Institute of Medicine (IOM) Geographic Variation Data Request: A Methodological Overview

February 2011

Introduction

This paper describes the methods used to generate the data in response to the request dated 18 January 2011 from Harvey V. Fineberg, President of the Institute of Medicine, and Joseph P. Newhouse, Committee Chair on the Study on Geographic Variation in Health Care, pertaining to data on geographic variation in Medicare. This overview is divided into the following seven sections:

1. Key data sources
2. Study population
3. Geographic variables
4. Disease variables
5. Standardization and risk adjustment of spending amounts
6. Utilization measures
7. Quality measures

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 CCW was designed as a database to support research on chronically ill beneficiaries, so it also contains other valuable features, such as a unique identifier for each beneficiary that makes it possible to track spending for individual beneficiaries over time and flags that indicate if a beneficiary has one or more of 21 specific chronic conditions.

The detailed nature of the CCW claims data makes it possible to analyze differences in cost and/or utilization for specific settings of care or types of services. [1] 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. The data in this request is for 2008.

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

[1] We excluded a small number of the CCW claims from the GV database because those claims either had extraordinarily high amounts of spending or because the difference between the Medicare payment amount and the standardized payment amount (discussed in more detail below) was extremely large. The claims that we excluded accounted for about 0.3 percent of total Medicare spending.

We also incorporated several quality measure sets into the data. Those measures were derived from three 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 (PQI), which is software developed by the Agency for Healthcare Research and Quality (AHRQ) that uses administrative date to measure hospital admission rates for ambulatory care sensitive conditions.

- Patient Safety Indicators (PSI), which is another AHRQ software product that uses administrative data for inpatient hospital stays to identify adverse events that occur during hospitalization.

All three 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

Since the primary goal of the data request is to analyze differences in health care utilization and spending for Medicare beneficiaries living in different parts of the United States, we created analytic files that exclude certain categories of Medicare beneficiaries to make those comparisons as meaningful as possible.

First, we did not include beneficiaries who were enrolled at any point during the year in a Medicare Advantage (MA) plan. (There were 11.0 million beneficiaries in MA plans in 2008, about 23 percent of the overall total.) CMS does not currently collect claims information for MA beneficiaries, so it is not possible to analyze their health care utilization or spending.

Second, we did not include beneficiaries who first became eligible for Medicare after January of the calendar year (2.3 million) and thus have less than a full year of spending in our data.

Third, we did not include beneficiaries who were enrolled in only Part A or Part B (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 did not include beneficiaries who were under the age of 65 and received Medicare because they were either disabled (4.9 million) or had end-stage renal disease (ESRD, 175,000).[2]

[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.

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.

Table 1: Study Population in IOM Requested Data

	Number	Percent
Total Medicare beneficiaries in 2008	47,850,425	100.0
Beneficiaries excluded from our analysis:		
Any enrollment in MA	11,010,040	23.0
First eligible after January 2008	2,344,071	4.9
Part A only or Part B only	3,572,468	7.5
Disabled	4,916,123	10.3
ESRD	174,803	0.4
Total excluded beneficiaries	22,017,505	46.0
Study population	25,832,920	54.0
Beneficiaries in study population that died during 2008	1,365,882	5.3

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

Table 2: Demographics of Beneficiaries in IOM Requested Data

	Number	Percent
Total Medicare beneficiaries, 2008	25,832,920	100.0
By age:		
65 to 74	12,012,203	46.5
75 to 84	9,375,944	36.3
85 to 94	4,027,912	15.6
95 +	416,861	1.6
By gender:		
Female	14,953,519	57.9
Male	10,879,401	42.1
By race:		
White, non-Hispanic	21,829,671	84.5

African-American	1,876,307	7.3
Hispanic	1,285,537	5.0
Asian / Pacific Islander	552,432	2.1
Other	288,973	1.1

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

3. Geographic Variables

Responding to the IOM request, we used hospital referral regions (HRRs) and states as the geographic units of analysis. 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 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. Our data show that 83 percent of Medicare expenditures in 2008 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.

For this reason, we also include data on prevalence of disease for 12 different chronic conditions that are a standard part of the CCW data. Those conditions are:

- Acute myocardial infarction (heart attack)
- Atrial fibrillation
- Chronic kidney disease
- Chronic obstructive pulmonary disease
- Colorectal cancer
- Depression

- Diabetes
- Female breast cancer
- Heart failure
- Ischemic heart disease
- Lung cancer
- Prostate cancer

The conditions listed on 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 spending and utilization patterns.

5. Standardization and risk adjustment

These data help the IOM to analyze underlying differences in resource use 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. However, Medicare spending and utilization can vary for reasons that are not attributable to practice patterns or willingness to seek care, and two of those reasons are particularly important. First, Medicare often pays different amounts for the same service in different areas (for example, to reflect variation in local wages or input prices). Second, the health of Medicare beneficiaries also varies geographically, and those differences will clearly affect spending and utilization.

