

Spending by Condition for the Long-Term Care Population Using Medicaid Claims

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Abstract	<p>Health care spending for the nursing home sector has been an understudied topic despite institutionalized long-term care patients often facing higher mortality rates, having numerous and serious comorbidities, and accounting for over \$194 billion dollars in personal health care expenditure just in 2018. Research on this population is increasing in importance as the U.S. population ages, but data limitations have constrained investigations in this area. To improve measurement for this significant sector of health care, this study utilizes Medicaid Analytic eXtract (MAX) Long-Term Care (LT) claims for 2000–2005, 2008, and 2011, and focuses on long-term care dual Medicare-Medicaid residents. Diagnoses from each claim are used to appropriate total costs to 260 Clinical Classification Software (CCS) categories. The long-term care population share of spending for many of these conditions greatly exceeds that of the general non-institutionalized U.S. population. The result shows two broad condition categories dominate spending for this population: circulatory and mental health conditions, each category accounting for about 20 percent of long-term care expenditures in 2011. Among circulatory conditions, treated prevalence for severe circulatory conditions (for example, strokes) has fallen while treated prevalence for early-stage circulatory conditions (for example, high cholesterol) has risen. Approximately 43 percent of residents received a mental health diagnosis in 2011 and conditions such as anxiety, mood disorders, and dementia have grown in importance over the study period. Overall, this paper demonstrates how these methods and MAX LT file may be used to track spending-by-disease for this increasingly important sector.</p>
Keywords	Medical spending by condition, long-term care spending, Medicaid
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1. Introduction

Spending for nursing homes accounted for 8 percent of personal health care expenditures in 2018 (\$194 billion) [1]. In addition to contributing significantly to overall U.S. health care expenditures, nursing homes also serve as an important place of service for a population with numerous and serious comorbidities and a high demand for medical care. In 2016, it was estimated that around 1.3 million individuals, a majority of whom are older than 65, resided in a nursing home facility [2]. The health care literature overwhelmingly demonstrates that the elderly, especially those with multiple conditions, account for a disproportionate share of total health care spending [3]. The importance of nursing homes in health care is especially apparent with the 2018 mortality estimates that show 19 percent of deaths in the United States occurred in nursing homes, only ranking third behind a decedent's home and an inpatient setting [4]. Projections that account for the aging of the U.S. population further predict an 80 percent increase in the need for formal care between 2000 and 2050, underscoring the future importance of nursing homes [5].

A majority of health care research on spending by condition focuses on the civilian noninstitutionalized population [6–8]. Spending for the noninstitutionalized population is also the focus of the Health Care Satellite Account (HCSA), which is a set of annual statistics on spending by condition produced by the Bureau of Economic Analysis (BEA), the agency that calculates gross domestic product (GDP). The HCSA currently covers the period from 2000 to 2017 and provides information on spending for over 200 conditions to assist researchers, policy makers, and the public to better understand the health care sector. Currently, the estimates are limited to the noninstitutionalized U.S. population as they currently exclude estimates for long-term care (LTC) nursing home spending [9].

Research on spending for the institutionalized LTC population is sparse primarily because of data limitations. Historically, research on spending by disease for the LTC population has relied on data from the National Nursing Home Survey (NNHS). The NNHS was last fielded in 2004 and no new data source has been able to replace its measures. Although the survey is now over 15 years old, recent, well-publicized articles [10–13] that have estimated spending by medical condition have relied on the outdated 2004 NNHS data and then projected those estimates forward using limited survey information from the Medical Expenditure Panel Survey (MEPS) and Medicare Current Beneficiaries Survey (MCBS). However, neither survey was designed to measure spending by condition for the LTC population and both have features that limit their usefulness to measure this population. The limitation of MEPS is that it excludes the LTC population. A major limitation of MCBS is that its small sample size (around 900 LTC individuals) leads to highly volatile estimates. Moreover, MCBS has very limited information on the health of the LTC population, including just a couple of dozen condition categories.

To help overcome data limitations for the LTC population, this study presents new information on treated prevalence and spending by medical condition for Medicaid-funded nursing home services based on the Medicaid Analytic eXtract (MAX) Long-Term Care (LT) data, which covered more than 60 percent of the LTC population in 2015 [2]. The primary focus of this study is on dual-eligible LTC residents, who accounted for about 85 percent of Medicaid nursing home expenditures in 2011.

We first provide evidence that the MAX LT data closely match the estimates from the 2004 NNHS, a key benchmark data source for this sector. This close comparison suggests that MAX LT data may be used to obtain more up-to-date estimates for this sector on an annual basis.

We then examine the MAX LT estimates and compare them to those of the noninstitutionalized population, as reported in the HCSA. Consistent with earlier research [13], we find that the spending for the LTC population differs greatly from the noninstitutionalized population, with a much higher share of spending devoted to circulatory conditions and mental health. In fact, in 2011, the LTC share of spending on circulatory and mental health condition categories greatly exceeded the same categories for the noninstitutionalized population (a difference of over 8 percentage points for circulatory conditions and 16 percentage points for mental health). Although circulatory conditions comprised the highest share of spending in 2011, treated prevalence for circulatory conditions declined between 2000 and 2011. In contrast, treated prevalence for mental health conditions grew over the study period.

