,444	-0.8%
Percent of Medicare beneficiaries who have had a heart attack	1.1	1.1	< -0.1%
Count of Medicare beneficiaries with atrial fibrillation	2,303,406	2,303,258	< -0.1%
Percent of Medicare beneficiaries with atrial fibrillation	8.9	8.9	< -0.1%
Count of Medicare beneficiaries with chronic kidney disease	3,373,952	3,370,850	-0.1%
Percent of Medicare beneficiaries with chronic kidney disease	13.1	13.1	< -0.1%
Count of Medicare beneficiaries with chronic obstructive pulmonary disease	2,872,653	3,065,689	6.7%
Percent of Medicare beneficiaries with chronic obstructive pulmonary disease	11.1	11.9	7.2%
Count of Medicare beneficiaries with depression	2,763,775	2,756,762	-0.3%
Percent of Medicare beneficiaries with depression	10.7	10.7	< -0.1%
Count of Medicare beneficiaries with diabetes	6,940,783	6,941,033	< 0.1%
Percent of Medicare beneficiaries with diabetes	26.9	26.9	< 0.1%
Count of Medicare beneficiaries with heart failure	4,657,051	4,656,325	< -0.1%
Percent of Medicare beneficiaries with heart failure	18.0	18.0	< -0.1%
Count of Medicare beneficiaries with ischemic heart disease	8,910,420	8,899,976	-0.1%
Percent Medicare beneficiaries with ischemic heart disease	34.5	34.5	< -0.1%
Count of Medicare beneficiaries with breast cancer	547,150	788,937	44.2%
Percent of Medicare beneficiaries with breast cancer	2.1	3.1	47.6%

	July 2011 Data Set	July 2012 Data Set	Percent Change
Count of Medicare beneficiaries with colorectal cancer	271,063	394,269	45.5%
Percent of Medicare beneficiaries with colorectal cancer	1.0	1.5	50.0%
Count of Medicare beneficiaries with lung cancer	274,264	299,319	9.1%
Percent of Medicare beneficiaries with lung cancer	1.1	1.2	9.1%
Count of Medicare beneficiaries with prostate cancer	871,167	983,340	12.9%
Percent of Medicare beneficiaries with prostate cancer	3.4	3.8	11.8%
Count of Medicare beneficiaries with asthma	N/A	1,029,370	N/A
Percent of Medicare beneficiaries with asthma	N/A	4.0	N/A
Count of Medicare beneficiaries with hypertension	N/A	15,388,998	N/A
Percent of Medicare beneficiaries with hypertension	N/A	59.6	N/A
<i>Inpatient Hospital (IPPS, CAH, other)</i>			
Users (with a covered stay)	5,478,028	5,478,067	< 0.1%
% of Beneficiaries Using IP	21.2%	21.2%	< 0.1%
Covered Admissions Per 1,000 Beneficiaries	341	341	0.0%
Covered Days Per 1,000 Beneficiaries	1,860	1,861	0.1%
<i>Inpatient PPS Hospital</i>			
# Users (with a covered stay)	5,247,147	5,239,062	-0.2%
% of Beneficiaries Using IP: IPPS	20.3%	20.3%	-0.2%
Covered Stays Per 1,000 Beneficiaries	322	321	-0.2%
Covered Days Per 1,000 Beneficiaries	1,733	1,728	-0.3%
<i>Critical Access Hospital</i>			
# Users (with a covered stay)	254,697	241,913	-0.5%
% of Beneficiaries Using IP: CAH	1.0%	0.9%	0.0%
Covered Stays Per 1,000 Beneficiaries	13	13	0.0%
Covered Days Per 1,000 Beneficiaries	51	51	0.0%

	July 2011 Data Set	July 2012 Data Set	Percent Change
<i>Other Inpatient Hospital</i>			
# Users (with a covered stay)	117,372	130,693	11.3%
% of Beneficiaries Using IP: OIP	0.5%	0.5%	11.3%
Covered Stays Per 1,000 Beneficiaries	6	7	13.0%
Covered Days Per 1,000 Beneficiaries	77	83	6.8%
<i>Post-Acute Care (LTCH, IRF, SNF, HH)</i>			
# Users (with a covered stay)	3,603,678	3,603,678	0.0%
% of Beneficiaries Using PAC	13.9%	13.9%	0.0%
<i>Inpatient Rehabilitation Facility</i>			
# Users (with a covered stay)	279,180	279,180	0.0%
% of Beneficiaries Using PAC: IRF	1.1%	1.1%	0.0%
Covered Stays Per 1,000 Beneficiaries	12	12	0.0%
Covered Days Per 1,000 Beneficiaries	156	156	0.0%
<i>Long-Term Care Hospital</i>			
# Users (with a covered stay)	88,482	88,483	< 0.1%
% of Beneficiaries Using PAC: LTCH	0.3%	0.3%	< 0.1%
Covered Stays Per 1,000 Beneficiaries	4	4	0.0%
Covered Days Per 1,000 Beneficiaries	104	104	0.0%
<i>Skilled Nursing Facility</i>			
# Users (with a covered stay)	1,617,048	1,617,050	< 0.1%
% of Beneficiaries Using PAC: SNF	6.3%	6.3%	< 0.1%
Covered Stays Per 1,000 Beneficiaries	89	89	0.0%
Covered Days Per 1,000 Beneficiaries	2,354	2,354	0.0%
<i>Home Health</i>			
# Users	2,613,023	2,613,023	0.0%
% of Beneficiaries Using PAC: HH	10.1%	10.1%	0.0%
Episodes Per 1,000 Beneficiaries	197	197	0.0%
Visits Per 1,000 Beneficiaries	3,837	3,837	0.0%
<i>Hospice</i>			