To account for those factors, we modified the data from the CCW in two ways:

- We standardized Medicare's payment amounts to remove geographic differences in payment rates for individual services as a source of variation, and

- We adjusted for differences in beneficiaries' health using the risk-adjustment model that CMS uses to pay MA plans.

Standardization

To standardize payment rates, we examined Medicare's various FFS payment systems and identified the factors that lead to different payment rates for the same service. In general, those factors are adjustments that Medicare makes to account for local wages or input prices, and extra payments that Medicare makes to advance other program goals, such as compensating certain hospitals for the cost of training doctors. We then estimated what Medicare would have paid for each claim without those adjustments.

The process that we used to calculate standardized payments for each claim under the major FFS payment systems is summarized below. For additional detail, please refer to the Technical Supplement that appears at the end of this paper.

Inpatient acute care hospitals paid under the prospective payment system (PPS). We took the operating and capital base rates and multiplied them by the relative weight for each claim's

diagnosis-related group. We then added an adjusted outlier payment that the hospital received if the claim was for an unusually high-cost case.

Medicare uses the hospital wage index to adjust base rates and outlier payments to reflect local differences in wage levels. For example, the base payment rate in 2008 for chronic obstructive pulmonary disease (without any complications or comorbidities) was $4,412, but the amount that Medicare paid after the wage index was applied ranged from a low of $3,316 in rural Arkansas to a high of $8,506 in rural Alaska. We calculated all payment amounts with the wage index set at 1.0 to eliminate those differentials.

Our methodology excluded a number of other payments that hospitals can receive under the PPS: payments for medical education (both direct and indirect), payments to hospitals that serve a disproportionate share of low-income patients, payments for bad debt (deductibles and cost sharing that beneficiaries do not pay), and extra payments to certain rural hospitals such as sole community hospitals and Medicare-dependent hospitals.

Long-term care hospitals (LTCHs). We took the base payment rate for LTCHs and multiplied it by the relative weight for each claim's diagnosis-related group. We then added an adjusted outlier payment that the hospital received if the claim was for an unusually high-cost case.

Medicare uses the hospital wage index to adjust base rates and outlier payments for LTCHs. We used the core based statistical area (CBSA) wage index as a proxy due to limitations on data availability and calculated all payment amounts with the wage index set at 1.0 to eliminate those differentials.

Inpatient rehabilitation facilities (IRFs). We took the base payment rate for IRFs and multiplied it by the weight for each claim's case-mix-group. We then added an adjusted outlier payment that the hospital received if the claim was for an unusually high-cost case.

Medicare uses the hospital wage index to adjust base rates and outlier payments for IRFs. We used the CBSA wage index as a proxy due to limitations on data availability and calculated all payment amounts with the wage index set at 1.0 to eliminate those differentials.

Our methodology excluded the additional payments that Medicare makes to certain rural facilities, facilities that treat large numbers of low-income patients, and facilities that are part of teaching hospitals.

Inpatient psychiatric facilities (IPFs). We took the base payment rate for IPFs and followed Medicare's rules for adjusting that rate to account for the patient's age, the weight for their diagnosis-related group, length of stay, and comorbidities (if any). We then added an adjusted outlier payment that the hospital received if the claim was for an unusually high-cost case.

Medicare uses the hospital wage index to adjust base rates and outlier payments for IPFs. We used the CBSA wage index as a proxy due to limitations on data availability and calculated all payment amounts with the wage index set at 1.0 to eliminate those differentials.

Our methodology excluded the additional payments that Medicare makes to certain rural facilities, facilities that are part of teaching hospitals, facilities in Alaska and Hawaii, and facilities with emergency departments.

Skilled nursing facilities (SNFs). We took the base daily payment rates for SNFs (there are separate ones for urban and rural facilities; we used the average of the two) and multiplied the nursing and rehabilitation components by the appropriate weight for that claim's resource utilization group. By using the base payment rates, we eliminated the impact of the hospital wage index, which Medicare uses to adjust SNF payment rates. We then multiplied the overall daily rate by the number of days on the claim.

Home health services. We took the base rate for home health services and multiplied it by the weight for each claim's home health resource group. We then added an adjusted outlier payment that the home health agency received if the claim was for an unusually high-cost case.

Medicare uses a version of the hospital wage index to adjust base rates and outlier payments for home health services. We used the CBSA wage index as a proxy due to limitations on data availability and calculated all payment amounts with the wage index set at 1.0 to eliminate those differentials.

Hospice care. We used the base daily and hourly payment rates for hospice care as the standardized rates. By using the base payment rates, we eliminated the impact of the hospice wage index, which Medicare uses to adjust hospice payment rates.

Outpatient hospital services PPS. We took the conversion factor for outpatient services and multiplied it by the weight for the ambulatory payment classification for each claim. We then added an adjusted outlier payment that the hospital received if the claim was for an unusually high-cost case. We also included any pass-through payments for new technologies, but did not make any adjustments to those amounts. Finally, we followed Medicare rules by reducing payment amounts on claims for multiple or interrupted services by 50 percent.

