

# The Faces of Medicaid II:

*Recognizing the Care  
Needs of People with  
Multiple Chronic Conditions*



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*The **Center for Health Care Strategies (CHCS)** is a nonprofit health policy resource center dedicated to improving the quality and cost effectiveness of health care services for low-income populations and people with chronic illnesses and disabilities. We work directly with states and federal agencies, health plans, and providers to develop innovative programs that better serve people with complex and high-cost health care needs.*

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To provide a **“portrait”** of Medicaid beneficiaries with **multiple chronic conditions**, this analysis sought to answer two key questions...



What is the **prevalence of chronic conditions**?

Are there patterns or **clustering**s of these conditions to **help guide** the design, evaluation, and financing of **more effective care**?

## I. Introduction

It is difficult to discern meaningful characteristics in a sea of 55 million faces—the number of Americans currently served by Medicaid. For policy makers and those responsible for Medicaid services, the details are critical to getting the best value for the public funds spent on medical, behavioral, and long-term care for these beneficiaries. Recognition that 70 percent of Medicaid’s resources are devoted to 30 percent of its beneficiaries led the Center for Health Care Strategies (CHCS) to publish *The Faces of Medicaid* in 2000. Our previous report was a first step toward identifying the chronic illnesses and disabilities within the Medicaid populations and what services are most needed.<sup>1</sup>

Since that time, it has become clear that the majority of Medicaid spending is devoted to people with not just one chronic condition, but with multiple conditions. Further, we know that for the highest cost Medicaid beneficiaries, virtually all have a complex mix of comorbidities and a wide range of psychosocial needs. Disease management programs focused on single conditions—such as standalone diabetes, depression, or congestive heart failure—will not likely help Medicaid serve the patients on whom spending is concentrated. Furthermore, because so many of these high-need, high-cost beneficiaries are in unmanaged fee-for-service (FFS) systems, there are significant opportunities both to improve outcomes and to reduce or control the costs of caring for them. Indeed, with governors across the country proposing coverage expansions, their best bet, or “best buy,” for freeing up resources to pursue their coverage agenda is likely to be in “bending the cost trends” for these highest need beneficiaries.

This second edition of *The Faces of Medicaid* focuses on people with multiple chronic conditions who represent the greatest opportunities to improve outcomes and control costs within publicly financed care. In order to design programs that are tailored to the needs of this very heterogeneous group, states and health plans must have a clear picture of the prevalence of chronic conditions, the patterns of health care utilization and the associated costs. To provide this “portrait,” the analysis sought to answer two key questions: (1) what is the prevalence of chronic conditions within the Medicaid population; and (2) are there patterns or clusterings of these conditions that could inform the development of more appropriate guidelines, care models, performance measurement systems, and reimbursement methodologies?

No amount of detailed storytelling would make much of a difference if there were not consumers and family caregivers articulating the need for more tailored patient-centered care, or doctors and other providers willing to rethink how care should be delivered. The findings of *The Faces of Medicaid II* are, in essence, a call to action. We all need to respond to the “billion dollar question” looming before us: *now that we know how chronic conditions do (or do not) cluster and interact: what are we going to do about it?*

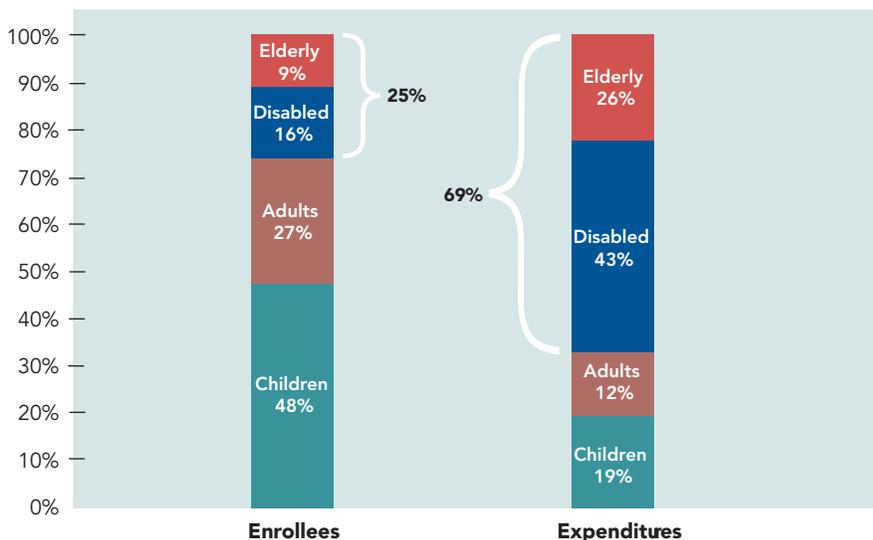
## II. Background

Medicaid spending accounts for approximately one in six health care dollars. With annual costs exceeding \$315 billion in federal fiscal year 2006, Medicaid is the single largest purchaser of nursing home and other long-term care services, as well as maternity care in the United States.<sup>2</sup> It accounts for seven percent of all federal outlays and averages 20 percent of state budgets, placing substantial pressure on public resources. Although growth in Medicaid expenditures has moderated from earlier levels, some still view it as unsustainable.<sup>3</sup> Efforts to curb Medicaid spending, however, must take into account that the program is a vital health care safety net, providing important services to those who might not otherwise be able to obtain care. Rather than limiting coverage, reimbursement, or benefits, state purchasers should pursue opportunities to get better value for every taxpayer dollar spent on Medicaid.

The majority of Medicaid beneficiaries are relatively inexpensive, with a remarkably small proportion of beneficiaries responsible for a significant

amount of total spending. Of the more than 55 million people served by the program, people with disabilities and the elderly represent just one quarter of the population, yet consume almost 70 percent of Medicaid’s resources. Most are served in the fragmented fee-for-service system in which care is uncoordinated and often duplicative. The Kaiser Family Foundation has diligently reminded Medicaid stakeholders over and over again of these basic facts.<sup>4</sup> This imbalance suggests that there should be opportunities for Medicaid to develop care man-

**Figure 1: Medicaid Enrollees and Expenditures by Enrollment Group**



Source: Kaiser Commission on Medicaid and the Uninsured based on CBO and OMB data, 2004.

agement strategies to improve the quality of care for this small group of very high-need, high-cost beneficiaries. By focusing on these beneficiaries, states may also be able to “bend the trend” in Medicaid’s longer-term cost growth.

Given the number of Medicaid beneficiaries with complex and comorbid conditions, states are increasingly recognizing the need to move beyond traditional approaches to caring for the chronically ill. However, the information available to assist state purchasers and health plans in understanding the characteristics of this population is limited. This information is particularly critical for those attempting to undertake care management for significant numbers of persons with disabilities, whose care needs are very different from those of other groups (e.g., TANF beneficiaries, frail elders on Medicare, commercially insured persons, etc.) with which they may be familiar. States generally know how to serve the TANF population, and have enrolled a large proportion of this group in some system of care. In contrast, many states are struggling to find the best systems of care for their under age 65 beneficiaries with disabilities, many of whom are eligible by virtue of their receipt of Supplemental Security Income (SSI). Like many Medicaid beneficiaries, the needs of these patients can sometimes be even more complex due to socioeconomic and behavioral factors, such as poverty, mental illness, homelessness, lack of transportation, and language and cultural barriers. (See Appendix B for a preliminary discussion of racial and ethnic differences in clusters and care.)

Most recent approaches to improving care for adults with multiple chronic conditions have taken the form of traditional disease management programs. These programs typically cover a handful of conditions one at a time—often diabetes, asthma, and congestive heart failure—and use approaches that “silo” patients into single-disease focused interventions. By and large, these programs do not address the care needs of medically complex patients, who typically interact with multiple providers and whose needs go well beyond learning disease-specific self-management techniques. Individuals with multiple chronic conditions and their providers need strategies for assessing and prioritizing a variety of complex needs, and an integrated delivery system that can incorporate behavioral and non-medical supportive services.

Patients, health care providers, and taxpayers all stand to benefit when Medicaid tailors its care models to fit the needs of the population it serves. A clearer understanding of the “faces” of Medicaid beneficiaries with complex conditions will help states identify opportunities to improve health outcomes and target scarce public resources more effectively. The insights acquired from better understanding how to care for adults with multiple chronic conditions within Medicaid may also be applicable to other populations with similarly complex care needs, including state employees and retirees, as well as Medicare and commercially insured beneficiaries.

### III. Faces of Medicaid II – Description and Study Approach

Because of the potential to improve care for many of this nation's highest-need, highest-cost patients, CHCS contracted with Rick Kronick, PhD, and Todd Gilmer, PhD, nationally recognized experts in Medicaid disease prevalence from the University of California San Diego (UCSD), to identify the most prevalent, complex and costly clusters of conditions and comorbidity patterns within the Medicaid population at a national level. Termed *The Faces of Medicaid II*, this cluster data analysis builds upon an earlier CHCS report, *The Faces of Medicaid*, through a systematic analysis of national utilization and cost data supplied by the Centers for Medicare and Medicaid Services (CMS). While the focus of the analysis is on disabled and elderly Medicaid beneficiaries, results are provided for the non-disabled adult and children eligibility categories as well.

#### Data and Methods

This analysis uses data from almost all Medicaid programs in the United States. CMS supplied data from the Medicaid Analytic eXtract (MAX) system for calendar years 2001 and 2002. The 2002 data are used in this report. The MAX data are a set of person-level data files containing information on Medicaid eligibility, service utilization, and payments. An extensive description of the MAX data and links to documentation are available at the CMS website.<sup>5</sup> Following standard practice, enrollees are analyzed separately according to the four major categories of eligibility: non-disabled children, non-disabled adults, people with disability, and the aged.

As described below, a number of exclusions to the data are made in arriving at our final analytic sample. The analytic sample includes 58% of all disabled Medicaid beneficiaries in the United States, 47% of the aged, 34% of non-disabled children, and 19% of non-disabled adults. We include approximately 18.5 million beneficiaries in the analytic sample, including 4.8 million beneficiaries with disability, 2.3 million aged, 8.8 million non-disabled children, and 2.6 million non-disabled adults. Across all categories of assistance, the most common reason for exclusion was enrollment in managed care. Among non-disabled adults, 20% of all beneficiaries were excluded because they did not have full benefits (primarily women who were eligible for family planning services only), and among both non-disabled adults and children, substantial numbers were excluded because they were not eligible for at least six months during the calendar year (data not shown).

It seems likely that the diagnostic profiles of managed care beneficiaries in the states in which virtually all beneficiaries are in managed care are similar to the diagnostic profiles of the beneficiaries included in the analytic sample. While it is possible to conjure hypotheses that could account for differences in diagnostic profiles between states in which most beneficiaries are in managed care and states in which most beneficiaries are in fee-for-service, the researchers could think of no reasons that such differences are likely. In the states in which fee-for-service data are included in the analysis and managed care data are excluded, it is possible that the excluded managed care beneficiaries are, on average, somewhat less complex and have somewhat less comorbidity than the included fee-for-service beneficiaries, but it would be surprising if the differences were dramatic.

Five major exclusions to the data are made in constructing the analytic sample used in this report:

- 1) **Subset of States.** Data for Arizona, Delaware, Hawaii, Maryland, Tennessee, and Oregon were not included because a very large percentage of Medicaid beneficiaries in these states are enrolled in managed care; thus, there would not have been useful information for these states. Service utilization from managed care encounter data in the MAX data system are incomplete, and expenditure data are limited to the premiums paid by Medicaid to health plans. The excluded states account for approximately 8.5% of Medicaid beneficiaries nationwide.
- 2) **Subset of Beneficiaries.** In any state in which more than 70% of the beneficiaries in a given category of assistance are enrolled in managed care, all beneficiaries in that category of assistance are excluded due to concerns that the relatively few beneficiaries in fee-for-service may not be representative of the broader group of eligibles. As a result, the following were excluded: the disabled in Michigan, New Mexico, Pennsylvania; non-disabled adults and children in Connecticut, Minnesota, New Jersey, Pennsylvania, Rhode Island, Wisconsin, and Washington, DC; and non-disabled children in New Mexico, Michigan, and Washington.
- 3) **Portion of Dual Eligibles.** Beneficiaries eligible for both Medicare and Medicaid (“dual eligibles”) were excluded in a few states in which the diagnostic data for dual eligibles appear suspect. Among disabled beneficiaries, 23% of Medicaid-only beneficiaries did not have any diagnosis that was included in the Chronic Illness and Disability Payment System (see below for a description of CDPS), compared to 22% with no CDPS diagnosis among dually eligible disabled. This similarity indicates that the density of diagnostic information is, on average, similar

for the Medicaid-only and dual-eligibles. However, there are a handful of states in which the proportion of dual eligibles with no CDPS diagnosis is much higher than the proportion of Medicaid-only disabled with no CDPS diagnosis, and this pattern suggests that some diagnostic information on dual eligibles may be missing in those states. These states are also, for the most part, states in which the fraction of aged enrollees with no CDPS diagnosis is much higher than the national average, supporting the hypothesis that diagnostic information is incomplete for dual eligibles in these states. We exclude the dually-eligible disabled and all aged beneficiaries in Connecticut, Florida, Georgia, Michigan, North Dakota, New Hampshire, Pennsylvania, and South Dakota because the diagnostic data for these beneficiaries appear to be incomplete.

**4) Short-Term Eligibles.** Beneficiaries with fewer than six months of FFS eligibility in 2002 were excluded because diagnostic profiles on these beneficiaries will be less complete than the diagnostic profiles on beneficiaries with longer periods of eligibility. If a beneficiary has had a limited opportunity to see a physician, it is difficult to use physician-reported data to accurately represent that individual's diagnoses.