	July 2011 Data Set	July 2012 Data Set	Percent Change
# Users (with a covered stay)	748,409	748,409	0.0%
% of Beneficiaries Using Hospice	2.9%	2.9%	0.0%
Covered Stays Per 1,000 Beneficiaries	31	31	0.0%
Covered Days Per 1,000 Beneficiaries	2,059	2,059	0.0%
<i>Hospital Outpatient</i>			
# Users	18,181,261	16,618,069	-8.6%
% of Beneficiaries Using HOP	70.4%	64.3%	-8.6%
Visits Per 1,000 Beneficiaries	6,424	3,881	-39.6%
<i>Outpatient Dialysis Facility</i>			
# Users	N/A	161,527	N/A
% of Beneficiaries Using Outpatient Dialysis Facilities	N/A	0.6%	N/A
Visits Per 1,000 Beneficiaries	N/A	730	N/A
<i>Clinic (FQHC/RHC)</i>			
# Users	N/A	1,779,083	N/A
% of Beneficiaries Using Clinic	N/A	6.9%	N/A
Visits Per 1,000 Beneficiaries	N/A	326	N/A
<i>Ambulatory Surgical Center</i>			
# Users	2,769,462	2,769,636	< 0.1%
% of Beneficiaries Using ASC	10.7%	10.7%	< 0.1%
Events Per 1,000 Beneficiaries	197	198	0.2%
<i>Evaluation and Management (E&M)</i>			
# Users	23,691,820	23,691,823	< 0.1%
% of Beneficiaries Using E&M	91.7%	91.7%	< 0.1%
Events Per 1,000 Beneficiaries	13,698	13,698	0.0%
<i>Physician Procedures</i>			
# Users	16,888,980	16,849,610	-0.2%

	July 2011 Data Set	July 2012 Data Set	Percent Change
% of Beneficiaries Using Physician Procedures	65.4%	65.2%	-0.2%
Events Per 1,000 Beneficiaries	4,736	4,349	-8.2%
<i>Imaging</i>			
# Users	18,905,407	18,918,281	0.1%
% of Beneficiaries Using Imaging	73.2%	73.2%	0.1%
Events Per 1,000 Beneficiaries	4,367	4,433	1.5%
<i>Durable Medical Equipment (DME)</i>			
# Users	7,440,000	7,696,386	3.4%
% of Beneficiaries Using DME	28.8%	29.8%	3.4%
Events Per 1,000 Beneficiaries	1,808	1,888	4.5%
<i>Lab Tests</i>			
# Users	19,031,169	19,031,172	< 0.1%
% of Beneficiaries Using Lab Tests	73.7%	73.7%	< 0.1%
Events Per 1,000 Beneficiaries	9,014	9,014	0.0%
<i>Other Tests</i>			
# Users	13,204,021	13,204,023	< 0.1%
% of Beneficiaries Using Other Tests	51.1%	51.1%	< 0.1%
Events Per 1,000 Beneficiaries	1,653	1,653	0.0%
<i>Part B Drugs</i>			
# Users	14,541,423	14,338,076	-1.4%
% of Beneficiaries Using Part B Drugs	56.3%	55.5%	-1.4%
<i>Other Part B Services (institutional and non-institutional)</i>			
# Users	15,544,185	12,103,096	-22.1%
% of Beneficiaries Using Other Part B Services	60.2%	46.9%	-22.1%
<i>Readmissions and ER Visits</i>			