Medicare uses the hospital wage index to adjust base rates and outlier payments for outpatient hospital services. We used the CBSA wage index as a proxy due to limitations on data availability and calculated all payment amounts with the wage index set at 1.0 to eliminate those differentials.

Our methodology excluded the additional hold-harmless payments that Medicare makes to certain cancer hospitals, children's hospitals, and rural hospitals, as well as the add-on payment for rural sole community hospitals.

Ambulatory surgical centers (ASCs). We took the conversion factor for ASC services and multiplied it by the relative weight for the ambulatory payment classification for each claim. By using just the conversion factor and the relative weights, we eliminated the impact of the hospital wage index, which Medicare uses to adjust ASC payment rates. We followed Medicare rules by reducing payment amounts on claims for multiple or interrupted services by 50 percent.

Physician services. Medicare uses three geographic practice cost indices to adjust payment rates for physician services. We eliminated those differentials by simply taking the appropriate facility or non-facility payment amount from the fee schedule. We followed Medicare rules by reducing payment amounts on claims for multiple services by 50 percent. We left in place the payment reductions that Medicare makes on claims submitted by non-participating physicians or non-physician providers (such as physician assistants and nurse practitioners).
Anesthesia services. For anesthesia claims, we used the base time unit, added any additional 15-minute time units, and multiplied the sum by the conversion factor. We left in place the payment reductions for multiple procedures or monitoring a certified registered nurse anesthetist.

Durable medical equipment (DME), prosthetics, and orthotics. Medicare pays for DME, prosthetics, and orthotics using a combination of state-specific fee schedules and a national fee schedule that has minimum and maximum payment amounts. (Starting in 2011, Medicare will use competitive bidding to pay for DME in some areas.) For DME claims, we used the ceiling amount on the national fee schedule as the payment amount for each claim. For prosthetics and orthotics, we used the average of the state-specific fees as the payment amount.

Laboratory services. Medicare also pays for laboratory services using a combination of state-specific fee schedules and a national fee schedule, although the latter is used for almost all claims. We took the payment amount for any claim that was paid under the state-specific fee schedules and replaced it with the corresponding amount from the national schedule.

Ambulance services. Medicare pays for ambulance services using a fee schedule that pays separately for mileage and for the level of support provided during the trip. We did not make any adjustments to payments for mileage-related codes. For all other codes, we used the average payment amount for each code as the standardized amount.

We did not adjust payment amounts for certain providers or services, such as critical access hospitals, federally-qualified health centers, and rural health centers (which are paid based on their costs); prescription drugs covered under Part B (which are paid using national rates); and parenteral and enteral nutrition claims.

We also were unable to fully standardize payments for inpatient and outpatient hospital services in Maryland. The state has a unique waiver that exempts it from the inpatient and outpatient PPSs and an all-payer rate setting commission develops rates for the state's hospitals. The only adjustment that we made to Maryland claims was to eliminate the effects of the hospital wage index.

Finally, we reduced all payment amounts to reflect any cost sharing that Medicare beneficiaries paid through a deductible, copayment, or coinsurance. For example, Part A had a deductible in 2008 of $1,024 for inpatient care and charged copayments on beneficiaries who received more than 60 days of inpatient care, while Part B had a deductible of $135 and required beneficiaries to pay coinsurance of 20 percent for most services.

Risk adjustment

CMS has developed a risk-adjustment model that uses HCCs (Hierarchical Condition Categories) to assign risk scores. Those scores estimate how beneficiaries' FFS spending will compare to the overall average for the entire Medicare population. The risk score for the overall average is set at 1.0; beneficiaries with scores greater than that are expected to have above-average spending, and vice versa. Risk scores are based on a beneficiary's age and sex; whether the beneficiary is eligible for Medicaid, first qualified for Medicare on the basis of disability, or lives in an institution (usually a nursing home); and the beneficiary's diagnoses from the previous year.[3] To facilitate comparisons of risk scores between an HRR or state and the average for the study population, we normalized an area's HCC score to the average for the study population. Given that the average HCC score for the study population is 1.15, this resulted in a decrease in the HCC score for all geographic regions.

CMS uses HCCs to determine the diagnosis-related portion of the risk score. The HCC system for 2008 includes a total of 189 conditions, with related conditions grouped into 70 disease hierarchies. For example, one hierarchy has three different diseases that affect the liver: end-stage liver disease, cirrhosis, and chronic hepatitis. Each condition has a weight that reflects its marginal contribution to a beneficiary's total expected Medicare costs.

Under the HCC system, CMS calculates the diagnosis-related portion of a beneficiary's risk score by adding up the weights for the most severe diagnosis that the beneficiary has in each disease hierarchy. Continuing the example above, a beneficiary with both cirrhosis (weight = 0.519) and acute hepatitis (weight = 0.303) would receive credit only for the cirrhosis diagnosis.[4] The researchers who developed the HCC system adopted this approach after finding that having multiple conditions within a hierarchy did not increase overall patient spending substantially.

