January 2017

Chronic Conditions among Medicare Beneficiaries: A Methodological Overview

The Office of Enterprise Data and Analytics, within the Centers for Medicare & Medicaid Services (CMS), has developed a set of information products and analytics examining chronic conditions among Medicare fee-for-service beneficiaries. Users can access chartbooks and chartpaks, tabular geographic data reports (data years 2007-2015), an interactive dashboard and atlas (data year 2015), as well as links to publications from the CMS website, http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Chronic-Conditions/index.html. CMS produces this information to provide researchers and policymakers a better understanding of the burden of chronic conditions among beneficiaries and the implications for our health care system. Information on prevalence, utilization, and Medicare spending for specific chronic conditions and multiple chronic conditions demonstrates the overall burden and complexity of chronic conditions among Medicare beneficiaries and can be used to identify high risk Medicare beneficiaries, as well as inform policy makers and providers about resource utilization of patients with chronic diseases.

This document provides an overview of the data, methods, and metrics used to develop the various chronic condition reports and supersedes all prior documentation and published reports.

Data Source and Study Population

Medicare is the United States' Federal health insurance program for persons aged 65 years or older, persons under age 65 years with certain disabilities, and persons of any age with end-stage renal disease (ESRD). The data used in the chronic condition reports are based upon CMS administrative enrollment and claims data for Medicare beneficiaries enrolled in the fee-for-service program. These data are available from the CMS Chronic Condition Data Warehouse (CCW), a database with 100% of Medicare enrollment and fee-for-service claims data[1].

For all the chronic condition public use files reporting prevalence, utilization and spending, the Medicare beneficiary population is limited to fee-for-service beneficiaries. We excluded Medicare beneficiaries with any Medicare Advantage enrollment during the year since claims data are not available for these beneficiaries. Also, we excluded beneficiaries who were enrolled at any time in the year in Part A only or Part B only, since their utilization and spending cannot be compared directly to beneficiaries enrolled in both Part A and Part B. Beneficiaries who died during the year were included up to their date of death if they met the other inclusion criteria[2].

[1] www.ccwdata.org

[2] In 2015, exclusions due to MA enrollment or Part A or B only enrollment were about 41.5% of the total population.

Chronic Conditions and Multiple Chronic Conditions

The CMS CCW database includes pre-defined indicators for chronic conditions and mental health conditions. To be consistent with the parameters outlined in the Department of Health and Human Services Initiative on Multiple Chronic Conditions (MCC)[3,4], we examined the following conditions:

Alzheimer's Disease and Related Dementia
Arthritis (Osteoarthritis and Rheumatoid)
Asthma
Atrial Fibrillation
Autism Spectrum Disorders
Cancer (Breast, Colorectal, Lung, and Prostate)
Chronic Kidney Disease
Chronic Obstructive Pulmonary Disease
Depression
Diabetes
Heart Failure
Hepatitis (Chronic Viral B & C)
HIV/AIDS
Hyperlipidemia (High cholesterol)
Hypertension (High blood pressure)
Ischemic Heart Disease
Osteoporosis
Schizophrenia and Other Psychotic Disorders
Stroke

A Medicare beneficiary is considered to have a chronic condition if the CMS administrative data have a claim indicating that the beneficiary received a service or treatment for the specific condition. Chronic conditions are identified by diagnoses codes on the Medicare claims. On October 1, 2015 the conversion from the 9th version of the International Classification of Diseases (ICD-9-CM) to version 10 (ICD-10-CM) occurred. Regardless of when a claim was submitted for payment, services that occurred prior to October 1, 2015, use ICD-9 codes. Chronic conditions identified in 2015 are based upon ICD-9 codes for the first ¾ of the year (January-September) and ICD-10 codes for the last quarter of the year (October-December). Detailed information on the identification of these conditions is available at the Chronic Condition Warehouse (www.ccwdata.org).

To classify MCC for each Medicare beneficiary, these conditions are counted and grouped into four categories (0-1, 2-3, 4-5 and 6 or more).

Co-morbidity: Dyads and Triads

Chronic condition co-morbidity is illustrated by the combinations of the 19 conditions listed above.