Distinct from previous work in this area, the MAX LT data, which contain annual data on hundreds of thousands of individuals, allow for a more detailed examination of spending, which we contrast with spending estimates for the noninstitutionalized population from the HCSA. At a more detailed condition level, and among the 30 highest expenditure conditions, we find that the 2011 spending share for dementia and hypertension are considerably higher for the LTC population than for the noninstitutionalized population. We also find that Parkinson's, paralysis, developmental disorders, schizophrenia, acute cerebrovascular disease, and the late effects of cerebrovascular disease (such as strokes and the after-effects of strokes) have considerably higher spending in the LTC population than among the noninstitutionalized population.

In terms of growth rates, we observe that the trends for the LTC population are similar to the trends for the HCSA noninstitutionalized population for many conditions. However, there are also some striking shifts in spending by condition for the LTC population that differ from the broader noninstitutionalized population. For example, although the noninstitutionalized HCSA population observed spending growth in all the top 30 CCS categories, the LTC population observed declines

in spending between 2000 and 2011 for strokes, atherosclerosis, hip fractures, and development disorders.

Overall, we find that the national picture of spending by condition as reported in the HCSA would be considerably different for many conditions if the LTC population was factored in, with a much higher share of spending on mental health conditions, like dementia, and several other debilitating physical conditions. Notwithstanding that the most recent year of MAX LT data used in this study is almost a decade old, the methods used in this study are still applicable to more recent data. The estimates, methods, and analyses described in this paper have already helped other researchers use MAX LT data to inform estimates on the LTC population [14]. We hope that our work continues to assist other researchers to tackle this understudied population.

2. Data and Methods

The data from this study are from the Centers for Medicare & Medicaid Services (CMS) MAX LT data for the years 2000–2005, 2008, and 2011, representing an annual average of over 900 thousand Medicaid-Medicare dual-eligible nursing home residents, of which each year over 70 percent were female and 89 percent were aged 65 and over (data not shown). MAX LT data average more than 15 million claims each year, allowing for a detailed study of spending trends for the LTC population [15].

Each claim in the nursing home data is associated with up to five International Classification of Diseases, volume 9 (ICD-9) diagnosis codes as well as spending associated with the diagnoses. Total spending for dual beneficiaries was defined as the sum of Medicaid payment and third-party payment from the MAX LT file. Rather than release estimates of the highly detailed ICD-9 diagnosis codes, which include tens of thousands of diagnoses, we instead map each ICD-9 code to one of 260 CCS categories from the Agency for Health Care Research and Quality.

Given the complexity of institutionalized cases and that residents are not institutionalized only for one diagnosis, we chose against the method of allocating spending by primary diagnoses and instead used an alternative approach that accounts for all diagnoses a resident has. For each resident, total costs were apportioned equally across all their listed CCS categories. Although this may appear to be a strong assumption, it is the superior option even after experimenting with alternative methods. Namely, we applied a primary diagnosis approach and a regression-based approach [16] that allows for greater flexibility in how spending is allocated across conditions in each year. We found the primary diagnosis approach tended to miss many important diagnoses for this population that has a high number of comorbidities. The regression-based approach produced very similar results to the equal allocation method, so we opted for the simpler equal allocation methodology.

Spending estimates for each year were then rescaled to match Medicaid nursing home spending from the National Health Expenditure Accounts (NHEA) and these rescaling factors were also applied to counts of persons treated [17]. This rescaling is necessary because MAX LT claims data are not complete in all states (for example, Maine enrollees are missing in MAX LT 2005 and 2008; counts of enrollees for Arizona and Hawaii in some years deviate significantly from other years). We then focus specifically on the dual-eligible, over 65 years of age, LTC population, where we define LTC as having a stay of 100 days or more in the nursing home.

2.1 Descriptive Statistics

Financing for the long-term care population is primarily paid by either Medicaid or out-of-pocket [11]. Table 1 displays total aggregate Medicaid and out-of-pocket spending from NHEA and the share of spending coming from the Medicaid source. Medicaid accounted for a stable share of the spending between these two funding sources, at around 54 percent in 2000, and 56 percent in 2011. Using the MAX LT data, we can determine what share of the Medicaid spending is from the dual-LTC population. We find that the elderly dual-LTC population accounted for about 85 percent of the Medicaid spending on nursing home services in 2011. The remaining 15 percent of spending includes nondual LTC Medicaid enrollees or individuals who are in the nursing home for fewer than 100 days.