We used total risk scores to adjust spending data at the HRR and state level.[5] The HCC model was designed for risk adjustment on larger populations, such as the enrollees in an MA plan, and generates more accurate results when used to compare groups of beneficiaries rather than individuals. The HCC model was also not designed to risk adjust spending at the service level and therefore is not applied to service level spending. The Medicare Payment Advisory Commission has used a similar approach in some of its work.[6]

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[3] Other methods of risk adjustment exist. For example, the Dartmouth Atlas has adjusted for risk in some of its recent research by comparing beneficiaries with the same chronic condition during the last two years of life and by comparing beneficiaries who are admitted to the hospital for the same reason. We decided to use the HCC model because it is generally regarded as the best risk-adjustment model available and is used by CMS for both MA and (in a modified form) Part D payment. However, the HCC model relies in part on diagnoses, so scores may reflect variation in physicians' practice patterns rather than beneficiaries' health status. For example, some areas with high utilization patterns may look riskier because more diagnoses will show up on claims.

[4] The HCC model for 2008 has two sets of weights: one for beneficiaries living in the community and another for beneficiaries living in an institution. This example uses the weights for a beneficiary living in the community. CMS also used the same HCC weights for 2007.

[5] To adjust spending we used the risk scores for a geographic area prior to normalizing.

[6] For example, see Medicare Payment Advisory Commission, *Measuring Regional Variation in Service Use*, December 2009.

By standardizing payment amounts and adjusting for differences in beneficiaries' health status, these data provide a more accurate picture of how resource use varies for Medicare beneficiaries across the country.

6. Utilization measures

In addition to standardizing and risk-adjusting spending amounts, we also calculated a series of figures that measure actual utilization for certain major types of Medicare-covered services. 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 17 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 care[7]
    - Inpatient acute care hospitals paid under the PPS
    - Critical access hospitals
    - Other inpatient hospital care[8]
    - Inpatient hospital care (use of any type of hospital listed above)
    - LTCHs
    - IRFs
    - SNFs
    - Hospice

- Number of episodes, number of visits
    - Home health

- Number of visits
    - Hospital outpatient services

- Number of claims filed
    - ASCs
    - Physician evaluation and management services

[7] Our calculations for all hospital-related and SNF services were based only on Medicare-covered days.
[8] This category includes hospitals such as IPFs and cancer hospitals.

- Physician procedures
- Laboratory tests
- Non-laboratory tests
- Imaging
- 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 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 five metrics on all-cause hospital readmissions[9] and emergency room (ER)[10] 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 admissions)
- Standardized all-cause hospital readmission costs as a percentage of standardized total admission costs
- Total number of ER visits
- Total number of ER visits per 1,000 beneficiaries

7. Quality measures

The relationships between the quality, use, and cost of health care are important elements to consider when analyzing the geographic variation in Medicare spending. For example, do areas with above-average spending 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 three different measure sets:

[9] We used all readmissions that took place within 30 days of the initial discharge.

[10] Our figures do not include inpatient ER visits – those that resulted in a subsequent inpatient admission – to critical access hospitals (CAHs). (Our figures do include outpatient ER visits to CAHs as well as all ER visits to PPS hospitals.) As a result, our figures underestimate ER use in areas with CAHs to some degree.

- 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.

- Patient Safety Indicators (PSI), which is another AHRQ software product that uses administrative data for inpatient hospital stays to identify adverse events that occur during hospitalization.

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.

Calculation of HRR-level and state-level scores for individual measures. The three data sets contain a total of 66 different measures. We decided not to use seven of those measures because they address issues that are not significant for the Medicare population, such as obstetric care and asthma. We then took the remaining 59 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.

- PSI measures also have numerators and denominators. We downloaded the PSI software from the AHRQ website and applied it to inpatient claims. The software generates results for each individual hospital; we then used provider ZIP codes to identify all hospitals in a given HRR or state. We added the numerators for all hospitals in an 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 used AHRQ's software to calculate each PQI and PSI measure separately for beneficiaries between the ages of 65 and 74 and for those who were 75 or older.

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

Appendix 1 - Hospital Referral Regions (continued)

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 (15)	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 Metrics

