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Multiple Chronic Conditions Among Medicare Beneficiaries: State-level Variations in Prevalence, Utilization, and Cost, 2011

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Objectives: Individuals with multiple (>2) chronic conditions (MCC) present many challenges to the health care system, such as effective coordination of care and cost containment. To assist health policy makers and to fill research gaps on MCC, we describe state-level variation of MCC among Medicare beneficiaries, with a focus on those with six or more conditions.

Methods: Using Centers for Medicare & Medicaid Services administrative data for 2011, we characterized a beneficiary as having MCC by counting the number of conditions from a set of fifteen conditions, which were identified using diagnosis codes on the claims. The study population included fee-for-service beneficiaries residing in the 50 U.S. states and Washington, DC

Results: Among beneficiaries with six or more chronic conditions, prevalence rates were lowest in Alaska and Wyoming (7%) and highest in Florida and New Jersey (18%); readmission rates were lowest in Utah (19%) and highest in Washington, DC (31%); the number of emergency department visits per beneficiary were lowest in New York and Florida (1.6) and highest in Washington, DC (2.7); and Medicare spending per beneficiary was lowest in Hawaii (\$24,086) and highest in Maryland, Washington, DC, and Louisiana (over \$37,000).

Conclusion: These findings expand upon prior research on MCC among Medicare beneficiaries at the national level and demonstrate considerable state-level variation in the prevalence, health care utilization, and Medicare spending for beneficiaries with MCC. State-level data on MCC is important for decision making aimed at improved program planning, financing, and delivery of care for individuals with MCC.

Keywords: Administrative Data Uses, Chronic Disease, Geographic, Spatial Factors, Small area variations, Medicare

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Introduction

While it is estimated that approximately one in four Americans have at least two chronic conditions that require ongoing medical care (Anderson, 2010), the burden of multiple (≥ 2) chronic conditions (MCC) among Medicare beneficiaries is even greater. Over two-thirds of Medicare beneficiaries in traditional Medicare, also known as fee-for-service, have two or more chronic conditions and about 1 in 7 (14%) have 6 or more. Among beneficiaries with three or more chronic conditions, one-third have hypertension and high cholesterol along with diabetes or ischemic heart disease (Centers for Medicare & Medicaid Services, 2012a). The co-occurrence of chronic conditions has far-reaching implications for treatment, coordination of care, and health care costs among Medicare beneficiaries. Beneficiaries with MCC have increased hospital readmissions and emergency department visits, which are commonly cited indicators of poor quality or poorly coordinated care, and important drivers of increased Medicare spending. MCC's burden is starkly demonstrated by the 14% of beneficiaries with 6 or more chronic conditions that account for almost half of total Medicare spending (Centers for Medicare & Medicaid Services, 2012a).

In 2010, the Department of Health and Human Services released a strategic framework on MCC to help in improving coordination of clinical services, public health programs, and research priorities relating to MCC. One of the framework's four main goals was to facilitate research addressing key knowledge gaps about MCC (U.S. Department of Health and Human Services, 2010). Previous research on MCC has focused on national-level populations—such as community-dwelling adults (Hwang, Weller, Ireys, & Anderson, 2001; Anderson, 2010), Medicare beneficiaries (Wolff, Starfield, & Anderson, 2002; Lochner & Cox, in press), and veteran populations (Lee et al., 2007; Steinman et al., 2012). While these studies have highlighted the important issue of MCC for health care, characterizing geographic variations of MCC would be useful for targeting service delivery, resource projections, and program planning. This would be particularly useful at the state-level, as states increasingly play a key role in the financing, regulation, and delivery of health care, yet few data sources support this level of analysis and, consequently, little is known about differences in health care use and spending across states for populations with MCC. Data from the Centers for Medicare & Medicaid Services (CMS) can fill these research gaps. We, therefore, used CMS data to examine state-level prevalence, utilization, and expenditure patterns of MCC to assist health policy makers and to further the research objectives of the HHS strategic framework, focusing on beneficiaries with six or more chronic conditions (MCC6+). In this report, we describe state-level patterns of MCC6+ populations in terms of prevalence, hospital readmission rates, emergency department visits, and Medicare spending.

Methods

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). We examined state-level patterns in MCC using the CMS administrative enrollment and claims data, for Medicare beneficiaries enrolled in the fee-for-service program for 2011, which are available from the CMS Chronic Condition Data Warehouse, a database with 100% of Medicare enrollment and fee-for-service claims data (Chronic Condition Data Warehouse, 2012).

The study population is limited to fee-for-service Medicare beneficiaries residing in the 50 U.S. states and Washington, DC, and who were continuously enrolled in Medicare fee-for-service parts A and B for 2011. We excluded beneficiaries with any Medicare Advantage enrollment during the year—since claims data are not available for these beneficiaries—and those who first became eligible for Medicare after January 1st of the calendar year. We included beneficiaries who died during the year up to their date of death if they met the other inclusion criteria. For 2011, the study population included 31.6 million Medicare beneficiaries and represented 61% of all Medicare beneficiaries enrolled during 2011. Most beneficiary exclusions were for persons enrolled in Medicare Advantage, which represented 13.4 million (approximately 26%) of the total Medicare population in 2011.