**5) Restricted Medicaid Eligibility.** Beneficiaries who were not eligible for full Medicaid benefits in July 2002 were excluded. This comprises a large number of TANF adults who were eligible for family planning services only, as well as substantial numbers of aged (and some disabled) beneficiaries who were eligible only for Medicare cost-sharing or premium assistance.

A summary of the exclusions and the number of beneficiaries affected is shown in Appendix A.

## **Combining Diagnoses into Groups**

The Chronic Illness and Disability Payment System (CDPS) is used to describe the diagnoses that are reported on health care claims. Diagnoses from laboratory and radiology claims are excluded because diagnoses from these sources are particularly likely to be 'rule-out' diagnoses. In the MAX data system virtually all claims, except for outpatient prescription drugs, transportation, and a few other claim types, have diagnostic information recorded on them. Most claims from ambulatory settings contain only one or two diagnoses, while many claims from inpatient hospitalizations contain five or more diagnoses. All diagnoses (both primary and secondary) that appear on the claims to characterize beneficiaries were used.

The CDPS was developed as a tool that Medicaid programs could use in adjusting payments to health plans based on the health status of enrollees.<sup>6,7</sup> It is a classification system that assigns ICD-9-CM codes to diagnostic buckets. CDPS includes 20 major categories of diagnoses, which correspond to body systems or diagnoses, such as cardiovascular disease, central nervous system diseases, or diabetes. Most of the major categories are further divided into several subcategories according to the degree of the increased expenditures associated with the diagnoses. For example, diagnoses of the nervous system are divided into three subcategories for high-cost, medium-cost, and low-cost conditions. One feature of CDPS that is advantageous when it is used as a payment tool, but less than optimal when used as a diagnostic profiling mechanism, is that it explicitly excludes diagnoses that are not well defined (that is, diagnoses in which one would expect that clinicians may disagree about whether a patient with a given presentation should be labeled with the diagnosis). For more information about CDPS, visit [www.cdps.ucsd.edu](http://www.cdps.ucsd.edu).

Diagnostic information is known to be incomplete. The strongest evidence of incomplete diagnostic information comes from analysis of the lack of persistence of chronic diagnoses in claims data. For example, among beneficiaries with a diagnosis of quadriplegia on at least one claim during a given 12-month period, only 60% of these beneficiaries have any claim with a diagnosis of quadriplegia in the subsequent period. Most of these beneficiaries see a physician one or more times during the second 12-month period, but the primary cause for the visit may be urinary tract infection or pneumonia, and not quadriplegia. Although the ICD-9 coding manual instructs physicians to: “Code all documented conditions that coexist at the time of the visit that require or affect patient care, treatment, or management,” it is clear from the results on lack of persistence of chronic diagnoses that these instructions are often ignored. Based on results using two years of data, it appears that reliance on incompletely coded diagnostic data may result in an underestimate of approximately 20% of the number of beneficiaries with multiple comorbidities.<sup>8</sup>

It appears that psychiatric diagnoses and diagnoses of developmental disability are underreported more frequently than “physical” diagnoses. Among Medicaid beneficiaries with disabilities in the sample, 6.8% are diagnosed with a developmental disability that is included in CDPS. However, in 2002, “retardation” is listed as the primary diagnosis for approximately 23% of SSI recipients.<sup>9</sup> Developmental disabilities are substantially underreported in the claims data. “Other mental diagnoses” (that is, other than retardation) are listed as the primary diagnosis for approximately 34% of SSI beneficiaries in 2002, with approximately 11% diagnosed with schizophrenia, and 23% diagnosed with other mental illness.<sup>10</sup> The 2002 MAX data produces the estimate that 8.5% are diagnosed

with schizophrenia; 2.6% with bipolar disorder or other “medium” cost psychiatric illness; and 16.8% with “low” cost psychiatric illness, much of which is depression. The prevalence of schizophrenia in the MAX data is slightly lower than, but similar to, the estimated prevalence in the SSI administrative data. However, other forms of mental illness appear to be underreported in the MAX data. For example, many of the beneficiaries in the MAX data with low-cost psychiatric illness likely do not have psychiatric illness as the major cause of disability, and it appears that serious psychiatric diagnoses in the MAX data are less frequent than in the SSI population more generally. Further evidence that psychiatric diagnoses are underreported more frequently than physical diagnoses comes from analysis of diagnostic and prescription drug data. Among beneficiaries filling prescriptions for anti-psychotics or lithium, 25% did not have any mental illness diagnosis reported on a claim during the year; among beneficiaries filling prescriptions for anti-depressants or anti-anxiety drugs, over two-thirds did not have any psychiatric diagnosis.<sup>11</sup>

In summary, readers are encouraged to remember that there is an underreporting of diagnoses in claims data, and that it seems likely that the underreporting is greater for psychiatric and developmental disabilities diagnoses than for other diagnoses.

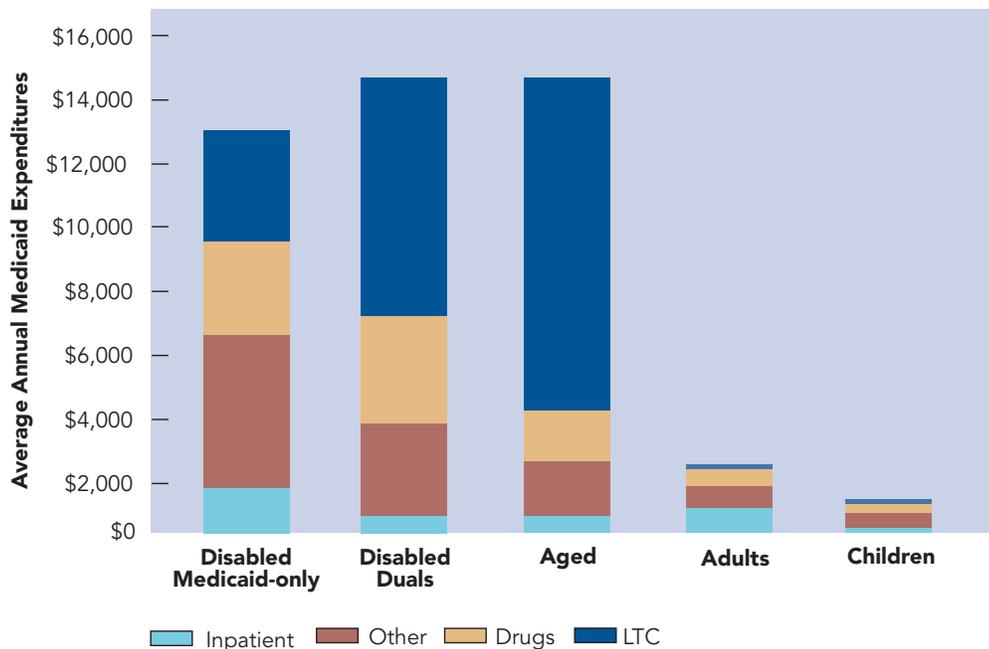
## IV. Results

Medicaid beneficiaries are extremely diverse. They include relatively healthy low-income children and their parents; non-elderly adults and children with a wide range of physical and mental disabilities; and both community-based and institutionalized elderly persons.

### Expenditures and Prevalence of Illness among Medicaid Beneficiaries

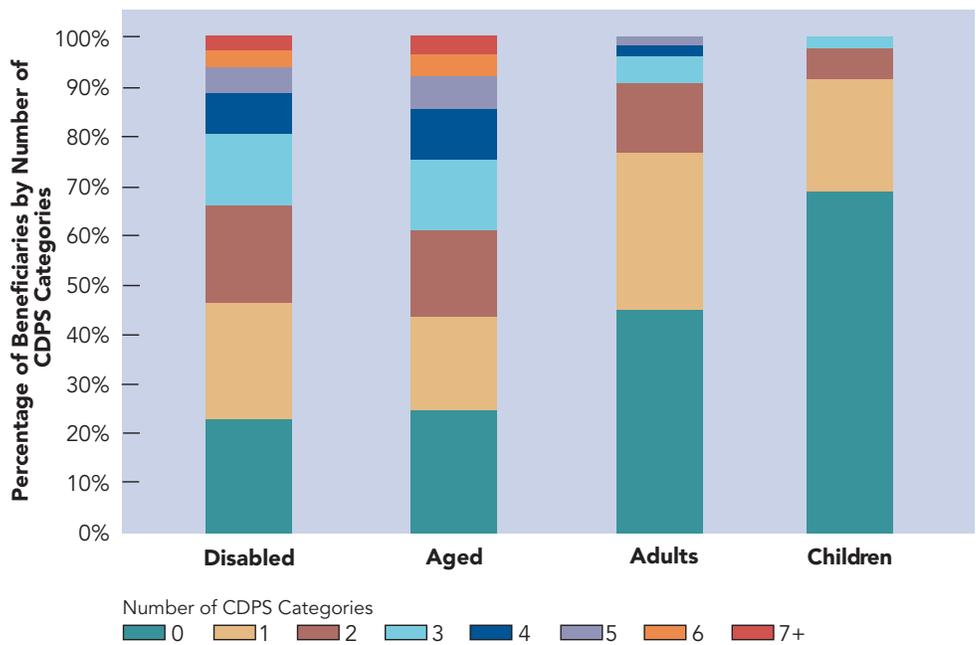
The diversity of Medicaid beneficiaries is reflected both in the prevalence of illness and in health services utilization and expenditures. Average annual expenditures are much higher among Medicaid beneficiaries with disability and among the elderly than among TANF children or adults—\$13,499 per beneficiary (in 2002) for Medicaid-only adults with disability, and \$15,335 for the elderly, compared to \$3,028 for non-disabled adults, and \$1,585 for non-disabled children (Exhibit 1).<sup>12</sup> Among beneficiaries with disability, long term care expenditures are much higher among those dually eligible for Medicaid and Medicare than for Medicaid-only beneficiaries, while Medicaid acute care expenditures are higher for Medicaid-only beneficiaries (although if Medicare acute care expenditures for the dual eligibles were included, total acute care expenditures would be much higher for dual eligibles than for Medicaid-only beneficiaries with disability).

**Exhibit 1: Average Annual Medicaid Expenditures, by Type of Beneficiary and Category of Service, 2002**



Differences across categories of assistance in the diagnostic burden of illness follow a similar pattern to differences across categories in relative expenditures. Among non-disabled low-income children in 2002, 68% had no diagnosis that is recommended for use in the CDPS payment system, and only 2% had three or more CDPS diagnoses (Exhibit 2). CDPS diagnoses are somewhat more prevalent among non-disabled adults—44% with no CDPS diagnosis and 10% with three or more, but are still sparse compared to the burden of illness among beneficiaries with disability (21% with no diagnosis, and 35% with more than three), and among the aged (23% with no diagnosis, and 39% with three or more).

**Exhibit 2: Distribution of Beneficiaries by Number of CDPS Categories**



People with disabilities are more likely to have three or more chronic conditions (35%) than non-disabled adults (10%), and the aged are even more likely (39%) to have a higher burden of illness.

### Comparison of Diagnostic Profiles for the Aged and Disabled

The CDPS risk-score provides a summary measure of the burden of illness, and shows that persons with disability have a much higher burden of illness than adults or children, and a similar overall burden of illness as the aged (Exhibit 3).

#### Exhibit 3: Average CDPS Risk Score, by Type of Beneficiary

	N	CDPS-risk score	% with no CDPS diagnosis
Disabled, Medicaid only	2,952,443	1.38	23%
Disabled dual eligibles	1,808,436	1.60	19%
Aged	2,346,976	1.43	23%
Adults	2,567,027	0.55	44%
Children	8,835,303	0.34	68%

Note: CDPS risk-score for each of the four categories is calculated using concurrent regression weights for persons with disabilities.

Although the average number of diagnoses and risk score among people with disability and the elderly are similar, there are substantial differences between the two groups in their types of diagnoses. Not surprisingly, cardiovascular disease is much more common among the elderly (52%) than among the disabled (32%), while psychiatric illness (particularly schizophrenia), substance abuse, and developmental disabilities are much more common among the disabled than among the elderly (Exhibit 4). Diabetes and cancer are more prevalent among the elderly, while central nervous system disorders and infectious disease (particularly HIV disease) are more prevalent among the disabled.

**Exhibit 4: Prevalence of Major CDPS Categories, by Type of Beneficiary**

CDPS Category	Disabled	Aged	Disabled Medicaid-only	Disabled Duals
Cardiovascular	31.5%	51.5%	28.4%	36.5%
Psychiatric	28.8%	10.4%	29.3%	28.0%
Central Nervous System	21.9%	18.1%	22.7%	20.7%
Pulmonary	19.4%	19.6%	19.8%	18.8%
Skeletal and Connective	19.0%	24.7%	17.6%	21.4%
Gastrointestinal	15.8%	15.0%	15.6%	16.0%
Diabetes	14.7%	19.9%	12.7%	18.0%
Renal	10.0%	12.9%	8.5%	12.6%
Skin	8.5%	9.3%	8.1%	9.1%
Developmental Disability	7.0%	0.6%	6.5%	7.8%
Eye	6.7%	18.6%	5.0%	9.5%
Metabolic	6.0%	5.6%	6.7%	4.8%
Substance Abuse	5.3%	0.7%	5.9%	4.3%
Infectious Disease	4.2%	3.2%	4.4%	4.0%
Cancer	3.9%	6.9%	3.6%	4.3%
Cerebrovascular	3.7%	8.9%	3.1%	4.7%
Genital	2.6%	3.0%	2.6%	2.6%
Hematologic	2.5%	1.9%	2.8%	2.2%
Pregnancy	1.1%	0.1%	1.5%	0.6%
N	4,760,879	2,346,976	2,952,443	1,808,436

People with disabilities and the elderly have different types of diagnoses. The aged are more likely to have cardiovascular disease (52%) than people with disabilities (32%), while those with disabilities are more apt to have a psychiatric diagnosis (29%) than aged beneficiaries (10%).