Table 1. Summary of Long-Term Care Nursing Home Data for 2000, 2005, and 2011

Medicaid and LTC components	Year			Average annual growth		
	2000	2005	2011	2000-2005	2005-2011	2000-2011
Nursing home spending from Medicaid and out-of-pocket funding (\$ billion)	\$ 59.0	\$ 73.8	\$ 84.8	4.6%	2.3%	3.3%
Medicaid beneficiaries spending	\$ 31.9	\$ 41.3	\$ 47.6	5.3%	2.4%	3.7%
Out-of-pocket spending	\$ 27.1	\$ 32.5	\$ 37.2	3.7%	2.3%	2.9%
Share Medicaid	54.03%	55.98%	56.18%			
Nursing home LTC Medicaid spending	\$ 27.8	\$ 35.4	\$ 40.6	5.0%	2.3%	3.5%
Medicaid spending per dual-eligible LTC resident	\$ 27,972	\$ 37,095	\$ 42,874	5.8%	2.4%	4.0%
Share of Medicaid spending on dual LTC population	87.2%	85.6%	85.2%			
PPI nursing homes	131.0	161.4	195.3	4.3%	3.2%	3.7%
GDP deflator	78.1	87.4	98.1	2.3%	1.9%	2.1%

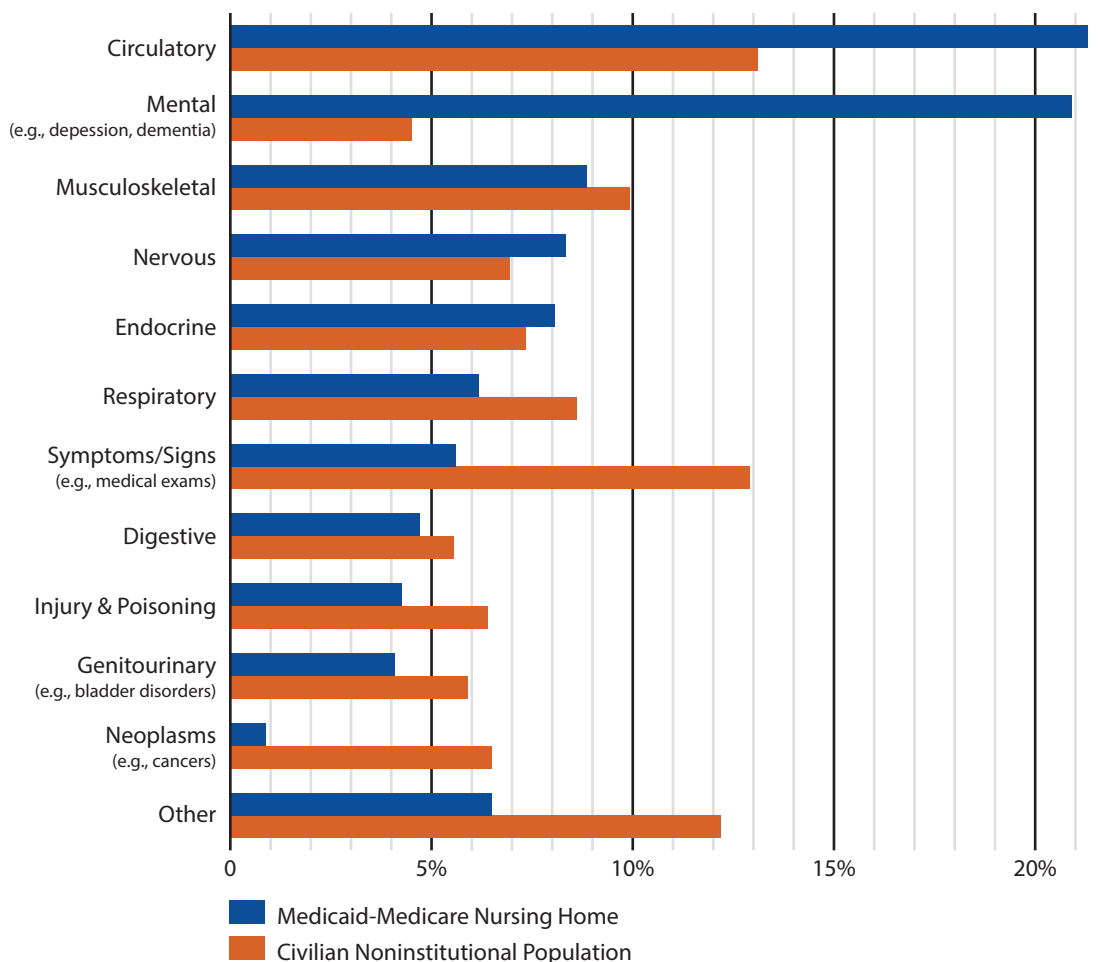
Source: Medicaid, out-of-pocket, and total nursing home spending is from the National Health Expenditure Accounts (NHEA) [17]. (December 2017 estimates). Dual-eligible LTC beneficiaries spending and Medicaid spending per dual-eligible LTC resident is from the authors' analysis of study data. The Producer Price Indexes (PPI) is from the Bureau of Labor Statistics. The gross domestic product (GDP) deflator is from BEA.