	July 2011 Data Set	July 2012 Data Set	Percent Change
Number of Acute Hospital Readmissions	1,559,687	1,553,660	-0.4%
Hospital Readmission Rate	18.6%	18.6%	-0.2%
Emergency Room Visits	13,945,322	14,203,842	1.9%
ER Visits per 1,000 Beneficiaries	540	550	1.9%
<i>Hospital Compare Measures</i>			
Heart attack patients given aspirin at hospital arrival	98.3	98.0	-0.3%
Heart attack patients with aspirin prescribed at hospital discharge	98.1	97.6	-0.5%
Heart attack patients prescribed angiotensin converting enzyme inhibitor or angiotensin receptor blocker at hospital discharge	95.0	93.9	-1.2%
Heart attack patients with smoking cessation counseling during hospital stay	99.2	98.8	-0.4%
Heart attack patients with beta blocker prescribed at hospital discharge	98.2	97.8	-0.4%
Heart attack patients with fibrinolytic received within 30 minutes of hospital arrival	48.0	45.4	-5.4%
Heart attack patients with percutaneous coronary intervention within 90 minutes of hospital arrival	85.3	80.5	-5.6%
Heart failure patients with discharge instructions	85.3	81.9	-4.0%
Heart failure patients with evaluation of left ventricular systolic function	97.1	96.0	-1.1%
Heart failure patients prescribed angiotensin converting enzyme inhibitor or angiotensin receptor blocker at hospital discharge	93.0	91.6	-1.5%
Heart failure patients with smoking cessation counseling	97.7	96.7	-1.0%
Pneumonia patients with pneumococcal vaccination	91.1	87.8	-3.6%
Pneumonia patients with appropriate initial antibiotic selection for community-acquired pneumonia in immunocompetent patients	90.7	89.1	-1.8%

	July 2011 Data Set	July 2012 Data Set	Percent Change
Pneumonia patients with blood cultures in emergency department before antibiotic administered	94.2	92.6	-1.7%
Pneumonia patients with influenza vaccination	88.1	85.2	-3.3%
Pneumonia patients with smoking cessation counseling	95.5	94.0	-1.6%
Pneumonia patients with initial antibiotic received within 6 hours of hospital arrival	94.6	93.8	-0.8%
Surgery patients with prophylactic antibiotic received within one hour prior to surgery incision	95.7	93.2	-2.6%
Surgery patients with appropriate prophylactic antibiotic selection	97.6	96.5	-1.1%
Surgery patients with prophylactic antibiotics discontinued within 24 hours after surgery end time	92.6	89.7	-3.1%
Cardiac surgery patients with controlled 6 A.M. postoperative blood glucose	91.6	86.5	-5.6%
Surgery patients with appropriate hair removal	99.0	97.4	-1.6%
Surgery patients with recommended venous thromboembolism prophylaxis ordered	92.8	91.7	-1.2%
Surgery patients who received appropriate venous thromboembolism prophylaxis between 24 hours prior to surgery and 24 hours after surgery	90.6	89.1	-1.7%
Hospital 30-day readmission rates for heart attack patients	19.4	19.3	-0.5%
Hospital 30-day readmission rates for heart failure patients	24.7	24.4	-1.2%
Hospital 30-day readmission rates for pneumonia patients	18.5	18.3	-1.1%
Hospital 30-day death (mortality) rates for heart attack patients	15.3	15.6	2.0%
Hospital 30-day death (mortality) rates for heart failure patients	10.9	10.8	-0.9%
Hospital 30-day death (mortality) rates for pneumonia patients	11.5	11.4	-0.9%

	July 2011 Data Set	July 2012 Data Set	Percent Change
<i>Prevention Quality Indicators</i>			
PQI03 Diabetes LT Complication Admission Rate (age 65-74)	276	271	-2.0%
PQI03 Diabetes LT Complication Admission Rate (age 75+)	325	319	-2.0%
PQI05 COPD Admission Rate (age 65-74)	839	1,029	22.6%
PQI05 COPD Admission Rate (age 75+)	1,048	1,288	22.9%
PQI07 Hypertension Admission Rate (age 65-74)	106	104	-1.4%
PQI07 Hypertension Admission Rate (age 75+)	190	187	-1.5%
PQI08 CHF Admission Rate (age 65-74)	888	854	-3.9%
PQI08 CHF Admission Rate (age 75+)	2,477	2,357	-4.8%
PQI10 Dehydration Admission Rate (age 65-74)	223	333	49.5%
PQI10 Dehydration Admission Rate (age 75+)	597	852	42.8%
PQI11 Bacterial Pneumonia Admission Rate (age 65-74)	773	739	-4.4%
PQI11 Bacterial Pneumonia Admission Rate (age 75+)	1,975	1,855	-6.1%
PQI12 UTI Admission Rate (age 65-74)	345	340	-1.4%
PQI12 UTI Admission Rate (age 75+)	1,258	1,236	-1.8%
PQI15 Adult Asthma Admission Rate (age 65-74)	217	N/A	N/A
PQI15 Adult Asthma Admission Rate (age 75+)	275	N/A	N/A
PQI16 Lower Extremity Amputation Admission Rate (age 65-74)	86	43	-50.4%
PQI16 Lower Extremity Amputation Admission Rate (age 75+)	82	44	-46.8%