Measures

Chronic Conditions

The CMS Chronic Condition Warehouse database includes pre-defined indicators for 27 chronic conditions (Chronic Condition Data Warehouse, 2012). For this characterization of MCC, we included 18 of these conditions that are consistent with the parameters outlined in a recent report from the Department of Health and Human Services (Goodman, Posner, Huang, Parekh, & Koh, in press). Since we collapsed the four cancer sites into one cancer category, we included the following 15 conditions: arthritis, Alzheimer's disease and related dementia, asthma, atrial fibrillation, cancer (breast, colorectal, lung, and prostate), chronic kidney disease, chronic obstructive pulmonary disease (COPD), depression, diabetes, heart failure, hyperlipidemia, hypertension, ischemic heart disease, osteoporosis, and stroke. A Medicare beneficiary was considered to have a chronic condition if the CMS administrative data had a claim indicating that the beneficiary was receiving a service or treatment for the specific condition. For example, to identify a beneficiary with hyperlipidemia during 2010, at least 1 inpatient, skilled nursing facility, or home health claim, or 2 outpatient or carrier claims had to include any of the following diagnosis codes from the *International Classification of Diseases, 9th Revision, Clinical Modification*: 272.0, 272.1, 272.2, 272.3, 272.4. (Detailed information on the

identification of chronic conditions is available at the Chronic Condition Data Warehouse, 2012). Chronic conditions were counted and grouped into four categories (0–1, 2–3, 4–5 and 6 or more).

Hospital Readmissions

A readmission was 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 was classified as an index admission, a readmission, or both. Transfer from one acute care hospital to another on the same day was counted as a single stay and, thus, one index admission. Under this definition, a readmission for a given year (e.g., 2011) could occur as late as January 30 of the following year (e.g., 2012) (Centers for Medicare & Medicaid Services, 2013a). Readmission rates are calculated as the number of readmissions divided by the number of admissions and expressed as a percentage of all admissions.

Emergency Department Visits

The total number of emergency department visits a beneficiary had in 2011 included 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 beneficiary (Centers for Medicare & Medicaid Services, 2013a).

Medicare Spending

Medicare spending included total Medicare payments for all Medicare covered services in 2011 and is presented as Medicare spending per beneficiary (per capita). To make Medicare payments across geographic areas comparable, and to reflect variation due to utilization patterns, payments have been standardized to remove geographic differences in payment rates for individual services, such as those that account for local wages or input prices (Centers for Medicare & Medicaid Services, 2013b).

Results

Exhibit 1 presents the characteristics of Medicare fee-for-service beneficiaries by state in 2011. Nationally, beneficiaries aged 65 years and older represented 82.6% of the Medicare population, but by state ranged from 73.9% in West Virginia to 87.7% in Arizona. Overall, while 9.7% of beneficiaries were non-Hispanic Black and 5.6% were Hispanic, there was considerable racial and ethnic variation by state: the percentage of non-Hispanic Black beneficiaries was lowest in Idaho and Montana (0.2%) and highest in Washington, DC (65.4%), followed by Mississippi (27.8%) and Louisiana (26.8%). The percentage of Hispanic beneficiaries was lowest in North Dakota, Maine, Kentucky, and West Virginia (all 0.4%), and highest in New Mexico (29.7%) followed by Texas (17.6%) and California (17.1%). More than one in five beneficiaries (22.1%) was enrolled in both Medicare and Medicaid, also referred to as dual-eligibles: the percentage of

dual-eligibles was lowest in Arizona (11.1%) and Utah (11.8%) and highest in Maine (40.3%) and Washington, DC (36.1%).