3. Results

We first compare estimates from MAX LT to estimates reported from the 2004 NNHS, which has been the primary data source used in several earlier studies on the LTC population. The NNHS is distinct from our analysis as it included the full LTC population and not just dual Medicare-Medicaid enrollees. Another differing feature is that the NNHS is a survey while the MAX LT data are administrative records. Although NNHS disease categories did not always align with that of CCS categories (such as disagreement on whether Alzheimer's was classified as a mental health condition or a nervous system disorder), their estimates on episode distribution were comparable after some adjustments to the CCS classification, which helped align MAX LT estimates to NNHS disease categories. In fact, concerning episode distribution and focusing on broad condition categories, referred to as "chapters," we found an average of the absolute percent difference among chapters to be just 1.7 between the MAX LT 2004 and the 2004 NNHS. Table A.1, the comparison table of estimates of spending by condition for these two data sources, is included in the appendix. Overall, we find the estimates from these two sources to be quite similar, supporting the reliability of the MAX LT data as an alternative to the discontinued NNHS to help understand spending trends for the LTC population.

With confidence that MAX LT data can inform the institutionalized population, we proceeded to examine spending by disease chapter for the most recent year available. Figure 1 shows how broad categories of spending for the LTC population differ from those of the HCSA's noninstitutionalized population in 2011. The figure shows that circulatory conditions represent the highest spending category for both the institutionalized LTC and noninstitutionalized populations. However, the LTC spending for circulatory conditions also amounts to a larger share of spending (21 percent) than the amount that the noninstitutionalized population spends for circulatory conditions (13 percent). Likewise, mental disorders account for a much larger share of LTC nursing home spending (20 percent) than that of the civilian noninstitutionalized population represented in the HCSA (4.5 percent). On the other hand, neoplasms represent a much smaller share of nursing home spending for the institutionalized LTC population (1 percent) than for the civilian noninstitutionalized (6.5 percent).

Figure 1. Spending Shares by Medical Condition in 2011: Medicaid-Medicare Nursing Home (MAX) vs. Civilian Noninstitutionalized Population (BEA HCSA)



Source: Authors' analysis of study data.

Table 2 examines changes in LTC spending, treated prevalence, and cost per case between 2000 and 2011 at the CCS chapter level. Total prevalence along the bottom is a count of the number of conditions treated divided by the total number of patients. The table indicates that in the year 2000 the average person in the LTC population had 2 conditions, while in 2011 the average person in this population reported 2.6 conditions. In both years, the circulatory chapter (for example, atherosclerosis, heart attacks, and hypertension) ranks highest in spending and treated prevalence. Mental disorders chapter (for example, depression, anxiety, and dementia) ranks second in both years but nearly closed the gap with the circulatory chapter in 2011, indicating that mental disorders observed a noteworthy rise in treated prevalence during the preceding decade.

Between 2000 and 2011, treated prevalence grew in all chapters except circulatory, injury and poisoning (such as burns, fractures, and sprains) and neoplasms (such as cancers). Spending and

treated prevalence grew most rapidly for symptoms/signs (for example, medical exams, rehabilitation, and allergies). The second highest growth for spending and treated prevalence occurred for the musculoskeletal chapter (such as osteoarthritis, connective tissue disorders, and spine/back problems).

Table 2. Medicaid Nursing Home Spending, Treated Prevalence, and Cost per Case by CCS Chapter: 2000 and 2011

Clinical Classification System chapter	2000			2011			Annual percent change		
	Spending (\$ billion)	Treated prevalence	Cost per case	Spending (\$ billion)	Treated prevalence	Cost per case	Spending (\$ billion)	Treated prevalence	Cost per case
Circulatory (e.g., hypertension, heart attacks)	\$ 7.31	47%	\$ 15,710	\$ 8.64	47%	\$ 19,485	1.5%	0.0%	2.0%
Mental (e.g., depression, dementia)	\$ 5.92	36%	\$ 16,648	\$ 8.48	43%	\$ 20,699	3.3%	1.8%	2.0%
Musculoskeletal (e.g., back pain, arthritis)	\$ 1.68	15%	\$ 11,587	\$ 3.61	27%	\$ 13,962	7.2%	5.8%	1.7%
Nervous (e.g., paralysis, epilepsy)	\$ 2.42	17%	\$ 14,177	\$ 3.40	23%	\$ 15,377	3.1%	2.8%	0.7%
Endocrine (e.g., diabetes, nutritional deficiencies)	\$ 1.97	17%	\$ 11,411	\$ 3.29	25%	\$ 14,032	4.8%	3.3%	1.9%
Respiratory (e.g., COPD, asthma)	\$ 1.85	13%	\$ 14,322	\$ 2.51	15%	\$ 17,464	2.8%	1.4%	1.8%
Symptoms/signs (e.g., medical examinations, rehabilitation)	\$ 0.58	5%	\$ 11,126	\$ 2.29	17%	\$ 14,449	13.3%	11.1%	2.4%
Digestive (e.g., gastritis, teeth disorders)	\$ 1.35	12%	\$ 11,290	\$ 1.92	17%	\$ 12,224	3.2%	2.9%	0.7%
Injury & poisoning (e.g., fractures, sprains)	\$ 1.68	12%	\$ 13,824	\$ 1.74	11%	\$ 16,231	0.3%	-0.7%	1.5%
Genitourinary (e.g., bladder disorders)	\$ 0.84	7%	\$ 11,274	\$ 1.68	13%	\$ 13,252	6.5%	5.4%	1.5%
Neoplasms (e.g., cancers)	\$ 0.37	3%	\$ 12,186	\$ 0.37	3%	\$ 13,527	0.0%	-0.5%	1.0%
Other	\$ 1.83	16%	\$ 11,765	\$ 2.66	22%	\$ 12,574	3.4%	3.3%	0.6%
All conditions	\$ 27.80	200%	\$ 13,954	\$ 40.58	264%	\$ 16,242	3.5%	2.5%	1.4%