Chronic condition ***dyads*** represent the combinations of two chronic conditions among Medicare beneficiaries who have at least two of the conditions. There are 171 dyads.

[3] www.hhs.gov/ash/initiatives/mcc/

[4] Goodman, R.A., et al. Defining and Measuring Chronic Conditions: Imperatives for Research, Policy, Program, and Practice. *Preventing Chronic Disease.* 25 April 2013.
http://www.cdc.gov/pcd/collections/pdf/PCD_MCC_Collection_5-17-13.pdf.

Chronic condition ***triads*** represent the combinations of three chronic conditions among Medicare beneficiaries who have at least three of the conditions. There are 969 triads.

Geographic Information

Chronic condition information is presented at the national, state, county, and hospital referral region (HRR) levels and is based upon the beneficiary's residence, rather than where care was received. State/county FIPS codes are included.

State

A Medicare beneficiary's state of residence is based upon the state code available in the CMS enrollment database, which is provided by the Social Security Administration (SSA). If a beneficiary's SSA state code is unknown or if the SSA county code does not match the state, then the beneficiary is assigned to the "unknown" category. Washington, DC and the territories of Puerto Rico and Virgin Islands are listed at the state-level[5].

County

A Medicare beneficiary's county of residence is based upon both the state and county codes available in the CMS enrollment database, which is provided by the Social Security Administration (SSA), as well as Census Bureau definitions of Core Based Statistical Areas (CBSA)[6]. The CBSA treats cities and towns in the six New England states and independent cities in Virginia as counties, and they are classified as counties in the chronic condition reports. To designate the beneficiary's county, the SSA state/ county code is linked to 2010 CBSA data. If there is no corresponding information available from the CBSA data, then there is no county information for the beneficiary and the beneficiary is included in the "unknown" category.

Hospital Referral Region

The Dartmouth Atlas of Health Care created 306 Hospital Referral Regions (HRRs) to delineate local health care markets in the United States. Please refer to the Dartmouth Atlas for a complete description of HRRs[7]. A beneficiary's HRR is based upon linking the beneficiary's 5-digit zip code to the HRR crosswalk file provided by the Dartmouth Atlas. If the beneficiary zip code is not found in the HRR crosswalk, then the beneficiary's HRR is assigned to an "unknown" category.

[5] Information for Puerto Rico and the Virgin Islands are not available in the Chronic Conditions Dashboard.
[6] www.census.gov/population/metro/
[7] www.dartmouthatlas.org/data/region/

Medicare Enrollment and Socio-Demographic Information

Beneficiaries with Part A and Part B

Medicare Part A (hospital insurance) covers services including inpatient care at a hospital, skilled nursing facility (SNF), and hospice. Part A also covers services like lab tests and surgery. Medicare Part B (medical insurance) covers services including doctor and other health care providers' services, outpatient care, durable medical equipment, and some preventive services (https://www.medicare.gov/what-medicare-covers/index.html).

The number of beneficiaries with both Part A and B enrollment are included in the Medicare Beneficiary Characteristic tables.

Medicare Advantage Beneficiaries

Medicare Advantage (MA), sometimes called "Part C", includes both Part A (Hospital Insurance) and Part B (Medical Insurance). Enrollment in a MA Plan is like an HMO or PPO.

The number of beneficiaries in MA as well as the MA participation rate, which is calculated as the percent of Part A and Part B beneficiaries who are in enrolled in a MA program, are included in the Medicare Beneficiary Characteristic tables.

Fee-for-Service Beneficiaries

Fee-for-service, also known as Original Medicare, includes Part A (Hospital Insurance) and Part B (Medical Insurance).

Age

A beneficiary's age as of the end of the calendar year is available from the CMS enrollment database. Average age is presented for fee-for-service beneficiaries.

Sex

A beneficiary's sex is available from the CMS enrollment database and is classified as Male/Female.

Race and Ethnicity

All the chronic condition reports use the variable RTI_RACE_CD, which is available on the Master Beneficiary Files in the CCW. The RTI_RACE_CD variable improves the race/ethnicity classification on the CMS enrollment database, particularly for those who are Hispanic or Asian/Pacific Islander, by using Census surname lists for Hispanic and Asian/Pacific Islander origin as well as geography[8]. The race/ethnicity classifications are: Non-Hispanic White, Black or African American, Asian/Pacific Islander, Hispanic, and American Indian/Alaska Native.