Table 1: Hospital Compare Indicators
Heart attack patients given aspirin at hospital arrival
Heart attack patients with aspirin prescribed at hospital discharge
Heart attack patients prescribed angiotensin converting enzyme inhibitor or angiotensin receptor blocker at hospital discharge
Heart attack patients with smoking cessation counseling during hospital stay
Heart attack patients with beta blocker prescribed at hospital discharge
Heart attack patients with fibrinolytic received within 30 minutes of hospital arrival
Heart attack patients with percutaneous coronary intervention within 90 minutes of hospital arrival
Heart failure patients with discharge instructions
Heart failure patients with evaluation of left ventricular systolic function
Heart failure patients prescribed angiotensin converting enzyme inhibitor or angiotensin receptor blocker at hospital discharge
Heart failure patients with smoking cessation counseling
Pneumonia patients with pneumococcal vaccination
Pneumonia patients with appropriate initial antibiotic selection for community-acquired pneumonia in immunocompetent patients
Pneumonia patients with blood cultures in emergency department before antibiotic administered
Pneumonia patients with influenza vaccination
Pneumonia patients with smoking cessation counseling
Pneumonia patients with initial antibiotic received within 6 hours of hospital arrival
Surgery patients with prophylactic antibiotic received within one hour prior to surgery incision
Surgery patients with appropriate prophylactic antibiotic selection
Surgery patients with prophylactic antibiotics discontinued within 24 hours after surgery end time
Cardiac surgery patients with controlled 6 A.M. postoperative blood glucose
Surgery patients with appropriate hair removal
Surgery patients with recommended venous thromboembolism prophylaxis ordered
Surgery patients who received appropriate venous thromboembolism prophylaxis between 24 hours prior to surgery and 24 hours after surgery
Hospital 30-day readmission rates for heart attack patients
Hospital 30-day readmission rates for heart failure patients
Hospital 30-day readmission rates for pneumonia patients
Hospital 30-day death (mortality) rates for heart attack patients
Hospital 30-day death (mortality) rates for heart failure patients
Hospital 30-day death (mortality) rates for pneumonia patients

Table 2: Prevention Quality Indicators (Rate per 100,000 people)
Adult Asthma Admission Rate (age 65-74 and age 75+)
Diabetes Long-term Complications Admission Rate (age 65-74 and age 75+)
Congestive Heart Failure Admission Rate (age 65-74 and age 75+)
Hypertension Admission Rate (age 65-74 and age 75+)
Dehydration Admission Rate (age 65-74 and age 75+)
Urinary Tract Infection Admission Rate (age 65-74 and age 75+)
Chronic Obstructive Pulmonary Disease (COPD) Admission Rate (age 65-74 and age 75+)
Bacterial Pneumonia Admission Rate (age 65-74 and age 75+)

Table 3: Patient Safety Indicators (rate per 100,000 people)
Pressure/decubitus ulcer (age 65-74 and age 75+)
Iatrogenic pneumothorax, secondary diagnosis field (age 65-74 and age 75+)
Central venous catheter-related bloodstream infections, secondary diagnosis field (age 65-74 and age 75+)
Postoperative pulmonary embolism or deep vein thrombosis (age 65-74 and age 75+)
Postoperative sepsis (age 65-74 and age 75+)
Accidental puncture or laceration (age 65-74 and age 75+)

Appendix 3 – All Indicators

Count of Beneficiaries
Average Age
Percent Female
Percent Male
Percent Non-Hispanic White
Percent African American
Percent Hispanic
Percent Asian American/Pacific Islander
Percent American Indian/Alaskan Native
Percent Other/ Unknown Race/Ethnicity
Percent Eligible for Medicaid
Average HCC (Hierarchical Condition Categories) Score expressed as a Ratio to the National Average
Count of Medicare beneficiaries who have had a heart attack
Percent of Medicare beneficiaries who have had a heart attack
Count of Medicare beneficiaries with atrial fibrillation
Percent of Medicare beneficiaries with atrial fibrillation
Count of Medicare beneficiaries with chronic kidney disease
Percent of Medicare beneficiaries with chronic kidney disease
Count of Medicare beneficiaries with chronic obstructive pulmonary disease
Percent of Medicare beneficiaries with chronic obstructive pulmonary disease
Count of Medicare beneficiaries with depression
Percent of Medicare beneficiaries with depression
Count of Medicare beneficiaries with diabetes
Percent of Medicare beneficiaries with diabetes
Count of Medicare beneficiaries with heart failure
Percent of Medicare beneficiaries with heart failure
Count of Medicare beneficiaries with ischemic heart disease
Percent Medicare Beneficiaries with ischemic heart disease
Count of Medicare beneficiaries with breast cancer
Percent of Medicare beneficiaries with breast cancer
Count of Medicare beneficiaries with colorectal cancer
Percent of Medicare beneficiaries with colorectal cancer
Count of Medicare beneficiaries with lung cancer
Percent of Medicare beneficiaries with lung cancer
Count of Medicare beneficiaries with prostate cancer
Percent of Medicare beneficiaries with prostate cancer
Total Actual Costs
Total Standardized Costs
Total Standardized Risk-Adjusted Costs
Actual Per Capita Costs
Standardized Per Capita Costs
Standardized Risk-Adjusted Per Capita Costs