### Detailed Diagnostic Distribution among People with Disabilities

The CDPS diagnostic groups are at a high level of aggregation, and clinicians and program managers may find more useful a listing of some of the major diagnoses within the CDPS categories. Exhibit 5 (pages 16-18) provides more detail on the most prevalent diagnoses within the major CDPS categories among persons with disability. Not surprisingly, diagnoses that are relatively common in the general population, such as hypertension and diabetes, are also prevalent among beneficiaries with disability—13.5% of all Medicaid beneficiaries are diagnosed with Type II diabetes, and 23% with hypertension. Among very complex beneficiaries—those with diagnoses in eight or more major CDPS categories—the proportions diagnosed with Type II diabetes and hypertension increases to 56% and 65% respectively. Other diagnoses that are quite rare in the general population are not so rare among persons with disability. For example, 8.5% of people with disability are diagnosed with schizophrenia; 9.2% with affective psychoses; and 4.9% with hypertensive heart disease.<sup>13</sup>

(As discussed in the Data and Methods section, because of incomplete coding of diagnostic information, claims data underestimate the true prevalence of disease, and the underestimate appears to be larger for serious mental illness than for most physical illnesses.)

Among people with disabilities, the most common co-occurring conditions are hypertension (23%), diabetes (14%), and behavioral health disorders, like affective psychoses (9%) and schizophrenia (9%). For those with eight or more diagnoses, hypertension (65%) and diabetes (56%) are the most common co-occurring conditions.

**Exhibit 5: Most Frequent Primary Diagnoses among Beneficiaries with Disability**

Major Group	CDPS Category	Label	Overall Frequency	Frequency among Beneficiaries with 8+ CDPS Categories
Cardiovascular	CARVH	MALFUNC VASC DEVICE/GRAF	0.8%	13.5%
	CARM	MAL HYPERT HRT DIS W CHF	4.9%	35.4%
	CARM	PRIM CARDIOMYOPATHY NEC	1.3%	8.0%
	CARM	TRICUSPID VALVE DISEASE	0.6%	5.3%
	CARL	OTH CHR ISCHEMIC HRT DIS	5.9%	28.6%
	CARL	CARDIAC DYSRHYTHMIAS	3.1%	20.9%
	CARL	RHEUM FEV W/O HRT INVOLV	2.6%	16.3%
	CARL	ANGINA PECTORIS	2.1%	10.2%
	CARL	AORTIC ANEURYSM	2.1%	15.3%
	CARL	PAROX ATRIAL TACHYCARDIA	1.8%	12.3%
	CARL	OTH AC ISCHEMIC HRT DIS	1.5%	9.1%
	CARL	THROMBOPHLEBITIS	1.3%	13.6%
	CARL	CARDIAC SEPTAL CLOS ANOM	1.0%	4.2%
	CARL	CARDIOMEGALY	1.0%	7.9%
	CARL	CONDUCTION DISORDERS	0.7%	4.9%
	CARL	ACUTE MYOCARDIAL INFARCT	0.6%	5.1%
	CARL	AMI ANTEROLATERAL, INIT	0.6%	5.0%
	CAREL	ESSENTIAL HYPERTENSION	22.7%	64.8%
Psychiatric	PSYH	SCHIZOPHRENIC DISORDERS	8.5%	12.6%
	PSYM	BIPOLAR AFFECTIVE, MANIC	3.7%	8.0%
	PSYL	AFFECTIVE PSYCHOSES	9.2%	25.6%
	PSYL	DEPRESSIVE DISORDER NEC	6.9%	26.6%
	PSYL	OTH NONORGANIC PSYCHOSES	2.8%	9.9%
	PSYL	ATTENTION DEFICIT DIS	2.6%	0.3%
	PSYL	NEUROTIC DEPRESSION	2.4%	8.0%
	PSYL	PROLONG DEPRESSIVE REACT	2.3%	5.5%
PSYL	PSYCHOSES OF CHILDHOOD	1.0%	0.4%	
Skeletal & Connective	SKCM	CHRONIC OSTEOMYELITIS	0.2%	2.5%
	SKCL	OTH INFLAMM POLYARTHROP	1.3%	3.9%
	SKCL	OSTEOMYELITIS	0.5%	7.3%
	SKCL	FRACTURE NECK OF FEMUR	0.5%	3.6%
	SKCL	SYST LUPUS ERYTHEMATOSUS	0.5%	2.9%
	SKCL	TRAUMATIC AMPUTATION TOE	0.5%	4.8%
	SKCVL	OTH BONE & CARTILAGE DIS	2.7%	11.5%
	SKCVL	INTERNAL DERANGEMNT KNEE	1.4%	5.7%
	SKCEL	OSTEOARTHROSIS ET AL	7.5%	24.1%
	SKCEL	INFLAM SPONDYLOPATHIES	1.8%	6.4%
	SKCEL	CERVICAL DISC DISPLACMNT	1.3%	3.9%
	SKCEL	INTERVERTEBRAL DISC DIS	1.3%	4.4%
SKCEL	THORAC/LUMBAR DISC DEGEN	1.3%	4.0%	
SKCEL	ACQ DEFORMITIES OF TOE	1.0%	3.4%	
Central Nervous System	CNSH	QUADRIPLEGIA NOS	0.7%	3.7%
	CNSM	MULTIPLE SCLEROSIS	0.7%	2.0%
	CNSM	HERED SPASTIC PARAPLEGIA	0.6%	3.8%
	CNSM	CONGENITAL QUADRIPLEGIA	0.6%	1.3%
	CNSM	MUSCULAR DYSTROPHIES	0.3%	1.2%
	CNSM	AUTONOMIC NERVE DISORDER	0.3%	3.0%
	CNSL	CONVULSIONS	6.4%	24.8%
	CNSL	EPILEPSY	3.5%	9.1%
CNSL	INFANTILE CEREBRAL PALSY	2.5%	3.3%	

Major Group	CDPS Category	Label	Overall Frequency	Frequency among Beneficiaries with 8+ CDPS Categories
<b>Central Nervous System (continued)</b>	CNSL	MIGRAINE	2.2%	6.8%
	CNSL	ABN INVOLUN MOVEMENT NEC	2.0%	12.9%
	CNSL	APHASIA	1.0%	5.3%
	CNSL	MONONEURITIS LEG	0.9%	5.9%
	CNSL	INSOMNIA W SLEEP APNEA	0.9%	4.3%
	CNSL	HERED PERIPH NEUROPATHY	0.9%	6.8%
	CNSL	INFLAM/TOXIC NEUROPATHY	0.8%	9.0%
	CNSL	SENILE/PRESENILE PSYCHOS	0.7%	5.3%
<b>Pulmonary</b>	PULVH	TRACHEOSTOMY STATUS	0.2%	2.6%
	PULVH	ATTEN TO TRACHEOSTOMY	0.1%	1.4%
	PULVH	DEPENDENCE ON RESPIRATOR	0.1%	2.0%
	PULVH	CYSTIC FIBROSIS	0.1%	0.1%
	PULH	RESPIRATORY FAILURE	1.4%	20.9%
	PULH	PRIM PULM HYPERTENSION	0.2%	1.8%
	PULL	ASTHMA	8.1%	21.6%
	PULL	CHR AIRWAY OBSTRUCT NEC	6.3%	32.4%
	PULL	VIRAL PNEUMONIA	4.2%	34.1%
	PULL	OBSTRUCT CHR BRONCHITIS	2.8%	15.1%
	PULL	PLEURISY	0.9%	9.5%
	PULL	EMPHYSEMA	0.9%	4.6%
	PULL	PULMONARY COLLAPSE	0.5%	6.8%
	PULL	CHR PULMONARY HEART DIS	0.5%	3.8%
	PULL	OTH BACTERIAL PNEUMONIA	0.4%	4.9%
<b>Gastrointestinal</b>	GIH	PERITONITIS	0.2%	2.9%
	GIH	HEPATIC COMA	0.2%	2.9%
	GIM	CHR LIVER DIS/CIRRHOSIS	1.3%	9.7%
	GIM	GASTROSTOMY STATUS	0.6%	5.9%
	GIM	ATTEN TO GASTROSTOMY	0.4%	4.0%
	GIM	ASCITES	0.4%	5.2%
	GIL	DISEASES OF ESOPHAGUS	7.4%	30.3%
	GIL	GASTROINTESTINAL HEMORR	2.1%	18.5%
	GIL	INGUINAL HERNIA	1.6%	7.4%
	GIL	GASTRIC ULCER	1.4%	8.2%
	GIL	CHOLERA	1.1%	7.4%
	GIL	DIVERTICULA SM INTESTINE	1.0%	4.6%
	GIL	INTESTINAL OBSTRUCTION	0.9%	10.3%
	GIL	ACUTE PANCREATITIS	0.7%	6.5%
<b>Diabetes</b>	DIA1H	DMI RENL NT ST UNCNRD	0.3%	4.7%
	DIA1M	DMI WO CMP NT ST UNCNRD	4.2%	26.5%
	DIA2M	DIAB W NEUROLOGIC MANIF	1.3%	12.5%
	DIA2M	DIAB W OPHTHALMIC MANIF	0.9%	5.7%
	DIA2M	DIAB W RENAL MANIFEST	0.6%	8.7%
	DIA2M	PROLIF DIAB RETINOPATHY	0.6%	4.1%
	DIA1M	DIABETES W KETOACIDOSIS	0.5%	4.6%
	DIA1M	DMI NEURO NT ST UNCNRD	0.5%	6.2%
	DIA2L	DIABETES MELLITUS	13.5%	55.8%
<b>Skin</b>	SKNH	DECUBITUS ULCER	1.1%	16.5%
	SKNL	CHRONIC ULCER OF SKIN	0.4%	5.6%

continued

**Exhibit 5: Most Frequent Primary Diagnoses among Beneficiaries with Disability (continued)**

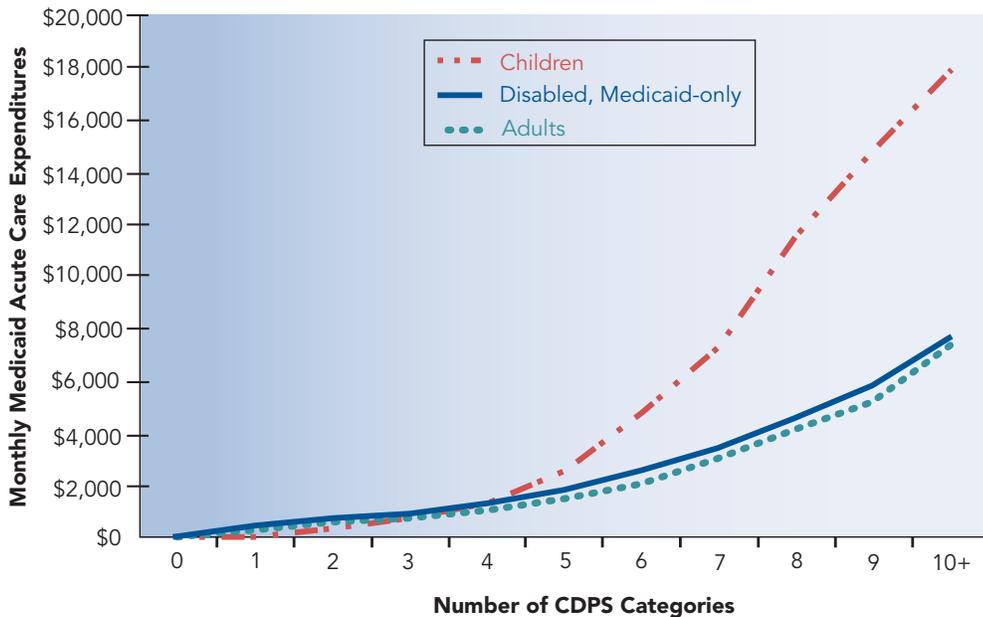
Major Group	CDP	Label	Overall Frequency	Frequency among Beneficiaries with 8+ CDPS Categories
<b>Renal</b>	RENVH	CHRONIC RENAL FAILURE	2.1%	21.0%
	RENVH	COMP-REN DIALYS DEV/GRFT	0.6%	6.9%
	RENM	INCONTINENCE OF URINE	3.5%	15.7%
	RENM	ACUTE RENAL FAILURE	1.5%	25.3%
	RENM	MAL HYP REN W RENAL FAIL	1.2%	15.5%
	RENM	RETENTION OF URINE	0.7%	7.7%
	RENL	HEMATURIA	1.4%	9.1%
	RENL	BLADDER NECK OBSTRUCTION	0.9%	6.2%
	RENL	RENAL/URETERAL CALCULUS	0.8%	3.8%
	RENL	KIDNEY INFECTION	0.6%	4.5%
RENL	ACUTE NEPHRITIS	0.4%	6.0%	
<b>Substance Abuse</b>	SUBL	OPIOID TYPE DEPENDENCE	1.2%	6.4%
	SUBL	COCAINE DEPENDENCE	1.0%	5.2%
	SUBL	DRUG DEPENDENCE	0.9%	4.5%
	SUBL	DRUG PSYCHOSES	0.6%	4.3%
	SUBVL	ALCOHOL DEPENDENCE SYNDR	2.1%	9.9%
	SUBVL	ALCOHOL ABUSE	1.8%	9.2%
	SUBVL	ALCOHOLIC PSYCHOSES	0.5%	3.7%
<b>Cancer</b>	CANH	SECONDRY MAL NEO GI/RESP	0.6%	4.0%
	CANH	MAL NEO TRACHEA/LUNG	0.4%	2.7%
	CANM	MALIG NEO FEMALE BREAST	0.7%	2.4%
	CANM	RADIOTHERAPY ENCOUNTER	0.5%	3.4%
	CANL	MALIGNANT NEOPLASM COLON	0.3%	1.8%
	CANL	MALIGN NEOPL PROSTATE	0.2%	1.0%
<b>Developmental Disability</b>	DDM	SEVERE MENTAL RETARDAT	1.8%	2.3%
	DDL	MILD MENTAL RETARDATION	5.5%	7.4%
<b>Metabolic</b>	METH	HYPERPOTASSEMIA	0.7%	14.1%
	METH	ACIDOSIS	0.4%	7.8%
	METM	KWASHIORKOR	0.7%	13.0%
	METVL	HYPOPOTASSEMIA	1.5%	18.3%
	METVL	GOUT	0.7%	3.8%
<b>Eye</b>	EYEL	RETINAL DETACHMENT	0.3%	1.4%
	EYEVL	CATARACT	4.5%	19.0%
<b>Cerebrovascular Infectious</b>	CERL	CVA	2.0%	17.9%
	AIDSH	HUMAN IMMUNO VIRUS DIS	1.7%	5.8%
	INFH	STAPHYLOCOCC SEPTICEMIA	0.3%	7.5%
	HIVM	ASYMP HIV INFECTN STATUS	0.7%	3.4%
	INFM	GRAM-NEG SEPTICEMIA NEC	1.1%	26.0%
	INFM	THRUSH	0.6%	7.8%
	INFL	HERPES ZOSTER	0.4%	2.2%
	INFL	INFCT MCRG RESISTNT DRUG	0.2%	4.4%
<b>Hematological</b>	HEMEH	CONG FACTOR VIII DIORD	0.0%	0.2%
	HEMVH	HB-S DISEASE W/O CRISIS	0.3%	0.8%
	HEMM	HEREDIT HEMOLYTIC ANEMIA	0.5%	1.6%
	HEMM	AGRANULOCYTOSIS	0.4%	4.7%
	HEMM	APLASTIC ANEMIA	0.3%	5.5%
	HEML	PURPURA & OTH HEMOR COND	0.6%	9.5%
	HEML	FUNCTION DIS NEUTROPHILS	0.5%	7.3%
	HEML	COAGULATION DEFECTS	0.5%	7.2%