Exhibit 1. Characteristics of the Medicare Population by State: 2011

	Age ¹		Sex		Race/ethnicity ²				Medicare-Medicaid enrollee ³
	Less than 65 years	65 years and older	Men	Women	Non Hispanic White	Non Hispanic Black	Hispanic	Asian/PI	
	Percentage (%)								
National	17.5	82.6	44.4	55.6	81.1	9.7	5.6	2.2	22.1
Alabama	22.4	77.7	43.7	56.3	78.9	19.9	0.5	0.3	22.3
Alaska	17.4	82.6	49.4	50.6	74.7	2.7	2.3	3.8	24.7
Arizona	12.3	87.7	47.6	52.4	84.7	2.3	7.8	1.0	11.1
Arkansas	21.3	78.7	44.7	55.3	87.3	10.7	0.9	0.4	23.7
California	17.3	82.7	45.8	54.2	64.6	5.9	17.1	10.2	32.0
Colorado	16.0	84.0	46.4	53.6	84.9	3.2	9.5	1.2	15.4
Connecticut	14.4	85.6	42.6	57.4	86.6	6.3	4.8	1.2	26.4
Delaware	15.3	84.7	44.3	55.7	81.1	14.9	1.9	1.1	16.7
Florida	13.2	86.8	44.9	55.1	81.7	7.7	8.8	1.0	19.3
Georgia	20.0	80.0	44.1	55.9	75.3	21.7	1.4	1.0	23.1
Hawaii	12.9	87.2	47.0	53.0	28.1	1.0	5.8	54.2	16.3
Idaho	16.8	83.2	47.3	52.7	94.2	0.2	3.3	0.6	17.7
Illinois	14.7	85.4	43.3	56.8	80.7	11.6	5.0	1.7	18.7
Indiana	17.5	82.5	43.6	56.4	90.4	7.0	1.5	0.5	18.6
Iowa	13.6	86.5	43.4	56.6	96.5	1.5	0.8	0.5	17.2
Kansas	15.0	85.0	43.6	56.4	91.5	4.2	2.5	0.7	16.2
Kentucky	24.8	75.2	45.7	54.3	93.6	5.2	0.4	0.3	24.9
Louisiana	22.8	77.2	44.9	55.2	70.1	26.8	1.8	0.7	31.6
Maine	22.0	78.0	45.3	54.7	97.8	0.4	0.4	0.3	40.3
Maryland	13.9	86.2	42.7	57.3	72.7	21.8	1.8	2.7	15.7
Massachusetts	20.0	80.0	43.1	56.9	87.1	4.4	5.1	1.9	28.4
Michigan	20.3	79.8	44.4	55.6	83.6	12.6	1.6	0.9	20.7
Minnesota	21.6	78.4	46.1	53.9	93.0	2.9	1.0	1.2	19.7
Mississippi	23.8	76.2	43.8	56.2	70.9	27.8	0.5	0.4	32.0
Missouri	19.6	80.4	44.3	55.7	90.1	7.8	0.9	0.5	21.0
Montana	14.4	85.6	47.3	52.8	93.9	0.2	1.0	0.3	15.7
Nebraska	12.9	87.1	43.4	56.6	93.9	2.7	1.8	0.5	16.2
Nevada	15.9	84.1	48.5	51.5	78.3	6.8	8.2	4.3	16.1
New Hampshire	16.8	83.2	44.1	55.9	96.7	1.0	0.9	0.5	16.3
New Jersey	13.2	86.8	42.1	57.9	79.0	10.1	7.1	2.6	15.8
New Mexico	19.8	80.3	47.5	52.5	61.0	1.7	29.7	0.6	23.9
New York	17.9	82.1	43.2	56.8	77.5	10.1	7.4	3.2	28.1

Exhibit 1 (cont.)

	Age ¹		Sex		Race/ethnicity ²				Medicare-Medicaid enrollee ³
	Less than 65 years	65 years and older	Men	Women	Non Hispanic White	Non Hispanic Black	Hispanic	Asian/PI	
	Percentage (%)								
North Carolina	19.5	80.5	43.3	56.7	78.1	18.8	1.1	0.7	22.7
North Dakota	12.5	87.5	44.0	56.0	95.7	0.3	0.4	0.3	15.7
Ohio	20.1	80.0	44.9	55.1	87.8	9.6	1.2	0.7	22.4
Oklahoma	18.3	81.7	44.5	55.5	84.0	5.3	1.6	0.6	20.8
Oregon	16.8	83.2	47.9	52.2	92.9	1.1	2.6	1.4	17.1
Pennsylvania	17.0	83.0	43.3	56.8	89.5	6.8	1.9	1.0	19.7
Rhode Island	23.5	76.5	43.4	56.6	87.4	3.7	6.1	1.0	27.5
South Carolina	18.6	81.4	44.3	55.7	77.1	21.1	0.8	0.4	18.6
South Dakota	12.4	87.6	44.6	55.4	93.9	0.3	0.5	0.3	16.8
Tennessee	19.9	80.1	44.3	55.7	87.7	10.7	0.6	0.5	24.1
Texas	15.9	84.2	44.5	55.5	70.1	9.8	17.6	1.7	22.0
Utah	14.7	85.3	45.7	54.3	92.5	0.6	4.1	1.4	11.8
Vermont	17.9	82.2	45.1	54.9	97.5	0.4	0.6	0.4	27.2
Virginia	15.5	84.6	43.7	56.3	79.2	16.2	1.5	2.2	16.9
Washington	16.4	83.6	46.1	53.9	87.7	2.6	3.0	4.2	20.0
Washington, DC	19.5	80.5	41.8	58.2	28.8	65.4	3.2	1.4	36.1
West Virginia	26.1	73.9	47.8	52.2	96.3	2.6	0.4	0.2	26.4
Wisconsin	17.2	82.8	44.1	55.9	92.5	3.8	1.5	0.8	20.9
Wyoming	13.0	87.1	47.0	53.1	93.5	0.5	3.8	0.4	14.2

NOTES.

¹Medicare beneficiaries younger than 65 primarily are disabled.

²Row totals do not sum to 100%, because "other" group not shown. Race/ethnicity is based upon an enhancement to the SSA race code, which uses geography and Census surname information to improve the classification of Hispanic and Asian/Pacific Islander Medicare beneficiaries. More information is available at <http://www.cms.gov/Research-Statistics-Data-and-Systems/Research/HealthCareFinancingReview/downloads/08springpg27.pdf>

³Medicare beneficiaries also enrolled in Medicaid are known as "dual eligible."

SOURCE: CMS administrative enrollment and claims data for Medicare beneficiaries enrolled in the fee-for-service program for 2011, which are available from the CMS Chronic Condition Data Warehouse (www.ccwdata.org).