IP Actual Costs (Inpatient – IPPS, CAH, Other IP)
IP Actual Costs as % of Total Actual Costs
IP Per Capita Actual Costs
IP Per User Actual Costs
IP Standardized Costs
IP Standardized Costs as % of Total Standardized Costs
IP Per Capita Standardized Costs
IP Per User Standardized Costs
IP Users
% of Beneficiaries Using IP
IP Admissions Per 1000 Beneficiaries
IP Days Per 1000 Beneficiaries
IP: IPPS Actual Costs (Inpatient Prospective Payment System)
IP: IPPS Actual Costs as % of Total Actual Costs
IP: IPPS Actual Costs as % of IP Actual Costs
IP: IPPS Per Capita Actual Costs
IP: IPPS Per User Actual Costs
IP: IPPS Standardized Costs
IP: IPPS Standardized Costs as % of Total Standardized Costs
IP: IPPS Standardized Costs as % of IP Standardized Costs
IP: IPPS Per Capita Standardized Costs
IP: IPPS Per User Standardized Costs
IP: IPPS Users
% of Beneficiaries Using IP: IPPS
IP: IPPS Admissions Per 1000 Beneficiaries
IP: IPPS Days Per 1000 Beneficiaries
IP: CAH Actual Costs (Critical Access Hospital)
IP: CAH Actual Costs as % of Total Actual Costs
IP: CAH Actual Costs as % of IP Actual Costs
IP: CAH Per Capita Actual Costs
IP: CAH Per User Actual Costs
IP: CAH Standardized Costs
IP: CAH Standardized Costs as % of Total Standardized Costs
IP: CAH Standardized Costs as % of IP Standardized Costs
IP: CAH Per Capita Standardized Costs
IP: CAH Per User Standardized Costs
IP: CAH Users
% of Beneficiaries Using IP: CAH
IP: CAH Admissions Per 1000 Beneficiaries
IP: CAH Days Per 1000 Beneficiaries
IP: Other IP Actual Costs (Other Inpatient)
IP: Other IP Actual Costs as % of Total Actual Costs
IP: Other IP Actual Costs as % of IP Actual Costs
IP: Other IP Per Capita Actual Costs
IP: Other IP Per User Actual Costs

IP: Other IP Standardized Costs
IP: Other IP Standardized Costs as % of Total Standardized Costs
IP: Other IP Standardized Costs as % of IP Standardized Costs
IP: Other IP Per Capita Standardized Costs
IP: Other IP Per User Standardized Costs
IP: Other IP Users
% of Beneficiaries Using IP: Other IP
IP: Other IP Admissions Per 1000 Beneficiaries
IP: Other IP Days Per 1000 Beneficiaries
PAC Actual Costs (Post Acute Care – IRF, LTCH, SNF, HH)
PAC Actual Costs as % of Total Actual Costs
PAC Per Capita Actual Costs
PAC Per User Actual Costs
PAC Standardized Costs
PAC Standardized Costs as % of Total Standardized Costs
PAC Per Capita Standardized Costs
PAC Per User Standardized Costs
PAC Users
% of Beneficiaries Using PAC
PAC: IRF Actual Costs (Inpatient Rehabilitation Facility)
PAC: IRF Actual Costs as % of Total Actual Costs
PAC: IRF Actual Costs as % of PAC Actual Costs
PAC: IRF Per Capita Actual Costs
PAC: IRF Per User Actual Costs
PAC: IRF Standardized Costs
PAC: IRF Standardized Costs as % of Total Standardized Costs
PAC: IRF Standardized Costs as % of PAC Standardized Costs
PAC: IRF Per Capita Standardized Costs
PAC: IRF Per User Standardized Costs
PAC: IRF Users
% of Beneficiaries Using PAC: IRF
PAC: IRF Admissions Per 1000 Beneficiaries
PAC: IRF Days Per 1000 Beneficiaries
PAC: LTCH Actual Costs (Long Term Care Hospital)
PAC: LTCH Actual Costs as % of Total Actual Costs
PAC: LTCH Actual Costs as % of PAC Actual Costs
PAC: LTCH Per Capita Actual Costs
PAC: LTCH Per User Actual Costs
PAC: LTCH Standardized Costs
PAC: LTCH Standardized Costs as % of Total Standardized Costs
PAC: LTCH Standardized Costs as % of PAC Standardized Costs
PAC: LTCH Per Capita Standardized Costs
PAC: LTCH Per User Standardized Costs
PAC: LTCH Users
% of Beneficiaries Using PAC: LTCH