**Note:** Most stage 1 groups include more than one ICD-9 code. A complete listing of the codes included in each group is available at <http://cdps.ucsd.edu>.

### Relationship between Number of CDPS Categories and Acute Care Expenditures

Acute care expenditures are strongly related to the number of CDPS diagnostic groups among children, adults, and Medicaid-only persons with disability. Among Medicaid-only persons with disability, each CDPS category is associated, on average, with an increase in expenditures of approximately \$700/month, or approximately \$8,400 per year (Exhibit 6). The concave shape of the graph provides some evidence of “super-additivity”—moving from seven to eight CDPS categories adds more expenditures than going from one to two categories. The curvature of the lines in Exhibit 6 are primarily because diagnoses tend to be more severe as the number of CDPS categories increase, but in part the concave shape of the graph indicates that “complexity matters.” Controlling for the number of CDPS categories, expenditures for adults and persons with disability are relatively similar, although expenditures for persons with disability average \$300-\$400 per month more than for adults with similar numbers of diagnoses. However, the major difference between adults and persons with disabilities is not in expenditures per CDPS category, but rather in the number of CDPS categories (recall the data shown in Exhibit 2 showing the burden of illness among beneficiaries with disability).

**Exhibit 6: Monthly Medicaid Acute Care Expenditures, by Type of Beneficiary and Number of CDPS Categories, 2002**



The pattern for children is somewhat different—as was shown in Exhibit 2, there are exceedingly small numbers of children with five or more CDPS categories, although as Exhibit 6 demonstrates care for the few children with diagnoses in many groups is extremely expensive.

### **The Costs of Complexity**

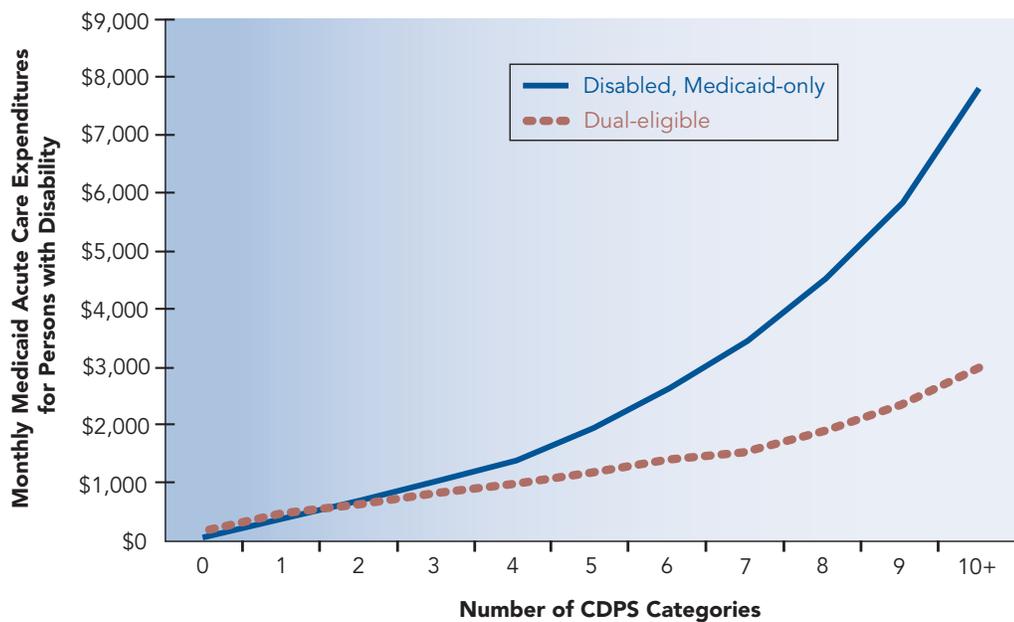
For the most part, the costs of diseases are additive. For example, a beneficiary who has high-cost central nervous system (CNS) disease (primarily quadriplegia) is expected to have annual expenditures approximately \$15,000 greater than a beneficiary without high-cost CNS disease and a beneficiary with high-cost pulmonary disease is expected to have expenditures approximately \$15,000 greater than a beneficiary without high-cost pulmonary disease. Combine the two and a beneficiary with both high-cost CNS and high-cost pulmonary disease is expected to have expenditures approximately \$30,000 greater than someone without either diagnosis.

However, for beneficiaries with diagnoses in eight or more CDPS categories there appears to be evidence of “super-additivity,” that is a cost of great complexity. The total expenditures for beneficiaries with diagnoses in eight separate CDPS categories are approximately 5% higher than the sum of the effects of the individual diagnoses. For beneficiaries with nine separate CDPS diagnoses, actual expenditures are 10% more than the sum of the individual diagnoses, and for those with 10 or more CDPS categories, actual expenditures are 14% more than the sum of the individual diagnoses. For example, for beneficiaries with eight CDPS categories, actual expenditures are \$3,426 per month, 5% higher than the \$3,275 that is predicted by an additive model; for nine CDPS, actual is \$4,404, 10% higher than the \$4,002 predicted; and for 10+, actual is \$5,899 and predicted is \$5,166.

The results indicate that the lines in Exhibit 6 are concave (that is, curve upward) in part because beneficiaries with diagnoses in many diagnostic groups tend also to have more severe diagnoses, but also because the existence of multiple diagnoses (complexity) increases total expenditures.

Among dual eligibles with disability, the relationship between the number of CDPS categories and Medicaid acute care expenditures is less steep than for Medicaid-only beneficiaries (Exhibit 7). This less steep relationship between number of CDPS categories and acute care spending for dual eligibles compared to Medicaid-only beneficiaries with disability is a result of the composition of Medicaid spending: for dual eligibles, Medicaid acute care spending is disproportionately for prescription drugs (because most inpatient and physician services are reimbursed by Medicare), and prescription drug spending is less strongly associated with the number of CDPS categories than is physician, or, especially, inpatient utilization.<sup>14</sup>

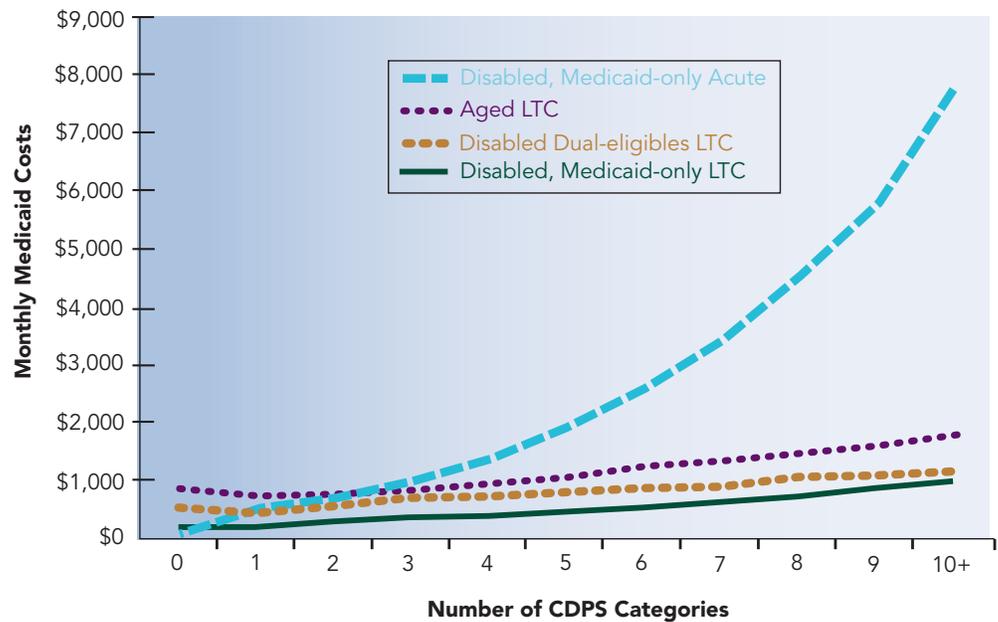
**Exhibit 7: Monthly Medicaid Acute Care Expenditures for Persons with Disability, by Dual-Eligible Status and Number of CDPS Categories, 2002**



### Relationship between Number of CDPS Categories and Long Term Care Expenditures

For both persons with disability and the aged, long term care expenditures are less strongly related to the number of CDPS categories than are acute care expenditures (Exhibit 8). Long term care utilization is related primarily to the level of functional needs (and the level of informal support), and diagnostic mix is only weakly related to functional needs. The strong relationship between the number of diagnoses and acute care expenditures is contrasted to the relatively weak relationship between the number of diagnoses and long term care expenditures in Exhibit 8—the acute care expenditure line increases rapidly with number of diagnostic groups, while the long term care expenditure lines for various categories of assistance are relatively flat. Many people with multimorbidity do not use LTC services, and, conversely, some people with dementia but few physical comorbidities do use LTC services. In acute care, by contrast, almost all people with multimorbidity use extensive acute care services, and relatively few people without multiple illnesses are high utilizers.

**Exhibit 8: Average Monthly Medicaid Expenditures, by Type of Beneficiary, Type of Expenditure, and Number of CDPS Categories, 2002**

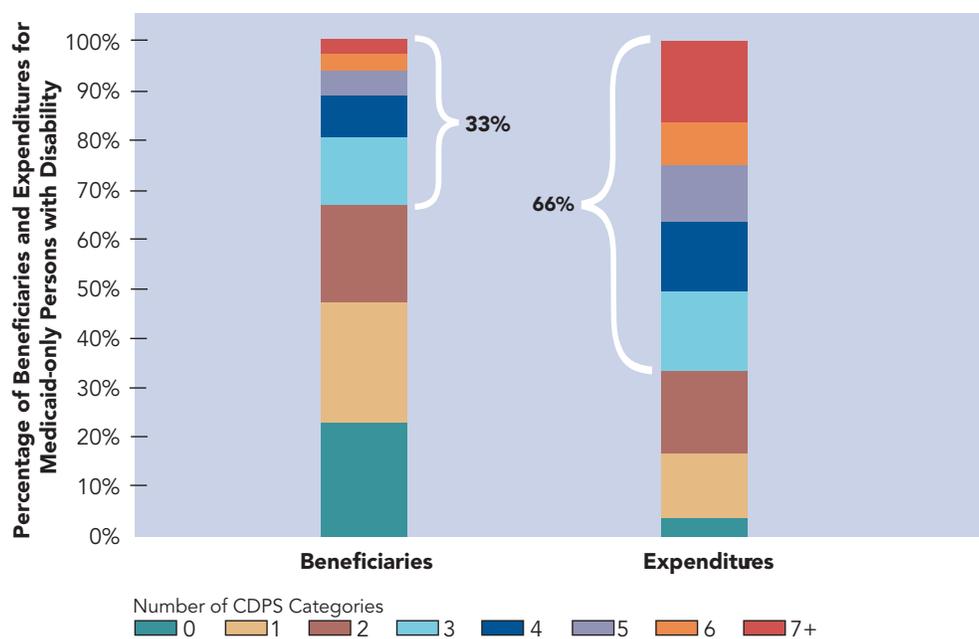


As the number of diagnoses increases, long-term care expenditures remain fairly constant. Acute care costs, however, grow exponentially with additional conditions.

## Diagnostic Clusters and the High Cost of Comorbidities

As a result of the strong relationship between expenditures and the number of diagnostic groups, even though “only” one-third of Medicaid-only people with disability have diagnoses in three or more CDPS diagnostic groups, these beneficiaries account for more than two-thirds of acute care expenditures (Exhibit 9).<sup>15</sup> The overwhelming majority of acute care expenditures for persons with disability are among people with multiple CDPS categories.