In 2011, approximately two-thirds (67.3%) of Medicare beneficiaries had two or more chronic conditions (MCC2+) and 14% had six or more (MCC6+). Prevalence rates were lowest in Alaska and Wyoming (50% for MCC2+ and 7% for MCC6+), and highest in Florida and New Jersey (75% for MCC2+ and 18% for MCC6+; Exhibit 2).

Exhibit 2. Prevalence of Multiple Chronic Conditions among Medicare Beneficiaries by State: 2011

	Number of Chronic Conditions			
	0 to 1	2 to 3	4 to 5	6+
	Prevalence (%)			
National	32.7	31.5	21.8	14.0
Alabama	30.0	33.2	23.1	13.8
Alaska	50.1	29.0	14.0	6.9
Arizona	37.0	31.9	20.1	11.0
Arkansas	35.9	31.7	20.7	11.8
California	36.1	30.1	20.6	13.2
Colorado	44.4	30.0	16.6	9.1
Connecticut	30.3	33.1	22.5	14.2
Delaware	25.9	34.0	25.2	14.9
Florida	25.6	30.9	25.3	18.2
Georgia	30.9	32.8	22.8	13.5
Hawaii	33.4	35.3	21.8	9.5
Idaho	44.0	30.3	17.2	8.6
Illinois	31.7	31.8	21.7	14.9
Indiana	31.9	32.1	21.8	14.3
Iowa	37.1	32.9	19.7	10.3
Kansas	35.6	32.5	20.4	11.6
Kentucky	30.4	31.5	22.9	15.3
Louisiana	30.5	30.9	22.9	15.7
Maine	36.3	32.6	19.6	11.5
Maryland	29.9	32.8	23.1	14.2
Massachusetts	32.7	33.1	21.0	13.2
Michigan	30.5	30.2	22.3	16.9
Minnesota	46.0	29.7	15.9	8.3
Mississippi	33.4	32.8	21.3	12.5
Missouri	32.5	31.5	21.9	14.1
Montana	46.6	30.3	15.6	7.5
Nebraska	40.0	31.0	18.5	10.6
Nevada	38.7	30.4	19.7	11.2
New Hampshire	35.9	33.2	19.8	11.2
New Jersey	26.5	30.4	25.3	17.9
New Mexico	41.4	30.8	18.5	9.3
New York	30.0	30.0	23.4	16.6
North Carolina	31.4	34.4	21.9	12.3
North Dakota	40.3	31.0	18.3	10.3
Ohio	30.1	31.1	22.8	16.1
Oklahoma	33.7	30.9	21.5	14.0
Oregon	43.5	31.3	16.9	8.3

Exhibit 2 (cont.)

	Number of Chronic Conditions			
	0 to 1	2 to 3	4 to 5	6+
	Prevalence (%)			
Pennsylvania	29.1	32.0	23.4	15.6
Rhode Island	30.5	32.8	22.9	13.8
South Carolina	30.1	34.9	22.8	12.2
South Dakota	41.3	31.5	17.7	9.5
Tennessee	31.1	32.3	22.2	14.5
Texas	31.7	29.8	22.2	16.3
Utah	43.7	30.3	17.0	8.9
Vermont	41.6	33.3	16.8	8.3
Virginia	32.1	34.0	21.8	12.2
Washington	42.8	30.9	17.3	9.0
Washington, DC	36.6	30.5	20.4	12.5
West Virginia	30.5	31.6	23.0	14.9
Wisconsin	37.6	31.5	19.5	11.3
Wyoming	50.2	28.3	14.4	7.2

SOURCE: CMS administrative enrollment and claims data for Medicare beneficiaries enrolled in the fee-for-service program for 2011, which are available from the CMS Chronic Condition Data Warehouse (www.ccwdata.org).

Exhibits 3 and 4 present state-level hospital readmission and ED visit rates, respectively, by number of beneficiary's chronic conditions for 2011. Nationally, 19.1% of Medicare hospital admissions were followed by a readmission within 30 days, with readmission rates increasing directly in relation to the number of chronic conditions. Nationally, the readmission rate for beneficiaries without MCC was 8.9% and increased to 25.0% for beneficiaries with MCC6+. Across states, the readmission rate for beneficiaries with MCC6+ was lowest in Utah (19.5%) and highest in Washington, DC (30.5%). Among Medicare beneficiaries with MCC6+, hospital readmissions were 30–50% higher in Washington, DC, West Virginia, and Maryland when compared with Utah and Idaho.

Nationally, the average ED visit rate was 0.7 visits per beneficiary, with rates more than eightfold greater among beneficiaries with MCC6+ when compared with beneficiaries without MCC (2.0 versus 0.2 respectively). State-level ED visits for beneficiaries with MCC6+ ranged from approximately 1.7 per beneficiary in Florida, Nebraska, and South Dakota to 2.7 in Washington, DC.