[8] Eicheldinger, C and Bonito, A. Health Care Financing Review/Spring 2008/Volume 29, Number 3.

Medicare-Medicaid Enrollment

Beneficiaries enrolled in both Medicare and Medicaid are known as "dual eligibles." Medicare beneficiaries were classified as dual eligibles if in any month in the given calendar year they were receiving full or partial Medicaid benefits.

Measures

Prevalence

Prevalence estimates are calculated by taking the beneficiaries with a particular condition (or MCC category) divided by the total number of beneficiaries in our fee-for-service population, expressed as a percentage.

Emergency department visits

The total number of emergency department visits for a beneficiary includes visits where the beneficiary was released from the outpatient setting and where the beneficiary was admitted to an inpatient setting. ED visits are presented as the number of visits per 1,000 beneficiaries.

For specific chronic conditions, the numerator is the number of ED visits for beneficiaries with the chronic condition. The ED visit may or may not be associated with the chronic condition. The denominator is the number of beneficiaries with the chronic condition.

For MCC, ED visits are presented within MCC category (e.g. 0-1, 2-3, 4-5, or 6+). The numerator is the number of ED visits among beneficiaries for the specific MCC category and the denominator is the number of beneficiaries in the specific MCC category.

Hospital readmissions

A readmission is defined as an admission to an acute care hospital for any cause within 30 days of discharge from an acute care hospital. Except when the patient died during the stay, each inpatient stay is classified as an index admission, a readmission, or both. Transfer from one acute care hospital to another on the same day is counted as a single stay and, thus, one index admission. Under this definition, a readmission for a given year (e.g., 2015) could occur as late as January 30 of the following year (e.g., 2016). Readmission rates are expressed as a percentage of all admissions.

For specific chronic conditions, the numerator is the number of readmissions for beneficiaries with the chronic condition. The denominator is the number of admissions for beneficiaries with the chronic condition. The admission or readmission may or may not be associated with the chronic condition.

For MCC, readmissions are presented within MCC category (e.g. 0-1, 2-3, 4-5, or 6+). The numerator is the number of readmissions among beneficiaries for the specific MCC category and the denominator is the number of admissions among beneficiaries in the specific MCC category.

Medicare spending

Medicare spending includes total Medicare payments for all Medicare covered services in Parts A and B and is presented per beneficiary (i.e. per capita).

Both total actual payments and total standardized payments are presented. Standardized payments are presented to allow for comparisons across geographic areas in health care use among Medicare beneficiaries. Standardization removes geographic differences in payment rates for individual services, such as those that account for local wages or input prices and makes Medicare payments across geographic areas comparable, so that differences reflect variation in factors such as physicians' practice patterns and beneficiaries' ability and willingness to obtain care. While standardization does account for the different amounts Medicare pays for the same service in different areas, it does not adjust for differences in beneficiaries' health status. More information on the standardization of Medicare payments can be found in the additional resources listed at the end of this document.

For specific chronic conditions, the numerator is total Medicare spending for beneficiaries with the chronic condition. The denominator is the number of beneficiaries with the chronic condition. Medicare spending may or may not be associated with the chronic condition.

For MCC, Medicare spending is presented within MCC category (e.g. 0-1, 2-3, 4-5, or 6+). The numerator is total Medicare spending among beneficiaries for the specific MCC category and the denominator is the number of beneficiaries in the specific MCC category.

Notes on Data Interpretation

On October 1, 2015 the conversion from the 9th version of the International Classification of Diseases (ICD-9-CM) to version 10 (ICD-10-CM) occurred. Regardless of when a claim was submitted for payment, services that occurred prior to October 1, 2015, use ICD-9 codes. Chronic conditions identified in 2015 are based upon ICD-9 codes for the first ¾ of the year (January-September) and ICD-10 codes for the last quarter of the year (October-December); for this reason, there is data discontinuity for estimates between 2015 and previous years. Preliminary comparisons between 2014 and 2015 showed only modest changes in prevalence for most of the chronic conditions, which largely were consistent with changes observed in previous years. This is to be expected given that three-quarters of the data for 2015 still utilize ICD-9 codes. Two exceptions are asthma and chronic kidney disease, where we observed increases in prevalence of 2-3 percentage points, which was higher than what had been observed in previous years.