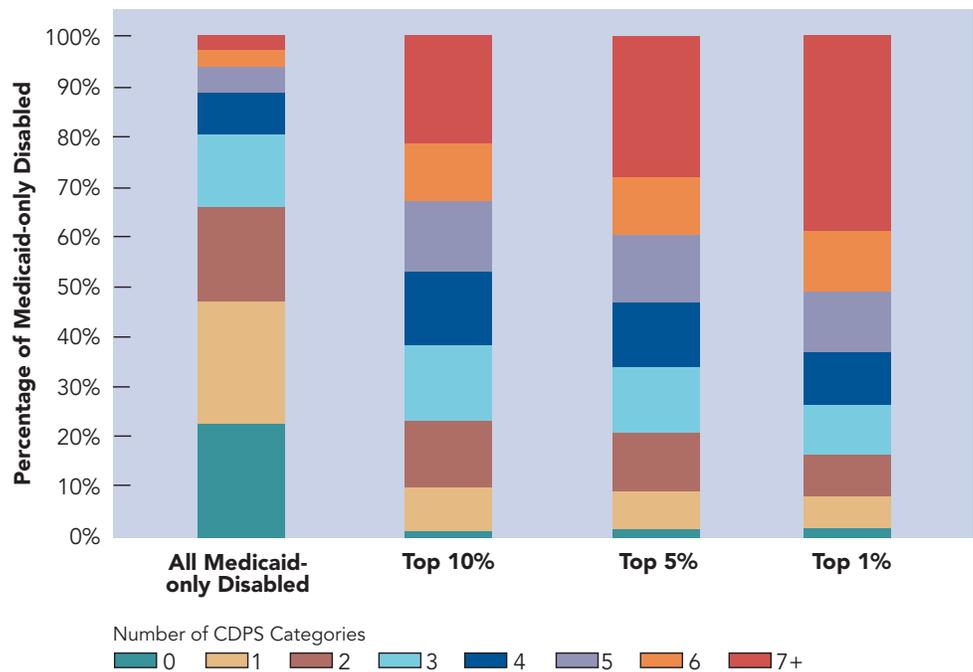
**Exhibit 9: Distribution of Beneficiaries and Expenditures for Medicaid-only Persons with Disability, by Number of CDPS Categories, 2002**



Medicaid beneficiaries who have a disability and three or more chronic conditions (33%) incur close to 70 percent of total spending for this group.

Among high-cost beneficiaries virtually all have multimorbidity. Within the most expensive 1% of beneficiaries in acute care spending, on whom average spending in 2002 was \$161,000 per year, almost 83% had diagnoses in three or more CDPS categories, and over 60% had diagnoses in five or more CDPS categories (Exhibit 10). And while the density of diagnoses among the top 5% and top 10% of beneficiaries is slightly less than among the top 1%, it is still the case that among expensive beneficiaries, the overwhelming majority have multiple chronic conditions. Among the top 1%, 38% of beneficiaries were diagnosed in seven or more major CDPS categories; among the top 5%, 27%, and among the top 10%, 21%. In sharp contrast, among the 90% of Medicaid-only beneficiaries with disability who were not in the top 10% of the expenditure distribution, only 1% were diagnosed in seven or more CDPS categories (data not shown).

**Exhibit 10: Distribution of Medicaid-only Disabled, by Number of CDPS Categories and Expenditure Groups**



Among the highest-cost beneficiaries, virtually all have multiple chronic conditions. People with three or more chronic conditions account for more than 80% of the top 1% of the highest-cost beneficiaries and more than 75% of the top 10% in terms of costs.

It is clear that the great majority of Medicaid spending is devoted to people with multiple chronic conditions, and that among high-cost Medicaid beneficiaries virtually all have multimorbidities. These observations suggest that disease management programs focused on single diseases—such as standalone asthma, diabetes, or congestive heart failure—may not address the actual needs of the patients with these conditions, who often have multimorbidity.

### Diagnostic Dyads among Beneficiaries with Disabilities

There are some pairs (dyads) of diagnoses that are strongly associated and some that show little correlation. Exhibit 11 includes examples of both extremes. For example, among the Medicaid-only disabled population, beneficiaries with diabetes are much more likely to also have cardiovascular disease than those without diabetes—among beneficiaries with disabilities who do not have diabetes, 23% are diagnosed with cardiovascular disease, while among those diagnosed with diabetes, 68% are diagnosed with cardiovascular disease (Exhibit 11). Similarly, beneficiaries with cardiovascular disease are much more likely than average to have pulmonary disease (33% of beneficiaries with cardiovascular disease also have pulmonary disease, compared to 14% among beneficiaries without cardiovascular disease), and those diagnosed with substance abuse are also much more likely than others to be diagnosed with psychiatric illness. Also shown in Exhibit 11 is a selection of diagnostic pairs in which there is very little association of two diagnoses—for example, beneficiaries with diabetes are not much more likely than the average beneficiary to be diagnosed with psychiatric illness.

**Exhibit 11: Association of Selected Diagnostic Pairs among Medicaid-only Persons with Disability**

Diagnosis 1	Diagnosis 2	Frequency of Diagnosis 2 among beneficiaries with Diagnosis 1	Frequency of Diagnosis 2 among beneficiaries without Diagnosis 1	Correlation between Diagnoses 1 and 2
Diabetes	Cardiovascular	68%	23%	0.34
Cardiovascular	Pulmonary	33%	14%	0.21
CNS	Skel. & Conn.	25%	15%	0.11
Dev. Dis.	CNS	49%	21%	0.16
CNS	Pulmonary	27%	18%	0.10
Substance Abuse	Psychiatric	55%	28%	0.14
CNS	Psychiatric	32%	28%	0.04
Diabetes	Psychiatric	31%	29%	0.01
Cardiovascular	Psychiatric	32%	28%	0.03
Pulmonary	Psychiatric	34%	28%	0.05

## **On Treating Patients with Multiple Chronic Conditions: An Interview with a Clinician**

This brief interview with Cynthia Boyd, MD, MPH, Johns Hopkins School of Medicine, illustrates the realities and challenges of caring for adults with multiple chronic conditions.

**Q: From the perspective of a geriatrician in the city of Baltimore treating many “faces” like those described in this report, how can we more effectively manage the care of people with multiple chronic conditions?**

**A:** We can do a better job of managing co-existing conditions if we take an approach that recognizes the specific interactions between the conditions and their treatments. For example, recognizing and treating depression may improve self-management and outcomes for chronic diseases like diabetes.

As another example, treating blood pressure is especially important among people with diabetes to reduce cardiovascular risk, and thus presents an opportunity for cohesive or synergistic management for these “concordant” conditions.

Sometimes one condition may be dominant over others temporarily or long-term. The pathophysiology and management of two co-existing conditions may be “discordant,” with potential for adverse events from treatments.<sup>16</sup> For example, in a patient with diabetes and cancer, the presence of active cancer may improve control of blood sugar because a patient is losing weight. In this situation, less aggressive goals for blood sugar control may be appropriate, and failure to modify therapy to make glycemic control less intensive may lead to dangerous episodes of low blood sugar.

**Q: What are the key challenges of caring for patients with a variety of chronic conditions?**

**A:** Determining how to prioritize among everything you are “supposed” to do within a given visit or over time when taking care of patients with multimorbidity is extremely challenging. Do you address five or six conditions a little bit in each visit, or would it serve your patient better to spend that time on only one or two conditions and address them thoroughly? Given the complexity of conditions, finite time to spend with each patient, and the competing factors in their lives, focusing on key disease pairs or sets, may be the best approach.

**Q: Why is it important to have a holistic view when treating patients with multiple chronic conditions?**

**A:** One of my older patients is the primary caregiver for a developmentally disabled adult child. She presented for an acute problem based on two of her chronic diseases that warranted inpatient hospitalization. She could not go to the hospital that afternoon because she needed to make sure her son had groceries and money. As a clinician, I was very focused on her conditions, but her reality was much broader than the diseases or medical problems she was having.

Across most pairs of major diagnostic groups, there is only a modest association in prevalence—for the most part, having a diagnosis in one CDPS group does not make a person much more likely than average to have a diagnosis in a second group (Exhibit 12). By far the largest correlation is between diabetes and cardiovascular disease, with a simple correlation coefficient of 0.34. The next highest correlations are 0.21 for cardiovascular disease with pulmonary disease, skeletal and connective disease, and gastrointestinal disease. The average correlation across all pairs is 0.06. Developmental disabilities are quite separate from most other diagnoses—the average correlation of developmental disabilities with other diagnoses is 0.0, and the correlation of developmental disabilities with CNS (0.16) is one of the few that is positive. Similarly, psychiatric diagnoses are very weakly related to most other diagnoses: beneficiaries with diagnoses such as diabetes, CNS, or infectious disease are not more likely to have psychiatric diagnoses than people without those diagnoses. Substance abuse is a notable exception to this statement; diagnoses of substance abuse and mental illness are strongly related.<sup>17</sup>

**Exhibit 12: Correlations among Major CDPS Categories among Medicaid-only Persons with Disability**

	Psy	Car	CNS	Pul	Skc	Dia	Dev	Gas	Eye	Ren	Skn	Inf	Can	Sub	Prg	Met	Gen	Hem	Cer
Psy	1.00																		
Car	0.03	1.00																	
CNS	0.04	0.04	1.00																
Pul	0.05	0.21	0.01	1.00															
Skc	0.04	0.21	0.11	0.13	1.00														
Dia	0.01	0.34	0.01	0.10	0.11	1.00													
Dev	0.02	-0.07	0.16	-0.03	-0.02	-0.06	1.00												
Gas	0.06	0.21	0.10	0.20	0.16	0.10	-0.01	1.00											
Eye	0.00	0.15	0.02	0.05	0.08	0.17	-0.01	0.06	1.00										
Ren	0.02	0.15	0.15	0.11	0.10	0.11	0.05	0.14	0.05	1.00									
Skn	0.05	0.14	0.09	0.10	0.13	0.14	0.00	0.11	0.05	0.11	1.00								
Inf	0.02	0.09	0.06	0.13	0.04	0.04	-0.02	0.12	0.03	0.11	0.11	1.00							
Can	-0.01	0.09	0.01	0.08	0.04	0.04	-0.03	0.09	0.03	0.06	0.04	0.08	1.00						
Sub	0.14	0.08	0.03	0.10	0.04	0.01	-0.05	0.12	-0.01	0.03	0.07	0.12	0.02	1.00					
Prg	0.01	-0.03	-0.01	0.00	-0.02	-0.02	-0.02	-0.01	-0.02	0.00	0.00	0.00	-0.01	0.01	1.00				
Met	0.01	0.12	0.16	0.15	0.08	0.06	0.05	0.16	0.03	0.15	0.08	0.14	0.06	0.07	-0.01	1.00			
Gen	0.04	0.06	0.02	0.04	0.05	0.03	-0.02	0.07	0.02	0.09	0.03	0.02	0.04	0.02	0.05	0.02	1.00		
Hem	0.00	0.09	0.04	0.11	0.04	0.03	-0.01	0.12	0.02	0.09	0.07	0.14	0.12	0.08	0.01	0.13	0.02	1.00	
Cer	0.00	0.17	0.12	0.08	0.06	0.10	-0.02	0.07	0.06	0.09	0.06	0.05	0.03	0.03	-0.01	0.07	0.01	0.06	1.00
Average	0.03	0.12	0.07	0.10	0.08	0.07	0.00	0.10	0.04	0.09	0.08	0.07	0.04	0.05	0.00	0.08	0.03	0.06	0.06

Note: Refer to Exhibit 4 for full listing of CDPS categories.

While many correlations are low, these results provide the basis for the next step of research. Understanding the relationship between specific diseases is an appropriate next step to help target clinically meaningful pairs. The broad CDPS categories presented here are made up of multiple conditions that are managed differently. While it does appear that, for example, pulmonary and cardiovascular conditions are more correlated than most, it will be useful to understand the specific diseases that underlie this relationship.

Even with relatively little correlation across diagnostic groups, as a result of the density of diagnoses among persons with disabilities, there are many pairs of diagnoses that occur fairly frequently among persons with disability, particularly among high-cost persons with disability (Exhibit 13). Among all enrollees with disability, 10% are diagnosed with both cardiovascular and pulmonary disease, 10% with cardiovascular disease and diabetes, and 9% with cardiovascular disease and psychiatric illness (these categories are not mutually exclusive). Among the most expensive 5% of people with disabilities, 30% are diagnosed with both cardiovascular and pulmonary disease, and there are many other diagnostic pairs among approximately 20% of beneficiaries. The prevalence of central nervous system diagnoses among the most common diagnostic pairs is noteworthy, and is in part a result of the characteristics of Medicaid enrollees with disability. Even though psychiatric illness is not strongly associated with most other diagnoses, the relatively high frequency of psychiatric illness in this population results in these illnesses being heavily represented among the most frequent diagnostic pairs.

### **Diagnostic Triads among Beneficiaries with Disabilities**

Among the most expensive 5% of beneficiaries with disability, approximately 18% are diagnosed with cardiovascular, pulmonary, and gastrointestinal disease, and 16% are diagnosed with cardiovascular, pulmonary, and central nervous system disorders (Exhibit 14). Additionally, a variety of other diagnostic triads exhibit a prevalence of at least 10% among the most expensive 5% of beneficiaries.