Source: Author's analysis of study data.

Table 3 presents the share of spending by more detailed condition for the 30 most costly conditions in 2011 for LTC nursing home spending. Table 3 also shows the relative spending share for the HCSA population for those conditions. Out of a total of 260 CCS categories, these 30 costly conditions accounted for over 71 percent of LTC nursing home spending in 2011. Similar to the statistics presented in figure 1 and table 2, table 3 also reflects the dominance of circulatory, mental health, and musculoskeletal conditions. Half of the CCS categories in table 3 belong to the top three spending chapters reflected in figure 1. Moreover, the greater detail afforded by table 3 offers unique insights. For example, although mental disorders is the second-highest spending chapter for the LTC population, at the more detailed CCS level, we find that the first costliest CCS category for the LTC dual Medicare-Medicaid population is dementia and related cognitive deficiencies (a subcategory of the mental disorders chapter), accounting for 13.4 percent of Medicaid nursing home spending in 2011. The same category, however, accounted for less than one percent of the noninstitutionalized spending reported in the HCSA. This high spending for dementia within the LTC population is likely driven by the fact that nearly one-third of Medicaid nursing home residents were diagnosed with dementia in 2011, up from nearly one-quarter in 2000 (data not shown). Meanwhile, although the circulatory chapter ranked highest for spending in 2011, at the CCS level, table 3 shows that its respective category, hypertension, is actually the second costliest condition, where the share of spending is over 4 percentage points higher than the noninstitutionalized population.

**Table 3. Share of Spending in 2011 for the LTC Nursing Home
Medicaid-Medicare Population and Noninstitutionalized Population
Based on the Health Care Satellite Account (HCSA)**

Clinical Classification System	Spending rank	Dual LTC spending share	Spending share (HCSA)
Delirium, dementia, and amnestic and other cognitive disorders	1	13.4%	0.7%
Essential hypertension	2	6.7%	2.6%
Diabetes mellitus without complication	3	3.3%	2.4%
Other connective tissue disease	4	3.1%	2.0%
Rehabilitation care, fitting of prostheses, and adjustment of devices	5	3.1%	2.1%
Acute cerebrovascular disease (e.g., stroke)	6	2.9%	0.7%
Other nervous system disorders	7	2.8%	1.4%
Mood disorders	8	2.8%	1.5%
Late effects of cerebrovascular disease	9	2.7%	0.2%
Schizophrenia and other psychotic disorders	10	2.6%	0.5%
Congestive heart failure, nonhypertensive	11	2.5%	1.0%
Other nontraumatic joint disorders	12	2.1%	1.8%
Other gastrointestinal disorders	13	2.1%	1.0%
Chronic obstructive pulmonary disease and bronchiectasis	14	2.0%	1.4%
Urinary tract infections	15	1.9%	0.8%
Pneumonia (except that caused by tuberculosis or sexually transmitted disease)	16	1.7%	1.0%
Osteoarthritis	17	1.5%	1.4%
Coronary atherosclerosis and other heart disease	18	1.4%	1.7%
Cardiac dysrhythmias	19	1.4%	1.2%
Respiratory failure, insufficiency, arrest (adult)	20	1.3%	0.6%
Deficiency and other anemia	21	1.3%	0.6%
Disorders of lipid metabolism (e.g., cholesterol)	22	1.1%	1.8%
Fracture of neck of femur (hip)	23	1.1%	0.5%
Paralysis	24	1.0%	0.1%
Epilepsy, convulsions	25	1.0%	0.5%
Thyroid disorders	26	1.0%	0.6%
Parkinson`s disease	27	1.0%	0.1%
Developmental disorders	28	0.9%	0.1%
Other injuries and conditions due to external causes	29	0.8%	0.8%
Anxiety disorders	30	0.8%	0.6%

Source: Authors' analysis of study data.