PAC: LTCH Admissions Per 1000 Beneficiaries
PAC: LTCH Days Per 1000 Beneficiaries
PAC: SNF Actual Costs (Skilled Nursing Facility)
PAC: SNF Actual Costs as % of Total Actual Costs
PAC: SNF Actual Costs as % of PAC Actual Costs
PAC: SNF Per Capita Actual Costs
PAC: SNF Per User Actual Costs
PAC: SNF Standardized Costs
PAC: SNF Standardized Costs as % of Total Standardized Costs
PAC: SNF Standardized Costs as % of PAC Standardized Costs
PAC: SNF Per Capita Standardized Costs
PAC: SNF Per User Standardized Costs
PAC: SNF Users
% of Beneficiaries Using PAC: SNF
PAC: SNF Admissions Per 1000 beneficiaries
PAC: SNF Days Per 1000 Beneficiaries
PAC: HH Actual Costs (Home Health)
PAC: HH Actual Costs as % of Total Actual Costs
PAC: HH Actual Costs as % of PAC Actual Costs
PAC: HH Per Capita Actual Costs
PAC: HH Per User Actual Costs
PAC: HH Standardized Costs
PAC: HH Standardized Costs as % of Total Standardized Costs
PAC: HH Standardized Costs as % of PAC Standardized Costs
PAC: HH Per Capita Standardized Costs
PAC: HH Per User Standardized Costs
PAC: HH Users
% of Beneficiaries Using PAC: HH
PAC: HH Episodes Per 1000 Beneficiaries
PAC: HH Visits Per 1000 Beneficiaries
Hospice Actual Costs
Hospice Actual Costs as % of Total Actual Costs
Hospice Per Capita Actual Costs
Hospice Per User Actual Costs
Hospice Standardized Costs
Hospice Standardized Costs as % of Total Standardized Costs
Hospice Per Capita Standardized Costs
Hospice Per User Standardized Costs
Hospice Users
% of Beneficiaries Using Hospice
Hospice Admissions Per 1000 Beneficiaries
Hospice Days Per 1000 Beneficiaries
OP Actual Costs (Outpatient)
OP Actual Costs as % of Total Actual Costs
OP Per Capita Actual Costs

OP Per User Actual Costs
OP Standardized Costs
OP Standardized Costs as % of Total Standardized Costs
OP Per Capita Standardized Costs
OP Per User Standardized Costs
OP Users
% of Beneficiaries Using OP
OP Service Events Per 1000 Beneficiaries
ASC Actual Costs (Ambulatory Surgical Center)
ASC Actual Costs as % of Total Actual Costs
ASC Per Capita Actual Costs
ASC Per User Actual Costs
ASC Standardized Costs
ASC Standardized Costs as % of Total Standardized Costs
ASC Per Capita Standardized Costs
ASC Per User Standardized Costs
ASC Users
% of Beneficiaries Using ASC
ASC Service Events Per 1000 Beneficiaries
E&M Actual Costs (Evaluation and Management)
E&M Actual Costs as % of Total Actual Costs
E&M Per Capita Actual Costs
E&M Per User Actual Costs
E&M Standardized Costs
E&M Standardized Costs as % of Total Standardized Costs
E&M Per Capita Standardized Costs
E&M Per User Standardized Costs
E&M Users
% of Beneficiaries Using E&M
E&M Medicare service events per 1000 Beneficiaries
PROC Actual Costs (Procedures)
PROC Actual Costs as % of Total Actual Costs
PROC Per Capita Actual Costs
PROC Per User Actual Costs
PROC Standardized Costs
PROC Standardized Costs as % of Total Standardized Costs
PROC Per Capita Standardized Costs
PROC Per User Standardized Costs
PROC Users
% of Beneficiaries Using PROC
PROC Medicare service events per 1000
IMG Actual Costs (Imaging)
IMG Actual Costs as % of Total Actual Costs
IMG Per Capita Actual Costs
IMG Per User Actual Costs

IMG Standardized Costs
IMG Standardized Costs as % of Total Standardized Costs
IMG Per Capita Standardized Costs
IMG Per User Standardized Costs
IMG Users
% of Beneficiaries Using IMG
IMG Medicare service events per 1000
DME Actual Costs (Durable Medical Equipment)
DME Actual Costs as % of Total Actual Costs
DME Per Capita Actual Costs
DME Per User Actual Costs
DME Standardized Costs
DME Standardized Costs as % of Total Standardized Costs
DME Per Capita Standardized Costs
DME Per User Standardized Costs
DME Users
% of Beneficiaries Using DME
DME Medicare service events per 1000
LABTST Actual Costs (Laboratory Test)
LABTST Actual Costs as % of Total Actual Costs
LABTST Per Capita Actual Costs
LABTST Per User Actual Costs
LABTST Standardized Costs
LABTST Standardized Costs as % of Total Standardized Costs
LABTST Per Capita Standardized Costs
LABTST Per User Standardized Costs
LABTST Users
% of Beneficiaries Using LABTST
LABTST Medicare service events per 1000
OTHTST Actual Costs (Non-laboratory Test)
OTHTST Actual Costs as % of Total Actual Costs
OTHTST Per Capita Actual Costs
OTHTST Per User Actual Costs
OTHTST Standardized Costs
OTHTST Standardized Costs as % of Total Standardized Costs
OTHTST Per Capita Standardized Costs
OTHTST Per User Standardized Costs
OTHTST Users
% of Beneficiaries Using OTHTST
OTHTST Medicare service events per 1000
DRUG Actual Costs (Part B Drugs)
DRUG Actual Costs as % of Total Actual Costs
DRUG Per Capita Actual Costs
DRUG Per User Actual Costs
DRUG Standardized Costs