### Exhibit 13: Frequency of Diagnostic Dyads among Beneficiaries with Disability

Diagnosis 1	Diagnosis 2	Frequency among all beneficiaries	Frequency among most expensive 5%
Cardiovascular	Pulmonary	10.1%	30.5%
Cardiovascular	Diabetes	9.9%	19.2%
Cardiovascular	Psychiatric	9.3%	22.0%
Cardiovascular	Gastrointestinal	8.3%	24.8%
Cardiovascular	CNS	7.8%	24.8%
Cardiovascular	Renal	5.5%	20.8%
Cardiovascular	Skin	4.4%	16.1%
Cardiovascular	Eye	3.9%	11.9%
Cardiovascular	Cerebrovascular	2.6%	8.0%
Cardiovascular	Cancer	2.0%	8.0%
CNS	Skeletal and Conn.	6.0%	17.9%
CNS	Pulmonary	5.9%	23.8%
CNS	Gastrointestinal	5.0%	20.7%
CNS	Renal	4.0%	17.5%
CNS	Develop. Dis.	3.2%	13.4%
CNS	Skin	3.1%	14.0%
CNS	Metabolic	2.7%	14.2%
Diabetes	Skeletal and Conn.	4.3%	9.4%
Psychiatric	CNS	7.2%	20.2%
Psychiatric	Pulmonary	6.5%	18.3%
Psychiatric	Skeletal and Conn.	6.0%	12.9%
Psychiatric	Gastrointestinal	5.6%	15.6%
Psychiatric	Diabetes	4.2%	10.7%
Psychiatric	Substance Abuse	3.0%	8.8%
Psychiatric	Skin	3.0%	10.2%
Psychiatric	Renal	3.0%	11.0%
Psychiatric	Develop. Dis.	2.3%	7.9%
Pulmonary	Gastrointestinal	5.9%	23.8%
Pulmonary	Skeletal and Conn.	5.8%	16.6%
Skeletal and Conn.	Gastrointestinal	5.2%	14.4%

#### The top five diagnostic dyads among the most expensive 5% of patients are:

Cardiovascular–Pulmonary . . . . .	30.5%
Cardiovascular–Gastrointestinal . . . . .	24.8%
Cardiovascular–Central Nervous System . . . . .	24.8%
Central Nervous System–Pulmonary . . . . .	23.8%
Pulmonary–Gastrointestinal . . . . .	23.8%

**Exhibit 14: Frequency of Diagnostic Triads among Beneficiaries with Disability**

Diagnosis 1	Diagnosis 2	Diagnosis 3	Frequency among all beneficiaries	Frequency among most expensive 5%
Cardiovascular	CNS	Gastrointestinal	2.7%	13.4%
Cardiovascular	CNS	Psychiatric	3.0%	11.7%
Cardiovascular	CNS	Pulmonary	3.3%	16.0%
Cardiovascular	CNS	Skeletal and Conn.	3.1%	11.1%
Cardiovascular	Diabetes	CNS	2.6%	9.5%
Cardiovascular	Diabetes	Eye	1.8%	3.6%
Cardiovascular	Diabetes	Gastrointestinal	2.7%	9.6%
Cardiovascular	Diabetes	Psychiatric	2.8%	8.7%
Cardiovascular	Diabetes	Pulmonary	3.4%	12.0%
Cardiovascular	Diabetes	Renal	2.3%	9.9%
Cardiovascular	Diabetes	Skeletal and Conn.	3.2%	8.4%
Cardiovascular	Diabetes	Skin	2.0%	8.0%
Cardiovascular	Gastrointestinal	Psychiatric	2.9%	11.0%
Cardiovascular	Pulmonary	Gastrointestinal	3.7%	17.5%
Cardiovascular	Pulmonary	Psychiatric	3.4%	13.3%
Cardiovascular	Pulmonary	Skeletal and Conn.	3.7%	12.5%
Cardiovascular	Renal	Skeletal and Conn.	2.1%	8.6%
Cardiovascular	Skeletal and Conn.	Gastrointestinal	3.2%	10.6%
Cardiovascular	Skeletal and Conn.	Psychiatric	3.1%	9.0%
Cardiovascular	Skeletal and Conn.	Skin	2.0%	8.2%
CNS	Gastrointestinal	Psychiatric	2.0%	8.6%
CNS	Pulmonary	Gastrointestinal	2.3%	13.9%
CNS	Pulmonary	Psychiatric	2.3%	10.0%
CNS	Pulmonary	Skeletal and Conn.	2.2%	10.4%
CNS	Renal	Pulmonary	1.5%	9.9%
CNS	Skeletal and Conn.	Psychiatric	2.2%	7.7%
Pulmonary	Gastrointestinal	Psychiatric	2.2%	9.8%
Pulmonary	Skeletal and Conn.	Gastrointestinal	2.2%	9.9%
Pulmonary	Skeletal and Conn.	Psychiatric	2.1%	7.5%
Skeletal and Conn.	Gastrointestinal	Psychiatric	1.9%	6.5%

**The top five diagnostic triads among the most expensive 5% of patients are:**

- Cardiovascular–Pulmonary–Gastrointestinal . . . . .17.5%
- Cardiovascular–Central Nervous System–Pulmonary . . . . .16.0%
- Central Nervous System–Pulmonary–Gastrointestinal . . . . .13.9%
- Cardiovascular–Central Nervous System–Gastrointestinal . . . . .13.4%
- Cardiovascular–Pulmonary–Psychiatric . . . . .13.3%

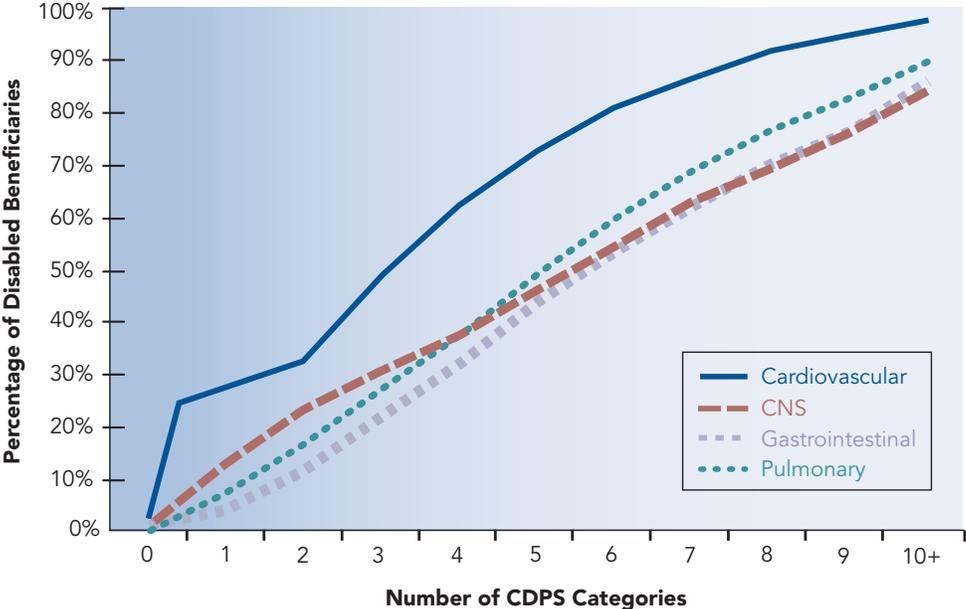
Among the 30 most common triads of diagnoses, 20 include cardiovascular disease, 12 each include pulmonary and skeletal and connective disease, 11 include psychiatric illness and CNS, and eight include diabetes (Exhibit 15). The strong relationship between diabetes and cardiovascular disease is reflected in the fact that each of the eight triads including diabetes also include cardiovascular disease. Diabetes rarely occurs in isolation—among beneficiaries with disabilities who are diagnosed with diabetes, only 7% have diabetes alone, while the other 93% have a diagnosis in at least one other CDPS diagnostic group (as noted above, see high correlation with cardiovascular).

**Exhibit 15: Frequency of Diagnostic Groups among Most Prevalent Triads**

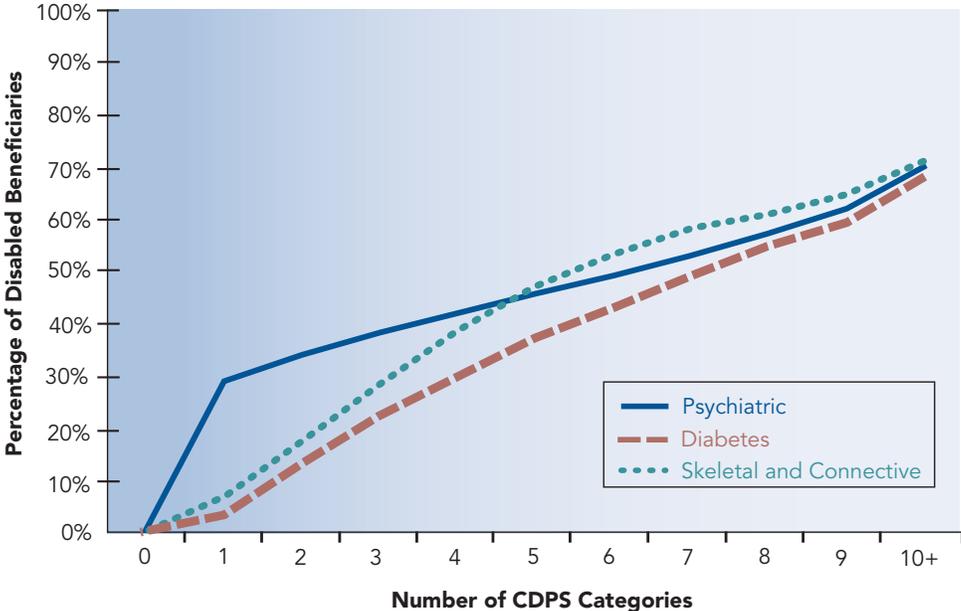
Diagnostic group	Number of times diagnosis appears among most frequent 30 triads
Cardiovascular	20
Pulmonary	12
Skeletal and Conn.	12
CNS	11
Psychiatric	11
Gastrointestinal	10
Diabetes	8
Renal	3
Skin	2
Eye	1

Among beneficiaries with disability who have diagnoses in many diagnostic groups, virtually all have cardiovascular disease, and large majorities have CNS, gastrointestinal, and pulmonary diagnoses (Exhibit 16). The pattern is different for psychiatric disease, which is quite common among beneficiaries with only one CDPS category, but does not increase so quickly as the number of CDPS categories increases (Exhibit 17). The distinct pattern for psychiatric illness is particularly strong for high-cost psychiatric illness (primarily schizophrenia), and for medium-cost psychiatric illness (primarily bipolar disorder), while for low-cost psychiatric illness (primarily depression) the pattern is more similar to the pattern for other diseases, although exhibiting a shallower slope (Exhibit 18).

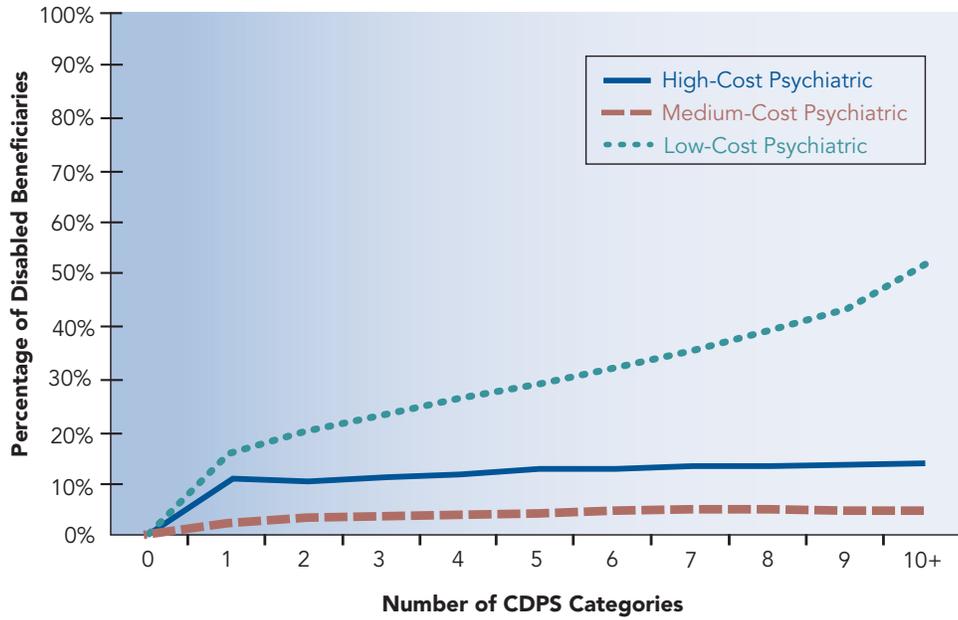
**Exhibit 16: Beneficiaries with Disability with Cardiovascular, CNS, Gastrointestinal, or Pulmonary Diagnoses, by Number of CDPS Categories**



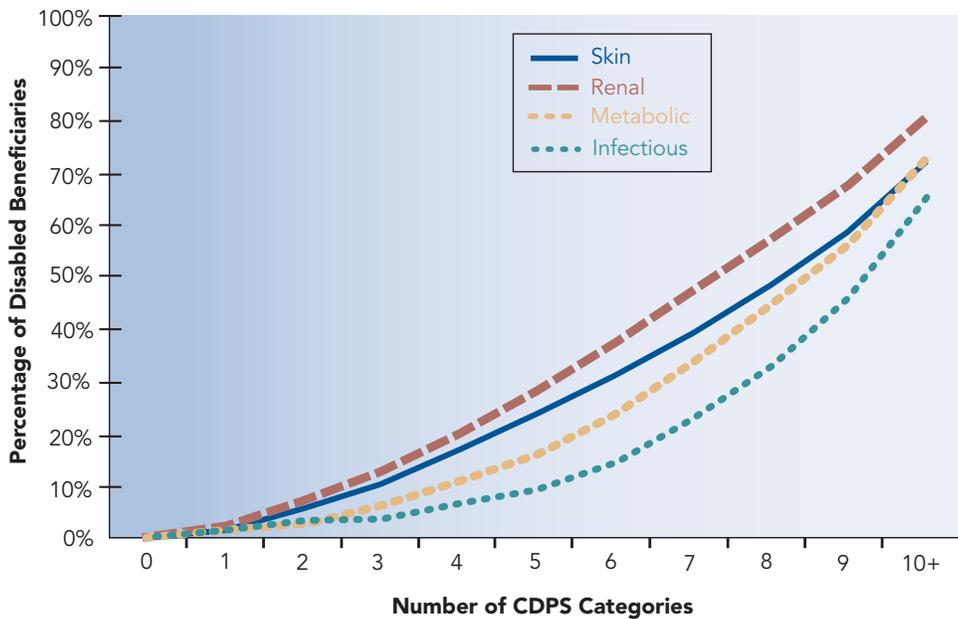
**Exhibit 17: Beneficiaries with Disability with Psychiatric, Diabetes, or Skeletal and Connective Diagnoses, by Number of CDPS Categories**