Exhibit 3. Hospital Readmissions within 30-days among Medicare Beneficiaries by Multiple Chronic Conditions by State: 2011

	Number of Chronic Conditions				
	Overall	0 to 1	2 to 3	4 to 5	6+
	Readmission rate (%)				
National	19.1	8.9	10.3	13.5	25.0
Alabama	18.1	9.0	10.0	13.3	24.0
Alaska	14.9	8.4	10.0	13.1	21.3
Arizona	18.0	7.7	9.6	13.2	24.8
Arkansas	18.5	8.7	10.2	13.9	25.1
California	19.3	8.6	10.5	13.9	25.3
Colorado	15.7	7.7	9.7	13.1	21.7
Connecticut	19.3	10.4	11.2	14.2	24.8
Delaware	17.8	8.1	8.6	12.2	22.9
Florida	19.5	9.2	10.2	12.6	24.4
Georgia	18.7	9.2	10.1	13.6	24.5
Hawaii	16.3	7.5	10.4	11.3	22.5
Idaho	14.2	7.3	8.7	11.9	20.4
Illinois	21.1	9.5	11.5	14.5	27.1
Indiana	18.5	8.1	9.7	12.4	24.4
Iowa	16.6	9.0	10.2	13.5	22.3
Kansas	16.6	7.9	9.7	12.8	22.5
Kentucky	20.1	7.9	9.7	13.6	26.1
Louisiana	19.8	10.3	10.9	14.3	25.0
Maine	17.0	8.1	10.2	12.8	22.6
Maryland	21.3	10.4	11.3	14.5	27.4
Massachusetts	19.9	9.2	12.0	14.6	25.9
Michigan	20.1	8.3	9.6	12.9	25.8
Minnesota	17.6	9.7	11.2	14.6	24.7
Mississippi	19.6	10.6	11.4	15.1	25.7
Missouri	19.4	8.6	10.5	13.4	25.7
Montana	14.7	7.6	9.3	13.4	20.8
Nebraska	16.3	8.0	9.9	12.3	22.7
Nevada	19.1	8.4	10.4	14.1	26.1
New Hampshire	17.4	7.2	9.9	13.2	23.3
New Jersey	21.2	9.6	10.6	13.9	26.2
New Mexico	16.5	7.8	10.2	13.6	22.6
New York	20.7	10.5	11.2	14.2	26.3
North Carolina	18.2	9.4	10.1	13.2	24.1
North Dakota	16.7	11.3	9.1	13.5	22.7
Ohio	20.2	8.4	10.6	13.3	25.9
Oklahoma	17.8	7.9	10.0	13.0	23.5
Oregon	15.3	7.8	8.9	12.8	21.8

Exhibit 3 (cont.)

	Number of Chronic Conditions				
	Overall	0 to 1	2 to 3	4 to 5	6+
	Readmission rate (%)				
Pennsylvania	19.0	8.6	9.9	13.2	24.4
Rhode Island	20.0	11.8	12.2	13.9	25.9
South Carolina	17.5	9.0	9.6	12.5	23.6
South Dakota	15.6	8.5	9.3	13.2	21.3
Tennessee	19.4	8.4	9.9	13.4	25.3
Texas	18.5	8.4	9.8	12.7	23.5
Utah	14.1	7.4	8.7	12.2	19.5
Vermont	16.0	8.2	10.2	13.1	22.0
Virginia	18.9	8.8	10.3	13.5	25.2
Washington	16.7	8.3	9.8	12.9	23.5
Washington, DC	23.6	11.1	13.0	17.7	30.5
West Virginia	21.4	8.2	10.4	14.4	27.7
Wisconsin	16.8	10.2	9.6	12.8	22.5
Wyoming	15.4	7.6	8.6	13.5	22.9

SOURCE: CMS administrative enrollment and claims data for Medicare beneficiaries enrolled in the fee-for-service program for 2011, which are available from the CMS Chronic Condition Data Warehouse (www.ccwdata.org).

Exhibit 4. Emergency Department Visits Among Medicare Beneficiaries by Multiple Chronic Conditions by State: 2011

	Number of Chronic Conditions				
	Overall	0 to 1	2 to 3	4 to 5	6+
	ED visits per beneficiary				
National	0.7	0.2	0.5	0.8	2.0
Alabama	0.7	0.3	0.5	0.8	2.0
Alaska	0.6	0.2	0.6	1.0	2.3
Arizona	0.6	0.2	0.4	0.8	2.0
Arkansas	0.7	0.2	0.5	0.9	2.1
California	0.6	0.2	0.4	0.7	1.8
Colorado	0.6	0.2	0.5	1.0	2.1
Connecticut	0.7	0.3	0.5	0.9	2.0
Delaware	0.6	0.2	0.4	0.7	1.8
Florida	0.6	0.2	0.3	0.6	1.7
Georgia	0.7	0.3	0.5	0.9	2.1
Hawaii	0.5	0.2	0.3	0.6	1.8
Idaho	0.6	0.2	0.5	0.9	2.0
Illinois	0.7	0.2	0.4	0.8	2.0
Indiana	0.7	0.3	0.5	0.8	2.1
Iowa	0.6	0.2	0.5	0.9	2.0
Kansas	0.6	0.2	0.4	0.8	1.9

Exhibit 4 (cont.)