In table 4 we examine LTC growth rates in dollars and episodes over the 2000 to 2011 period and contrast these estimates with those in the HCSA. In some cases, the general patterns in the growth rates are roughly consistent between the LTC population and the HCSA, while in other cases the trends differ starkly. Given that circulatory conditions, mental health, and musculoskeletal conditions were the three highest spending chapters for the LTC population (figure 1), we focus on the CCS conditions within those three chapters and highlight just a couple of noteworthy patterns.

The costliest chapter for the LTC population was the circulatory chapter. Interestingly, at the disaggregated CCS category level, we see both LTC and noninstitutionalized treated prevalence has declined for the late-stage and relatively more expensive (as measured by average cost per case) circulatory conditions such as strokes, heart attacks (data not shown), and congestive heart failure (CHF). These findings are consistent with research showing declines in occurrences of strokes [18], heart attacks [19], and CHF [20–22] in the over-65 noninstitutionalized population since 2000. Moreover, among those who do suffer strokes and heart attacks, more patients are discharged to home or to receive home health services rather than be discharged to another care facility [19, 23].

In contrast to the declines in costly late-stage circulatory conditions, the LTC estimates show an increase in the treated prevalence for early-stage and low-cost circulatory conditions such as hypertension and high cholesterol. The growth rate in spending and treated prevalence of high cholesterol conditions is particularly striking for the long-term care population, with annual growth rates in spending and treated prevalence of more than 20 percent. Prevention of high-expense, late-stage cardiovascular events could be attributed to increased prevention efforts, such as expanded medical treatment or adherence (for example, taking preventative medicine such as aspirin) [24–25]. Consistent with our findings that treated prevalence for the LTC population has increased for early-stage and low-cost circulatory conditions, even the noninstitutionalized population (via the National Health and Nutrition Examination Survey) has observed increases in the prevalence of those with controlled hypertension as more people with these conditions are obtaining treatment [26]. The expanded treatment coincides with a decline in the low-density lipoprotein (LDL) readings for individuals between the ages of 65–74 over the study period, potentially related to the rapidly expanded use of cholesterol lowering drugs [27]; these increases in the use of early, preventive treatments correspond with the declines we see for strokes and heart attacks in the nursing home data.

Table 4. Annual Per Capita Growth Rates, from 2000 to 2011, in Dollars and Episodes for the Medicaid-Medicare LTC and Noninstitutionalized Populations

Clinical Classification System	Spending rank	Long-term nursing home		HCSA	
		Growth rate dollars	Growth rate episodes	Growth rate dollars	Growth rate episodes
Delirium, dementia, and amnestic and other cognitive disorders	1	4.4%	2.2%	10.7%	2.0%
Essential hypertension	2	5.5%	3.4%	5.2%	3.2%
Diabetes mellitus without complication	3	3.9%	2.4%	8.7%	5.2%
Other connective tissue disease	4	14.5%	15.2%	7.0%	2.1%
Rehabilitation care, fitting of prostheses, and adjustment of devices	5	32.5%	30.0%	13.5%	10.0%
Acute cerebrovascular disease (e.g., stroke)	6	-2.2%	-4.9%	0.8%	-1.2%
Other nervous system disorders	7	8.8%	10.0%	9.1%	4.2%
Mood disorders	8	6.9%	5.6%	3.9%	2.4%
Late effects of cerebrovascular disease	9	6.5%	4.9%	11.0%	5.3%
Schizophrenia and other psychotic disorders	10	3.2%	1.8%	2.3%	1.5%
Congestive heart failure, nonhypertensive	11	0.5%	-1.0%	2.0%	-1.5%
Other nontraumatic joint disorders	12	8.6%	9.1%	7.1%	3.0%
Other gastrointestinal disorders	13	4.3%	4.5%	4.2%	1.2%
Chronic obstructive pulmonary disease and bronchiectasis	14	2.1%	1.3%	4.6%	-0.9%
Urinary tract infections	15	6.2%	5.3%	5.4%	0.3%
Pneumonia (except that caused by tuberculosis or sexually transmitted disease)	16	2.1%	1.6%	1.7%	-0.5%
Osteoarthritis	17	4.4%	3.8%	6.7%	3.1%
Coronary atherosclerosis and other heart disease	18	-1.4%	-1.6%	0.5%	-0.4%
Cardiac dysrhythmias	19	4.5%	3.3%	4.2%	1.3%
Respiratory failure, insufficiency, arrest (adult)	20	10.0%	8.3%	5.8%	1.8%
Deficiency and other anemia	21	4.8%	4.1%	6.4%	1.2%
Disorders of lipid metabolism (e.g., cholesterol)	22	24.4%	22.7%	6.4%	3.9%
Fracture of neck of femur (hip)	23	-3.0%	-4.6%	1.5%	-1.6%
Paralysis	24	0.4%	-1.4%	0.6%	-2.0%
Epilepsy, convulsions	25	1.2%	-0.6%	4.3%	-0.4%
Thyroid disorders	26	4.4%	3.2%	6.4%	2.9%
Parkinson`s disease	27	0.4%	-1.2%	5.8%	0.6%

Source: Authors' analysis of study data.