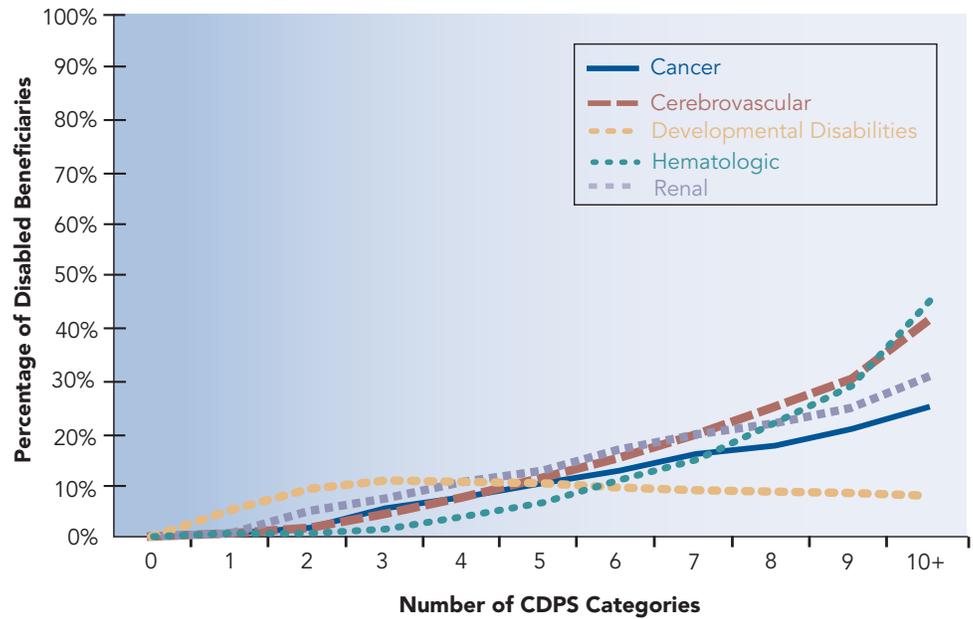
**Exhibit 18: Beneficiaries with Disability with High-, Medium-, and Low-Cost Psychiatric Diagnoses, by Number of CDPS Categories**



**Exhibit 19: Beneficiaries with Disability with Skin, Renal, Metabolic, or Infectious Diagnoses, by Number of CDPS Categories**



**Exhibit 20: Beneficiaries with Disability with Cancer, Cerebrovascular, Developmental Disabilities, Hematologic, or Renal Diagnoses by Number of CDPS Categories**



The frequency of skin, renal, metabolic, and infectious diseases each increase as the number of CDPS categories increases (Exhibit 19). As was shown by the lack of correlation between developmental disabilities and other diagnoses in Exhibit 12, there is no relationship between developmental disabilities and other diagnoses; as the number of CDPS diagnostic categories increases, the frequency of developmental disabilities does not increase (Exhibit 20).

## V. Implications

CHCS and UCSD undertook this inquiry to gain a clearer understanding of the “faces” of Medicaid beneficiaries across the country. While it has long been accepted that there is a high prevalence of comorbidities in Medicaid, little was known about which conditions are most prevalent, and even less was known about if and how certain conditions “cluster,” or group, in clinically, financially, or socially meaningful ways.

First, it is important to note that very little is known about how to best care for the millions of Medicaid beneficiaries living with multiple chronic conditions every day. This lack of knowledge, coupled with conventional disease-specific treatment guidelines, results in patients being treated as the sum of their individual conditions without regard to the impact of the conditions upon one another. Understanding the clusters and how conditions group into pairs or sets (dyads or triads) of these conditions could help consumers, family caregivers, purchasers, health plans, providers, and other stakeholders move from a piecemeal condition-based approach to a patient-centered, holistic approach.

This analysis sought to answer two key questions: (1) what is the prevalence of chronic conditions within the Medicaid population; and (2) are there patterns or clusterings of these conditions that could inform the development of more appropriate guidelines, care models, performance measurement systems, and reimbursement methodologies?

Now that we know how conditions do (or do not) cluster and interact, the “billion dollar question” still looming before us is: what do we do about it?

This report does not seek to answer that question, but to lay the foundation for doing so by highlighting key issues and opportunities for taking this work to the next level. This is especially critical as state purchasers, health plans, and other policymakers recognize the need to focus on high-need, high-cost beneficiaries within Medicaid—the majority of whom have multiple chronic conditions and are currently in the fragmented fee-for-service system. It is also timely as Medicaid stakeholders across the country are realizing that their ability to undertake coverage expansions is directly related to improving the quality and cost of care for those in Medicaid who are driving a significant portion of the costs. For such improvements to happen, four key issues must be addressed:

- Integration and coordination of care;
- Performance measurement;
- Financing; and
- Evaluation.

## Integration and Coordination of Care

Greater understanding of the “faces” of Medicaid beneficiaries should lead to improvements in the way care is delivered. Better identification of patterns in high-risk, high-cost comorbid patients strengthens the field’s ability to predict which beneficiaries: (a) present the best opportunity for significantly improved outcomes; (b) are likely to have high future costs; and (c) will respond best to targeted care management interventions. This has implications for how to: incorporate consumer preferences; develop care guidelines appropriate for patients with multiple chronic conditions; engage both patients and providers; organize and reimburse multidisciplinary care teams; measure improvements in quality/cost; develop risk adjustment and rate-setting methodologies that properly account for comorbidities; and align financing to support improved coordination and integration.

This analysis lays the groundwork for an examination of the clinically distinct conditions that make up high-cost clusters and should be the focus of integrated care. Such information will be essential for knowing which providers need to be part of these multidisciplinary teams. Work in these key areas will contribute significantly to the “evidence” base—or, to the “good practice” base. The latter term refers to the recognition that Medicaid stakeholders cannot wait for perfect evidence to begin implementing interventions that will improve the care and costs of providing that care for the most complex beneficiaries.

Given the complexity and heterogeneity of the Medicaid population, its patients are among those whose care should be the most aligned with the six aims from the Institute of Medicine’s *Crossing the Quality Chasm* report: efficient, timely, patient-centered, equitable, effective, and safe. Integrated care puts a premium on these aims—especially effectiveness and patient-centeredness—and it is essential for high-quality care.<sup>18</sup> The “Gold Standard” of integration is a coordinated system in which patients would have the full range of their primary, acute, behavioral, substance abuse, social, and long term care support needs met. For dual eligible beneficiaries, Medicare services should be integrated as well—resulting in a seamless system of care for the beneficiary. Recognizing that this may not be feasible immediately, Medicaid purchasers, plans, and policymakers can begin to put into place the essential building blocks necessary to move along the continuum of integration. Those are: (a) a system for managing care; (b) an entity accountable for doing so; (c) flexible financing to support getting the right services to the right patients at the right time; and (d) mechanisms to involve patients and their caregivers in meeting their care needs.

“Managed” systems provide the coordination and integration of services absent in the fragmented fee-for-service system and can be structured as health plan, state-run primary care case management, or specialized care management programs. Accountable entities can include health plans, integrated care organizations, Special Needs Plans or disease/care management organizations. Financing options range from full and partial capitation to administrative fee arrangements with shared risk. Some promising models for engaging consumers and their caregivers include shared decision making, motivational interviewing, self-directed care, and group education visits.

### **An Innovation in Integration in Washington State**

While aged, blind and disabled (ABD) adults in the state of Washington account for approximately 15 percent of the total Medicaid population, they drive 40 percent of total expenditures. The Washington Medicaid Integration Partnership (WMIP) was developed to improve their care and better manage their costs by integrating medical, mental health, substance abuse treatment, and long-term care services. The pilot program, which began in January 2005, currently serves approximately 2,700 ABD beneficiaries.

The state contracts with Molina Healthcare of Washington to provide health risk assessments, develop patient care plans, link multiple providers/care managers, and coordinate services. A care coordinator on the patient care team plays a key role in prioritizing and directing critical resources for beneficiaries with multiple chronic conditions and behavioral health needs.



To date, WMIP has demonstrated movement in a positive direction on key indicators: inpatient admissions and days in state mental hospital facilities have decreased compared to fee-for-service beneficiaries and patient satisfaction with aspects of care delivery (e.g., shorter wait times for routine care appointments) and care coordination has improved.

Further proof of the program’s success is evident in expansion plans: the Washington State legislature recently approved an increased enrollment into WMIP with funding for up to 13,000 total clients.<sup>19</sup>

WMIP was one of 10 projects in the *Medicaid Value Program: Health Supports for Consumers with Chronic Conditions*, a multi-stakeholder initiative designed by CHCS to develop and test models of care management for Medicaid consumers with comorbidities. This two-year collaborative was funded by Kaiser Permanente Community Benefit, with additional support from the Robert Wood Johnson Foundation. For more information, including individual project case studies and logic maps and a program evaluation, visit [www.chcs.org](http://www.chcs.org).

The bottom line is that, at any point along the integration continuum, there must be ways of connecting with the patient and his/her caregiver and tracking his/her multiple interaction points (or lack thereof) within an otherwise unmanaged system. This is made even more difficult for beneficiaries with multiple chronic conditions. In the short term, it may be more feasible for policymakers to start with incremental solutions that focus on assisting patients in navigating the system by providing some type of “go-to” person (e.g., care manager, health coach/buddy, health navigator, etc.) who helps patients with multiple chronic conditions coordinate and access needed services—whether they be medical, behavioral, social, etc. For example, this analysis reveals that among the most expensive 5% of Medicaid beneficiaries with disabilities, over 30% are diagnosed with both cardiovascular and pulmonary disease, and over 20% with both central nervous system disease and mental illness. These findings should compel stakeholders to ensure that there is a “go-to” person and/or multidisciplinary care team responsible for working with the patient and family caregivers on coordinating care, discharge planning, care transitions, service utilization, and overall needs (physical and psychosocial) in order to reduce inpatient admissions, prevent readmissions, and improve overall quality of care and life. The most expensive 5% of beneficiaries, who on average have diagnoses in five separate diagnostic groups, are particularly likely to benefit from this type of support.

## **A Tailored, Multidisciplinary Care Model for High-Risk, High-Cost Patients**

Irma, 77, is fiercely independent. She lives alone in a Boston suburb and is determined to live on her own despite limited mobility caused by three strokes, frequent falls, and depression. With poorly-controlled diabetes, congestive heart failure, and hypertension, she visited the hospital eight times in the past year. Irma has poor eating habits, difficulty keeping track of multiple prescriptions, and problems getting to appointments.

Irma's experience is typical of many adults with multiple chronic conditions: poorly managed care resulting in frequent emergency room visits and hospitalizations and excessive costs. Commonwealth Care Alliance (CCA), a Boston-based nonprofit founded by Dr. Robert Master, is able to help Irma retain her independence through its unique integrated model.

CCA offers a multidisciplinary team approach that stratifies high-risk patients into three levels and tailors care accordingly. Level I covers those whose needs can be met by regular primary care visits with extra monitoring to address risks; Level II includes those who need supplemental care coordination or behavioral health supports; and Level III includes those, like Irma, who require a new care paradigm. To support patients like Irma, CCA's integrated approach involves nurse practitioners, social workers, behavioral health clinicians, peer counselors, home visiting, and around-the-clock continuity of care. Through CCA, Irma can turn to one "go-to" person who helps her navigate the health care system.

With better management, Irma is able to keep her diabetes under control. Services are delivered in-home and she is gaining confidence and autonomy by participating in health care decisions. The primary care management team helps Irma monitor her diet and medications, arrange transportation to medical appointments, and ultimately improve her health status to help her avoid ER visits and hospitalizations, and, most importantly for her, to help her stay in her own home.

## Performance Measurement

The findings in this report illustrate the need to refine existing performance measures and to develop new measures responsive to complex patients with multiple chronic conditions. Existing measures tend to be disease specific and not calibrated to the risk or complexity of an individual patient. For example, glycemic control might be a good measure for a relatively low-risk patient with diabetes, but may not be the best measure for a high-risk diabetic patient who also has heart disease, high blood pressure, and high cholesterol. In the latter case, controlling blood pressure may provide greater overall benefit, yet the system may not be designed to recognize or reward differences in treatment based on the complexity and comorbid profiles of subsets of patients. In addition to facilitating prioritization, there are likely opportunities to increase the application of treatments that act synergistically to improve two or more conditions, and opportunities to reduce adverse errors that occur when treatments are considered one at a time without reconciling adverse interactions. In brief, a perspective that incorporates the reality of multimorbidity may identify opportunities to leverage existing knowledge and make a large impact in a short amount of time.

Additionally, there are few, if any, composite measures that account for the interplay of multiple conditions. This is troubling in terms of being able to monitor outcomes for complex patients. It should be a particularly important consideration in structuring pay-for-performance programs to ensure that complex patients and the providers caring for them are not excluded and/or penalized due to the complexity of the patient's needs. The authors hope this analysis compels policymakers to resist a one-size-fits-all approach and to recognize that different mechanisms of measuring and paying for the care of high-risk, high-cost, comorbid patients are necessary.