	Number of Chronic Conditions				
	Overall	0 to 1	2 to 3	4 to 5	6+
ED visits per beneficiary					
Kentucky	0.8	0.3	0.5	0.9	2.2
Louisiana	0.8	0.3	0.5	0.9	2.2
Maine	0.8	0.4	0.6	1.1	2.4
Maryland	0.7	0.2	0.4	0.8	2.2
Massachusetts	0.8	0.3	0.6	0.9	2.2
Michigan	0.8	0.3	0.5	0.8	2.1
Minnesota	0.6	0.3	0.6	1.1	2.2
Mississippi	0.8	0.3	0.6	1.1	2.4
Missouri	0.7	0.3	0.5	0.9	2.1
Montana	0.6	0.2	0.5	1.0	2.0
Nebraska	0.5	0.2	0.4	0.8	1.7
Nevada	0.6	0.2	0.5	0.8	2.0
New Hampshire	0.7	0.3	0.6	1.0	2.2
New Jersey	0.6	0.2	0.4	0.6	1.8
New Mexico	0.6	0.2	0.5	0.8	2.0
New York	0.6	0.2	0.4	0.7	1.6
North Carolina	0.7	0.3	0.5	0.9	2.2
North Dakota	0.6	0.2	0.5	0.8	1.8
Ohio	0.8	0.3	0.5	0.9	2.2
Oklahoma	0.7	0.3	0.5	0.9	2.1
Oregon	0.6	0.2	0.5	0.9	2.2
Pennsylvania	0.7	0.3	0.4	0.7	1.9
Rhode Island	0.8	0.3	0.5	0.9	2.2
South Carolina	0.7	0.3	0.4	0.8	2.0
South Dakota	0.5	0.2	0.4	0.8	1.7
Tennessee	0.7	0.2	0.5	0.9	2.2
Texas	0.7	0.2	0.4	0.7	1.9
Utah	0.6	0.2	0.5	0.9	1.8
Vermont	0.7	0.3	0.6	1.0	2.3
Virginia	0.7	0.2	0.5	0.9	2.2
Washington	0.6	0.2	0.5	0.9	2.2
Washington, DC	0.9	0.3	0.7	1.2	2.7
West Virginia	0.8	0.3	0.5	0.9	2.3
Wisconsin	0.6	0.2	0.5	0.9	2.0
Wyoming	0.6	0.2	0.6	1.1	2.3

SOURCE: CMS administrative enrollment and claims data for Medicare beneficiaries enrolled in the fee-for-service program for 2011, which are available from the CMS Chronic Condition Data Warehouse (www.ccwdata.org).

Exhibit 5 presents state-level per capita Medicare spending by number of beneficiary's chronic conditions for 2011. The average Medicare spending per beneficiary was \$9,436 and increased to \$31,543 for beneficiaries with MCC6+. For beneficiaries with MCC6+, per capita spending was lowest in Hawaii (\$24,086), followed by Oregon, Maine, and New York (all with per capita spending < \$28,000), and highest in Maryland, Washington, DC, and Louisiana at more than \$37,000 per beneficiary.

Exhibit 5. Medicare Spending for Beneficiaries with Multiple Chronic Conditions by State: 2011

	Number of Chronic Conditions				
	Overall	0 to 1	2 to 3	4 to 5	6+
	Per capita Medicare spending (\$)				
National	9,436	2,097	5,677	11,628	31,543
Alabama	9,502	2,250	5,727	11,792	30,542
Alaska	6,420	1,894	5,839	12,541	29,292
Arizona	8,568	2,247	6,016	12,066	30,815
Arkansas	8,735	1,963	5,705	12,117	31,598
California	8,886	1,978	5,683	11,294	31,427
Colorado	8,080	2,230	6,664	13,453	31,524
Connecticut	9,268	2,236	5,548	11,247	29,886
Delaware	9,203	2,160	4,891	9,982	30,004
Florida	11,167	2,357	5,990	11,633	31,654
Georgia	9,370	2,227	5,781	11,694	30,584
Hawaii	5,849	1,428	3,763	8,040	24,086
Idaho	7,662	2,194	6,561	12,967	28,953
Illinois	9,828	1,979	5,469	11,711	33,139
Indiana	9,580	2,026	5,380	11,676	32,724
Iowa	8,090	2,314	5,880	11,821	28,728
Kansas	9,119	2,321	6,186	12,861	31,655
Kentucky	9,321	1,910	5,142	10,779	30,488
Louisiana	11,622	2,276	6,393	13,629	37,194
Maine	8,042	2,163	5,603	11,364	27,841
Maryland	10,715	2,146	5,752	12,300	37,642
Massachusetts	9,436	2,393	5,777	11,833	32,280
Michigan	9,956	2,092	5,458	11,049	30,723
Minnesota	7,767	2,160	6,500	13,743	31,940
Mississippi	10,420	2,322	6,538	14,131	35,854
Missouri	9,305	2,034	5,682	11,524	30,755
Montana	7,133	2,228	6,420	13,103	28,174
Nebraska	8,791	2,213	6,545	13,651	31,814
Nevada	9,079	1,995	6,059	12,689	35,463
New Hampshire	8,173	2,065	5,443	11,426	30,149
New Jersey	10,023	1,957	5,150	10,084	30,131