The second highest spending chapter for the LTC population was that of mental disorders. The MAX LT data show that treated prevalence for dementia and related cognitive deficiencies grew by 2.2 percent on an annual basis while spending grew by 4.4 percent. Even though the treated prevalence growth rates for dementia are similar between the LTC and noninstitutionalized population, the noninstitutionalized population observed a much higher growth in spending to treat dementia than the LTC population, with an annual growth rate of over 10 percent. This contrasts with literature that suggest that, controlling for age, the prevalence of dementia within the general population has actually decreased over the past three decades [28–31]. Still, there is clear evidence in support of our findings reflected in the rise in the number of deaths in nursing homes attributed to dementia and Alzheimer’s [4]. Rather than our estimates reflecting increasing prevalence in the population, the trend we observe in our estimates may be related to a couple of national trends. As discussed previously, the treatments for some conditions (for example, circulatory conditions) have improved relative to the treatment of dementia, leading to a growing share of patients surviving circulatory conditions and being afflicted with dementia as an individual’s lifespan increases. At the same time, there has been a trend toward receiving home health services and other alternatives to nursing home care [32]. Therefore, it is likely that nursing homes are increasing in the share of patients that cannot receive home health, such as those with dementia.

Mood disorders, which includes depressive disorders, is the most prevalent mental condition afflicting nursing home residents, with 11 percent of the population having been treated for it in 2011 (data not shown). The MAX LT data show that spending and treated prevalence for mood disorders grew by more than 5 percent on an annual basis. This is consistent with the abundance of evidence in the literature highlighting growing depression among the elderly in nursing homes [33–35].

The third highest spending chapter for the LTC population was that of musculoskeletal conditions. We find that treated prevalence and spending is growing for many of the conditions in this category. For example, other connective tissue disease, other nontraumatic joint disorders, and osteoarthritis have increased respectively by 15.2 percent, 9.1 percent, and 3.8 percent on an annual basis. Much of the spending and treated prevalence growth may be related to joint replacement surgeries that have increased greatly over time [36–37]. We also observe that the treated prevalence and spending for osteoporosis—a condition wherein bones become porous and weak—has increased by more than 3 percent on an annual basis (data not shown). This is consistent with a finding by the Centers for Disease Control and Prevention that also shows a 34-percentage point increase in osteoporosis prevalence between 2008 and 2011 among dual-beneficiaries [38].

One other striking trend in table 4 is the 30 percent annual growth for rehabilitation between 2000 and 2011. The rehabilitation condition is categorized under the “Symptoms ill defined” chapter, but it is also related to the musculoskeletal chapter because those afflicted by musculoskeletal conditions (particularly those who have undergone a joint replacement treatment) may be referred to physical therapy for treatment. While it is possible that the growth in rehabilitation is related to the growing treatment of musculoskeletal conditions, another explanation may be related to the reimbursement incentives. Nursing homes are reimbursed more for treating patients with high-intensity therapies, and several recent investigations have found evidence of nursing homes upcoding for Medicare rehabilitation services [39-40]. The rapid rise in this particular treatment category has been a concern highlighted by researchers and has inspired federal litigation as well as a reconsideration of reimbursement for this treatment category. Again, similar to spending on musculoskeletal conditions, the causes and effects of this rapidly shifting trend in rehabilitation services remains uncertain and warrants additional research.

4. Conclusion

The estimates reported in this paper highlight the importance of tracking spending trends for the institutionalized LTC population. We show that the mix of medical conditions treated for the Medicaid LTC nursing home patients is quite different from that of the noninstitutionalized population, a finding that would be expected given that nursing home residents are a much older population. One of the most distinct features of the Medicaid nursing home population, when compared with the civilian noninstitutional population, is the high treated prevalence and cost of mental disorders, primarily dementia and other cognitive disorders. In 2011, 43 percent of Medicaid nursing home residents suffered from mental disorders and 31 percent from dementia. In the same year, mental disorders accounted for 20 percent of all Medicaid nursing home spending compared to less than 5 percent of health spending by the civilian noninstitutional population. There are several condition categories where incorporating nursing home spending for the institutionalized LTC population is necessary to obtain more accurate estimates of spending by condition at the national level. The share of noninstitutionalized spending greatly understates spending for categories such as strokes (acute cerebrovascular disease and late effects of cerebrovascular disease), schizophrenia, Parkinson's, dementia, and developmental disorders. The LTC share of spending for each of these conditions is more than four times higher than that reported for the general population in the HCSA. Not only are levels in spending different for the LTC population and noninstitutionalized population, we also find there are differences in spending growth rates that are important to capture.

While our data have a considerable lag and ends in 2011, this paper demonstrates the validity of the MAX LT data to capture spending for the LTC population. The continued availability of the CMS Medicaid data suggests these data may be used to continue to track spending by condition for this important sector.