Prevalence

Estimates of prevalence for the 19 individual chronic conditions do not mean that the beneficiary has only that condition, as beneficiaries may have any of the other conditions examined or conditions not included in our list. Estimates of the prevalence of MCC may vary from other sources, as estimates of MCC will be influenced by the number and type of conditions that are used. Also, although these reports include a broad set of common chronic conditions, our set of conditions excludes important behavioral

disorders, such as substance abuse disorders, and developmental conditions, which are prevalent among the Medicare-Medicaid enrollee population ages 18-64 years– also known as dual eligibles. Prevalence estimates are not age or sex adjusted and since women tend to live longer than men, women would be expected to have more chronic conditions. Finally, these geographic-level estimates (e.g. state, county, HRR) are measures of the overall magnitude of chronic conditions in the Medicare population and do not take into account differences in the composition of beneficiaries across areas. Similarly differences in beneficiary characteristics across geographic areas, such as the proportion of disabled or dually-eligible beneficiaries, have not been adjusted for and may explain some geographic variability.

Geographic variation in prevalence estimates of chronic conditions and MCC can be affected by using diagnoses on administrative claims to infer the presence of a chronic condition. Variability in coding diagnoses can lead to both the over and under diagnosis of specific conditions and affect estimates of chronic conditions (Singh, 2009). Also, there is evidence that regional variation in care is associated with the supply of health care resources, which can affect prevalence estimates; since in places where more health care resources are available, the likelihood that diagnoses will be identified may be increased.

Utilization and Medicare Spending

The Medicare utilization and payment information presented for the 19 conditions represents beneficiaries with the condition. The information should not be used to attribute utilization or payments strictly to the specific condition selected as beneficiaries with any of the specific conditions presented may have other health conditions that contribute to their Medicare utilization and payment amounts. For example, in 2014 the average Medicare payments for fee-for-service beneficiaries with atrial fibrillation were $ 24,643– this average includes beneficiaries with only atrial fibrillation as well as beneficiaries with atrial fibrillation and other health conditions. Similarly, utilization and Medicare spending information presented by the number of chronic conditions may include services and expenditures not related to the chronic conditions examined.

Suppression Criteria

CMS is obligated by the federal Privacy Act, 5 U.S.C. Section 552a and the HIPAA Privacy Rule, 45 C.F.R Parts 160 and 164, to protect the privacy of individual beneficiaries and other persons. All direct identifiers have been removed and information is suppressed that is based upon one (1) to eleven (11) beneficiaries. Suppressed data are noted by an asterisk “*”. Counter or secondary suppression is applied in cases where only one geographic area is suppressed for primary reasons, e.g. one county in a state has between 1 and 11 beneficiaries. In these cases, the geographic area with the next smallest count of fee-for-service beneficiaries is suppressed as well. Also, if one sub-group (e.g. age group) is suppressed, then the other sub-group is suppressed.

More detailed information on the data sources and measures can be found at:

Chronic Condition Data Warehouse. Chronic Condition Categories. Retrieved from http://www.ccwdata.org/chronic-conditions/index.htm.

Centers for Medicare & Medicaid Services. Geographic Variation Public Use File: A Methodological Overview. Baltimore, MD. 2013. Retrieved from http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/index.html.

Centers for Medicare & Medicaid Services. Geographic Variation Public Use File: Technical Supplement on Standardization. Baltimore, MD. 2013. Retrieved from http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/index.html.

Brian E. O'Donnell, Kathleen M. Schneider, John M. Brooks, Gregory Lessman, June Wilwert, et al. Standardizing Medicare Payment Information to Support Examining Geographic Variation in Costs. *MMRR 2013*: Volume 3 (3). Accessed from http://www.cms.gov/mmrr/Articles/A2013/MMRR2013_003_03_a06.htm.