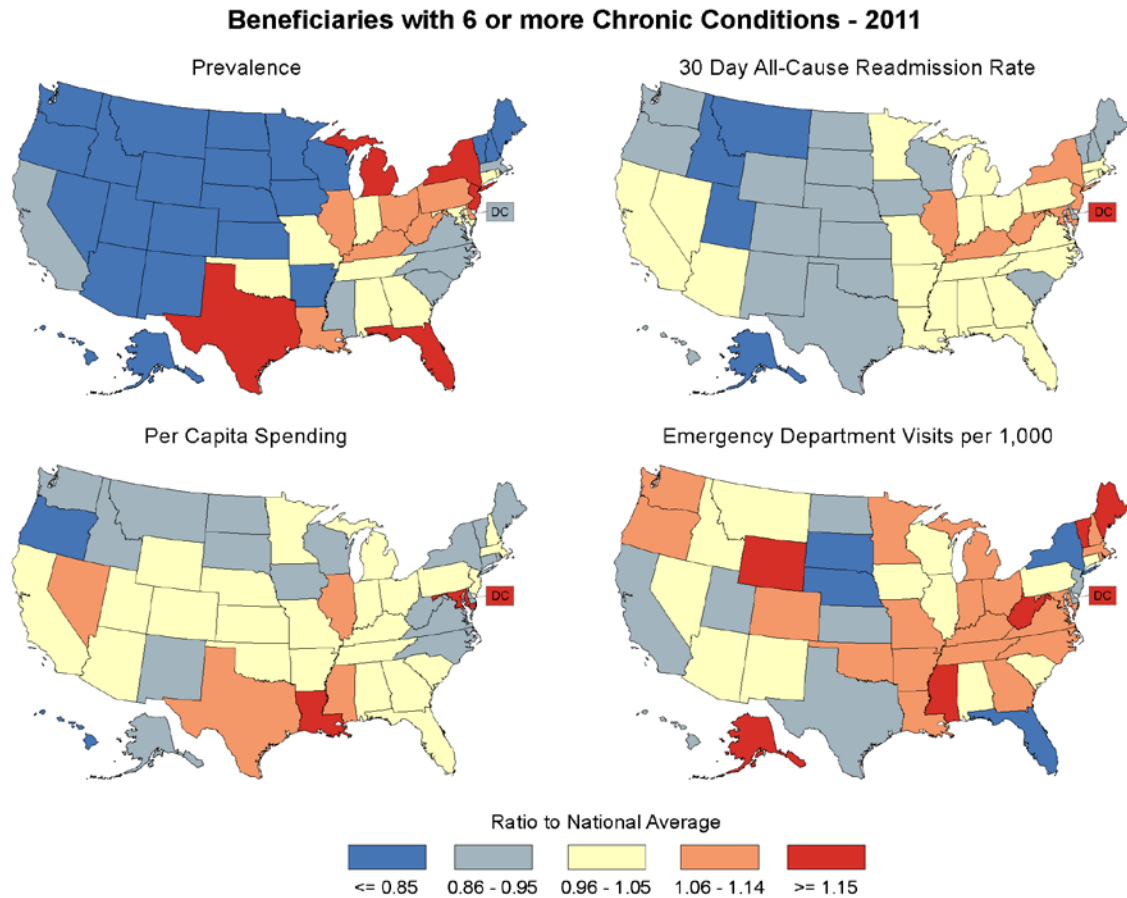
Exhibit 5 (cont.)

	Number of Chronic Conditions				
	Overall	0 to 1	2 to 3	4 to 5	6+
	Per capita Medicare spending (\$)				
New Mexico	7,197	1,820	5,543	11,174	28,606
New York	9,260	2,018	5,361	10,361	27,889
North Carolina	8,768	2,228	5,502	11,523	29,704
North Dakota	7,943	2,050	6,029	12,413	28,773
Ohio	10,057	1,979	5,405	11,316	32,404
Oklahoma	9,695	2,038	5,971	12,512	32,073
Oregon	6,858	2,019	5,660	11,666	26,876
Pennsylvania	9,763	2,019	5,312	10,982	31,511
Rhode Island	8,854	2,170	5,337	10,868	28,696
South Carolina	8,975	2,254	5,542	11,480	30,631
South Dakota	7,805	2,097	5,930	13,022	29,130
Tennessee	9,626	2,066	5,510	11,684	31,891
Texas	11,084	2,012	6,046	12,806	35,534
Utah	8,419	2,579	7,077	13,950	30,997
Vermont	7,186	2,157	5,690	11,702	29,186
Virginia	8,427	1,979	5,138	10,929	30,114
Washington	7,450	2,070	5,947	12,088	29,188
Washington, DC	9,996	1,959	6,217	13,341	37,357
West Virginia	8,733	1,764	4,734	9,937	29,550
Wisconsin	8,069	2,031	5,552	11,568	29,119
Wyoming	7,475	2,160	6,912	14,550	32,666

SOURCE: CMS administrative enrollment and claims data for Medicare beneficiaries enrolled in the fee-for-service program for 2011, which are available from the CMS Chronic Condition Data Warehouse (www.ccwdata.org).