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Appendix

In this appendix we compare the distribution of residents by diseases between the two most recent National Nursing Home Survey (NNHS) estimates and comparably available Medicaid Analytic eXtract (MAX) Long-Term Care (LT) data. Residents are only counted once per disease chapter. That is, if a resident is diagnosed with, for example, Hepatitis C and HIV in a year, that resident would only be tallied as a single count in the “Infectious and Parasitic Diseases” category. However, if a resident is diagnosed with Hepatitis C and Lung Cancer, then that resident is counted once per “Infectious and Parasitic Diseases” and “Neoplasms.” Percent distribution is simply the number of residents diagnosed with a condition divided by the aggregated counts of conditions. For example, 1.16 percent of the aggregated condition counts in the 2000 MAX data were “Infectious and Parasitic Diseases.” From a big picture perspective, the average absolute percent difference between the two sources in 2000/1999 and 2004 is just 1.6 and 1.7, respectively. Table A.1 shows that percent distribution by disease is comparable between MAX and NNHS, which suggests MAX is a suitable data source to replace NNHS.

Table A.1 Comparison of Distribution by Disease Chapter between MAX and NNHS

ICD 9 Codes	Chapter	Chapter description	Resident percent distribution by disease chapter			
			2000 MAX	1999 NNHS at interview	2004 MAX	2004 NNHS at interview
001-139	1	Infectious and parasitic diseases	1.16	0.69	1.14	0.59
140-239	2	Neoplasms	1.51	1.62	1.30	1.86
240-279	3	Endocrine, nutritional and metabolic diseases, and immunity disorders	8.67	8.41	9.11	10.78
280-289	4	Diseases of the blood and blood-forming organs	2.04	2.66	2.12	4.38
290-319	5	Mental disorders	14.91	16.83	14.32	15.27
320-389	6	Diseases of the nervous system and sense organs	12.17	9.65	12.16	9.63
390-459	7	Diseases of the circulatory system	23.30	25.71	21.32	17.76
460-519	8	Diseases of the respiratory system	6.47	4.44	6.07	4.63
520-579	9	Diseases of the digestive system	6.00	4.90	6.41	8.19
580-629	10	Diseases of the genitourinary system	3.72	2.95	4.16	4.22
680-709	12	Diseases of the skin and subcutaneous tissue	1.65	1.09	1.62	1.32
710-739	13	Diseases of the musculoskeletal system and connective tissue	7.27	7.74	8.93	10.19
780-799	16	Symptoms, signs, and ill-defined conditions	6.07	2.11	5.00	1.79
800-999	17	Injury and poisoning	2.61	6.21	3.49	7.67
V01-V82	18	Supplementary classification of factors influencing health status and contact with health services	2.47	5.00	2.86	1.71
Total			100.00	100.00	100	100

Note. The ICD-9 chapter mapping shown here reflects that of the World Health Organization (<https://apps.who.int/iris/handle/10665/40492>) and not the mapping of the Clinical Classification System (CCS). Note. In each row, an LTC resident can be counted only once for calculation.

Here we compare the change in distribution between the two sources. The change in distribution per source is calculated as the difference between the latest year's distribution and the previous year's distribution. For example, between 2000 MAX and 2004 MAX, the share of residents diagnosed with infectious and parasitic diseases declined by 0.01 percent out of 100 percent.

Table A.2 Change in Distribution in MAX and NNHS by Disease Chapter

ICD 9 Codes	Chapter	Chapter description	Resident percent distribution change by disease chapter	
			MAX 2000-2004	NNHS at interview 1999-2004
001-139	1	Infectious and parasitic diseases	-0.01	-0.11
140-239	2	Neoplasms	-0.22	0.23
240-279	3	Endocrine, nutritional and metabolic diseases, and immunity disorders	0.44	2.37
280-289	4	Diseases of the blood and blood-forming organs	0.08	1.73
290-319	5	Mental disorders	-0.59	-1.56
320-389	6	Diseases of the nervous system and sense organs	-0.01	-0.02
390-459	7	Diseases of the circulatory system	-1.98	-7.94
460-519	8	Diseases of the respiratory system	-0.39	0.19
520-579	9	Diseases of the digestive system	0.41	3.30
580-629	10	Diseases of the genitourinary system	0.44	1.27
680-709	12	Diseases of the skin and subcutaneous tissue	-0.03	0.23
710-739	13	Diseases of the musculoskeletal system and connective tissue	1.65	2.45
780-799	16	Symptoms, signs, and ill-defined conditions	-1.07	-0.32
800-999	17	Injury and poisoning	0.88	1.46
V01-V82	18	Supplementary classification of factors influencing health status and contact with health services	0.39	-3.29

Note. The ICD-9 chapter mapping shown here reflects that of the World Health Organization (<https://apps.who.int/iris/handle/10665/40492>) and not the mapping of the CCS.