DRUG Standardized Costs as % of Total Standardized Costs
DRUG Per Capita Standardized Costs
DRUG Per User Standardized Costs
DRUG Users
% of Beneficiaries Using DRUG
OTHER Actual Costs (ambulance, chiropractics, parenteral nutrition, vision/hearing/speech, other)
OTHER Actual Costs as % of Total Actual Costs
OTHER Per Capita Actual Costs
OTHER Per User Actual Costs
OTHER Standardized Costs
OTHER Standardized Costs as % of Total Standardized Costs
OTHER Per Capita Standardized Costs
OTHER Per User Standardized Costs
OTHER Users
% of Beneficiaries Using OTHER
Number of Acute Hospital Readmissions
Hospital Readmission Rate
Hospital Readmission Costs as Percentage of Total Admissions Costs
Emergency Department Visits
Emergency Department Visits per 1,000 Beneficiaries
Heart attack patients given aspirin at hospital arrival
Heart attack patients with aspirin prescribed at hospital discharge
Heart attack patients prescribed angiotensin converting enzyme inhibitor or angiotensin receptor blocker at hospital discharge
Heart attack patients with smoking cessation counseling during hospital stay
Heart attack patients with beta blocker prescribed at hospital discharge
Heart attack patients with fibrinolytic received within 30 minutes of hospital arrival
Heart attack patients with percutaneous coronary intervention within 90 minutes of hospital arrival
Heart failure patients with discharge instructions
Heart failure patients with evaluation of left ventricular systolic function
Heart failure patients prescribed angiotensin converting enzyme inhibitor or angiotensin receptor blocker at hospital discharge
Heart failure patients with smoking cessation counseling
Pneumonia patients with pneumococcal vaccination
Pneumonia patients with appropriate initial antibiotic selection for community-acquired pneumonia in immunocompetent patients
Pneumonia patients with blood cultures in emergency department before antibiotic administered
Pneumonia patients with influenza vaccination
Pneumonia patients with smoking cessation counseling
Pneumonia patients with initial antibiotic received within 6 hours of hospital arrival
Surgery patients with prophylactic antibiotic received within one hour prior to surgery incision

Surgery patients with appropriate prophylactic antibiotic selection
Surgery patients with prophylactic antibiotics discontinued within 24 hours after surgery end time
Cardiac surgery patients with controlled 6 A.M. postoperative blood glucose
Surgery patients with appropriate hair removal
Surgery patients with recommended venous thromboembolism prophylaxis ordered
Surgery patients who received appropriate venous thromboembolism prophylaxis between 24 hours prior to surgery and 24 hours after surgery
Hospital 30-day readmission rates for heart attack patients
Hospital 30-day readmission rates for heart failure patients
Hospital 30-day readmission rates for pneumonia patients
Hospital 30-day death (mortality) rates for heart attack patients
Hospital 30-day death (mortality) rates for heart failure patients
Hospital 30-day death (mortality) rates for pneumonia patients
PQI03 Diabetes LT Complication Admission Rate (age 65-74)
PQI05 COPD Admission Rate (age 65-74)
PQI07 Hypertension Admission Rate (age 65-74)
PQI08 CHF Admission Rate (age 65-74)
PQI10 Dehydration Admission Rate (age 65-74)
PQI11 Bacterial Pneumonia Admission Rate (age 65-74)
PQI12 UTI Admission Rate (age 65-74)
PQI15 Adult Asthma Admission Rate (age 65-74)
PQI16 Lower Extremity Amputation Admission Rate (age 65-74)
PQI03 Diabetes LT Complication Admission Rate (age 75+)
PQI05 COPD Admission Rate (age 75+)
PQI07 Hypertension Admission Rate (age 75+)
PQI08 CHF Admission Rate (age 75+)
PQI10 Dehydration Admission Rate (age 75+)
PQI11 Bacterial Pneumonia Admission Rate (age 75+)
PQI12 UTI Admission Rate (age 75+)
PQI15 Adult Asthma Admission Rate (age 75+)
PQI16 Lower Extremity Amputation Admission Rate (age 75+)
PSI03: Pressure/Decubitus Ulcer Rate (age 65 -74)
PSI03: Pressure/Decubitus Ulcer Rate (age 75+)
PSI06: Iatrogenic Pneumothorax Rate (age 65-74)
PSI06: Iatrogenic Pneumothorax Rate (age 75+)
PSI07: Central Venous Catheter-related Bloodstream Infections Rate (age 65-74)
PSI07: Central Venous Catheter-related Bloodstream Infections Rate (age 75+)
PSI12: Postoperative Pulmonary Embolism or Deep Vein Thrombosis Rate (age 65-74)
PSI12: Postoperative Pulmonary Embolism or Deep Vein Thrombosis Rate (age 75+)
PSI13: Postoperative Sepsis Rate (age 65-74)
PSI13: Postoperative Sepsis Rate (age 75+)
PSI15: Accidental Puncture or Laceration Rate (age 65-74)
PSI15: Accidental Puncture or Laceration Rate (age 75+)