Maps of the state-to-national ratio for each measure for beneficiaries with MCC6+ are shown in Exhibit 6. For states in the Pacific and Mountain West, and for most states in the Midwest, the prevalence of beneficiaries with MCC6+ was below the national average; in comparison, the prevalence generally was higher in the Northeast and South. In particular, the prevalence of beneficiaries with MCC6+ in Florida and New Jersey was approximately 30% higher than the national average. Medicare hospital readmissions, ED visits, and Medicare spending were highest in Washington, DC where, for beneficiaries with MCC6+, they were at least 15% higher than the national average.

Exhibit 6. State Maps of Prevalence, Hospital Readmissions, ED visits, and Medicare Spending for Medicare Beneficiaries with Six or More Chronic Conditions by State: 2011



SOURCE: CMS administrative enrollment and claims data for Medicare beneficiaries enrolled in the fee-for-service program for 2011, which are available from the CMS Chronic Condition Data Warehouse (www.ccwdata.org).

Discussion

Descriptions of MCC among persons in the United States have been produced primarily through analyses of national level data sets and studies using data sources in individual states (Koroukian, Murray, & Madigan, 2006; Anderson, 2010; Boyd et al., 2010; Centers for Medicare & Medicaid Services, 2012a; Freid, Bernstein, & Bush, 2012; Miller, Paschall, & Svendsen, 2006). This study of over 31 million Medicare beneficiaries—the first to examine state-specific patterns of MCC among this large population—documented substantial state-level variability among Medicare beneficiaries in MCC prevalence, healthcare utilization, and expenditures across the United States. For example, the Mountain states show a low prevalence of beneficiaries with MCC6+, and most also tend to have readmission rates and per capita spending for this population that are below the national average. Examples of intriguing intrastate differences include New York and Texas. New York had a high prevalence of beneficiaries with MCC6+,

although Medicare spending per beneficiary and rates for hospital readmission and ED visits were near or below the national average for each indicator. Texas had rates for readmissions and ED visits below the national average, while Medicare spending was more than 10% higher than the national average. Findings such as these highlight the need for further study of state variations in MCC that can identify specific factors underlying these patterns, such as differences in distributions of underlying risk factors, combinations and types of conditions, and the amount and the way care is delivered across the country.

This study begins to address key knowledge gaps about the burden of MCC in this important population, and directly addresses goals of the HHS Strategic Framework on MCC, specifically the fourth goal supporting targeted research about individuals with MCC (U.S. Department of Health and Human Services, 2010). Yet, to help place this study's findings and these state-level estimates in context, it is important to consider the study's methods and measures. Foremost, estimates of MCC will be influenced by the number and type of conditions that are used in a study such as this. Although we included a broad set of common chronic conditions in our determination of MCC, our list of conditions excluded several behavioral and mental health disorders, such as substance abuse disorders and schizophrenia, which were not available as pre-defined chronic conditions in our data source, the Chronic Condition Warehouse. However, our definition of MCC is based upon a standard approach that is consistent with the parameters outlined in a recent report from the Department of Health and Human Services (Goodman et al., in press). State level prevalence estimates of 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 the state-level prevalence of MCC. In states where there are more health care resources, more care is received and more claims are generated (Wennberg, Fisher, Goodman, & Skinner, 2008). Thus, in places where more health care resources are available, the likelihood that diagnoses will be identified may be increased. Finally, these state-level estimates are measures of the overall magnitude of MCC in the Medicare population and do not take into account differences in the composition of beneficiaries across states. While state differences in beneficiary characteristics, such as the proportion of disabled or dually-eligible beneficiaries, may account for some of the observed state-to-state variability, these estimates—particularly since they represent the first examination of state-level patterns of MCC—are more useful for the planning and delivery of health care services at the state-level.

States play a key role in health monitoring, surveillance, and program planning, and because states are attentive to the rising health care costs of an aging population that is living longer, but with more chronic illness, states also must address the regulation, financing, and delivery of health care. In addition, states are taking a leadership role in health care reform and are important partners in initiatives aimed at improving the quality, safety, and affordability of

health care, as exemplified by programs such as the Partnership for Patients, Health Care Innovation Awards, and the State Innovation Models (see <http://partnershipforpatients.cms.gov/> and <http://innovation.cms.gov/>). For these reasons, state-level data sources that provide timely, quality, and relevant data are important and necessary to inform health policy.

Like other well established examples of state-level data systems, such as the Behavioral Risk Factor Surveillance System (BRFSS; Centers for Disease Control and Prevention, 2013) and the Youth Risk Behavior Surveillance System (YRBSS; (Centers for Disease Control and Prevention, 2004), CMS is making available new public-use data resources on chronic conditions among Medicare beneficiaries. These resources can further support studies of this kind, including an interactive analytic dashboard that allows for the examination of geographic MCC patterns (Centers for Medicare & Medicaid Services, 2012b, available at www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Chronic-Conditions/index.html). This study, also, may provide a foundation for conducting similar analyses at sub-state and other jurisdictional levels that are more local—including, for example, hospital referral regions, counties, and communities—where strategies, interventions, and other health care services can be optimally tailored to individuals and populations with MCC.

Disclaimer

Disclaimer: The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the U.S. Department of Health & Human Services or its operating divisions, the Centers for Medicare & Medicaid Services and Centers for Disease Control and Prevention.

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