## Financing

This analysis raises noteworthy issues regarding the financing challenges and cost savings potential associated with improving care for high-cost, comorbid patients. Given the widespread debate around broader payment reform, the findings here underscore the need to overcome the financial misalignments inherent in the fragmented FFS system that tend to reward volume over value and do not encourage prevention, improved self-management, or enhanced care management.

The complexity of these patients and their multiple interaction points across the system reinforce the need for funding streams to be: (a) integrated (e.g., physical health, behavioral health and long term care); (b) blended (e.g., Medicaid and Medicare); and (c) flexible so that an accountable entity, such as a health plan, has the ability to provide services specific to a person's needs versus a one-size-fits-all approach. Incremental (though valuable) alternative approaches could include shared savings arrangements between Medicaid agencies and health plans/providers; enhanced payments for coordinated care management; patient incentives for improved self-management; and pay-for-performance programs that appropriately reward providers who care for the "sickest of the sick" and do not reward them for doing the things that are the easiest, whether or not they are the most appropriate for a specific patient. Lastly, these data also raise the question of the appropriateness of current rate setting and risk adjustment methodologies for comorbid populations and suggest the need for future analysis in this area.

## Evaluation

As demonstrated by the significant prevalence of comorbidities among Medicaid beneficiaries and the notable absence of care models for these comorbid patterns in the evidence base, there is a tremendous need to build a research agenda in Medicaid. To the extent possible given the constraints (e.g., sample sizes, data collection, patient location, etc.), future initiatives/demonstrations should include rigorous external evaluations to assess quality improvement and to shed light on the business case of particular interventions. Stakeholders need to be aware of realistic expectations for improved outcomes and return on investment within designated timeframes.

Similar to the evaluation work underway within Medicare, the Medicaid program and its stakeholders would benefit from evaluations that focus attention on the need to: identify and prioritize comorbidities; realign financing to support improved care coordination; enhance patient self management; integrate physical-behavioral-social services; engage patients and providers; and assess other elements of good care. Results from such evaluations would help change the way care is delivered, measured, and financed for the many Medicaid beneficiaries living with comorbidities; assist Medicaid agencies and CMS in being sophisticated, value-based purchasers of services; and contribute to the policy and payment reform debates underway at the national level. This presents a tremendous opportunity for CMS and other stakeholders to demonstrate leadership and elevate the rigor and productivity of research within Medicaid. Given the findings of this report about the levels of comorbidity and the demographic imperative this nation is facing, the hunger for real-time, reliable knowledge will only grow.

## VI. Closing

It is widely acknowledged that very little is known about how to effectively care for the most complex and costly patients with the greatest needs. This analysis provides Medicaid stakeholders with a new way to look at its beneficiaries. It is just a first step. Subsequent steps must entail developing care delivery and financing approaches for homogenous subsets of what is a very heterogeneous population. A good starting point will be using these data to focus on how to prioritize within given clusters or disease pairs. Promising opportunities exist in:

- Identifying clinically dominant comorbid conditions;
- “Flagging” treatment that is contra-indicated due to the presence of multiple conditions (the things that “shouldn’t be done”) as well as treatment that improves care for one more than one condition (the things that “should always be done”);
- Distinguishing between concordant and discordant conditions within a given cluster of comorbidities;<sup>20,21</sup>
- Using rapid-cycle testing to identify actionable steps to integrate care and holistically treat the patient and incorporate his/her preferences; and
- Realigning performance measurement and financing to support effective strategies for people with comorbidities.

Potential next steps include further drilling down into specific diseases and examining the interplay of additional factors within the data for opportunities and tradeoffs. Looking at the specific diseases that make up the CDPS categories will be important as some categories are fairly homogeneous in terms of how the diseases within them are managed clinically (e.g., Diabetes) while others are much more heterogeneous (e.g., CNS, Pulmonary). This analysis also highlights the need to further examine the interplay of three factors: (1) cost of the disease; (2) prevalence of the disease; and (3) the potential for modifying outcomes and costs. Focusing on the highest-risk, highest-cost patients has the potential to yield great benefits (from both a quality and cost perspective); however, further analysis will likely uncover opportunities that argue for looking beyond just the 5% most expensive patients (some of whom may have rare,

high-cost conditions). For example, a condition or group of conditions that is very prevalent and of moderate cost might be worthwhile to target (if costs and outcomes are modifiable) more so than something less prevalent at higher cost or that is less modifiable. Rich opportunities for improving care may exist in the patient with five comorbid diseases and 15 outpatient visits with three different doctors or several short hospitalizations for an ambulatory sensitive condition. Further analysis will make these findings even more applicable to improving care for patients by identifying opportunities to improve transitions, enhance coordination, increase patient activation, and prevent adverse events.

The implications are far-reaching and the opportunity exists to significantly impact both the way care is delivered and financed not only for the highest-need, highest-cost patients but also for the millions of other Medicaid beneficiaries with multiple chronic conditions receiving care in today's largely fragmented systems of care. At a minimum, the authors hope that this analysis underscores the danger of a one-size-fits-all and/or disease-specific care management approach and provides fertile ground for targeting resources at subsets of high-need, high-cost chronically ill beneficiaries.

CHCS is pleased to be in a position to work with several cutting-edge states and plans to address some of these promising opportunities. As laboratories for innovation, states can be critical testing grounds for rethinking care for special needs populations in Medicaid. It is the hope of the authors of this report that best practices emerge and take hold in these states and, with the added impetus of the findings from *The Faces of Medicaid II*, are spread to others across the health care system.

## VII. Appendices

### Appendix A: Summary of Exclusions from Analytic Sample

Reason for Exclusion	Aged	Disabled	Non-disabled Children	Non-disabled Adults	Disabled, Medicaid-only	Disabled, Dual Eligible
Six states for which we did not request data because of very heavy managed care penetration <sup>a</sup>	0.071	0.080	0.079	0.103	0.080	0.080
Entire category of assistance excluded because >70% of category of assistance enrolled in managed care in 2002 <sup>b</sup>	0.000	0.090	0.162	0.076	0.097	0.079
Eligibles excluded because diagnostic information on claims in the category of assistance in the state appear to be of poor quality <sup>c</sup>	0.163	0.050	0.001	0.001	0.000	0.124
Eligible in FFS for less than six months <sup>d</sup>	0.159	0.155	0.381	0.418	0.193	0.097
Not eligible for full Medicaid benefits in July 2002 <sup>e</sup>	0.138	0.049	0.037	0.214	0.030	0.078
Missing age/sex info, or invalid age	0.000	0.000	0.002	0.000	0.000	0.000
Total excluded	0.531	0.424	0.662	0.812	0.401	0.459
Total included	0.469	0.576	0.338	0.188	0.599	0.541
Included N	2,346,976	4,760,879	8,835,303	2,567,027	2,952,443	1,808,436
<b>Total beneficiaries</b>	<b>5,003,000</b>	<b>8,270,000</b>	<b>26,109,000</b>	<b>13,679,000</b>	<b>4,927,000</b>	<b>3,344,000</b>

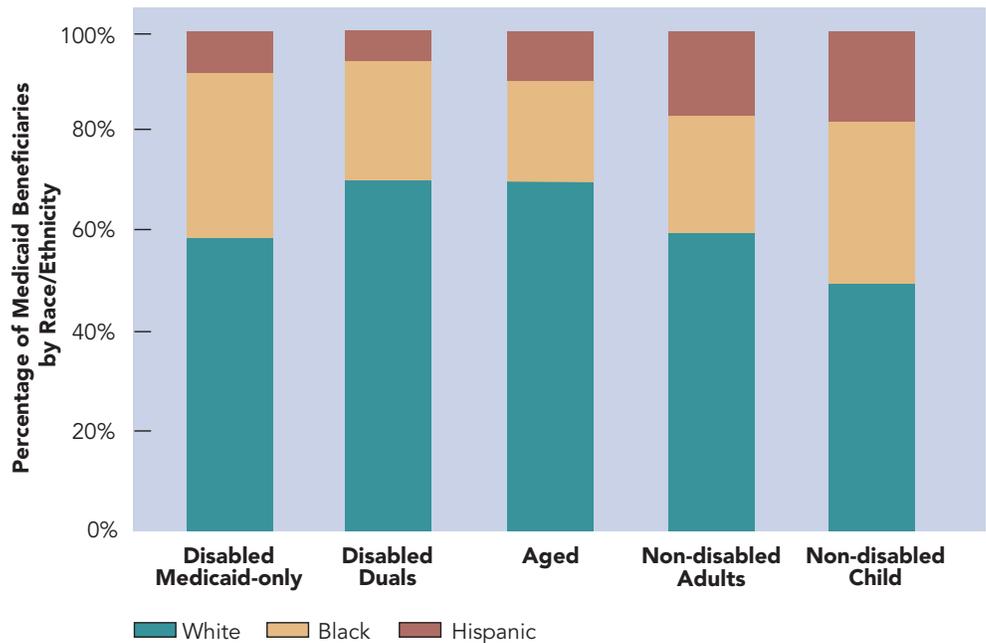
- a) We did not request data for AZ, DE, HI, MD, TN, and OR. We use enrollment data for FY 2004 from the KFF State Health Facts web site to estimate the fraction of all US beneficiaries in each category of assistance in these six states, and assume this fraction was the same in 2002.
- b) Excludes MI, NM, and PA for the disabled; RI, CT, DC, NJ, MN, PA, WI for non-disabled adults and children; and NM, MI, and WA for non-disabled children.
- c) Excludes the aged and dual-eligible disabled in CT, FL, GA, MI, ND, NH, PA, and SD; and ND for non-disabled adults and children.
- d) Excludes beneficiaries with fewer than 6 months of eligibility during CY 2002, as well as beneficiaries with 6 or more months of eligibility, but fewer than 6 months in FFS.
- e) Excludes beneficiaries who were not eligible at all during July 2002, as well as those who were eligible but did not have full Medicaid benefits in that month. For the aged and disabled, beneficiaries without full benefits are primarily those receiving Part B premium or Medicare cost-sharing assistance only. For non-disabled adults, beneficiaries without full benefits are primarily women eligible for family planning services only.

## Appendix B: Racial and Ethnic Differences in Patterns of Diagnoses and Expenditures

In addition to examining disease pairs, the authors thought it would be interesting to assess whether the MAX Medicaid data show racial and ethnic differences in diagnosis or expenditures. Although the MAX data do have a field for race/ethnicity (a combined field, as opposed to separate variables for race and ethnicity), CMS does not provide instructions to states as to how race/ethnicity data are to be collected or coded. Some states may rely on the observations of eligibility workers, and others on self-reported data from applicants.

As shown in Exhibit 21, among non-disabled adults and children in this analytic sample who are reported as either non-Hispanic whites, blacks, or Hispanic, approximately 50% of beneficiaries are reported to be non-Hispanic whites, 30% are black, and just under 20% are Hispanic.<sup>22</sup> Among Medicaid-only persons with disability, non-Hispanic whites account for close to 60% of beneficiaries, and Hispanics less than 10%. Among dual-eligibles (both the disabled and the aged), non-Hispanic whites are close to 70%, and there are fewer blacks than in other categories of assistance.

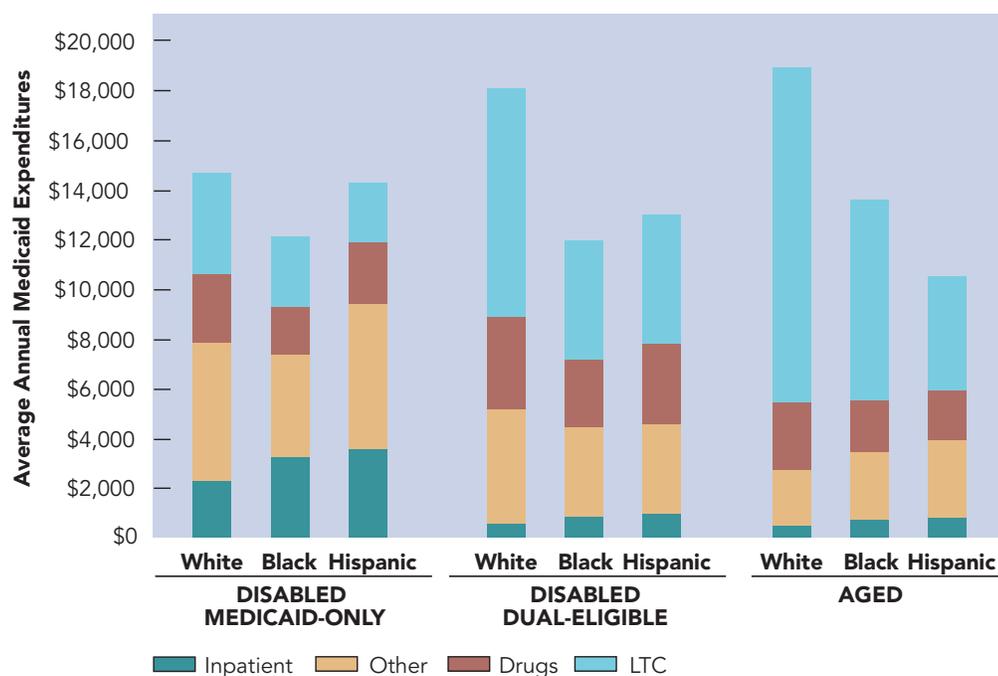
**Exhibit 21: Race/Ethnicity of Medicaid Beneficiaries, by Category of Assistance, 2002**



Note: Excludes Asian/Pacific Islanders, Native Americans, and beneficiaries with unknown race/ethnicity.

There are striking differences across racial/ethnic groups in expenditures, particularly for long term care. Among the aged, long-term care expenditures for non-Hispanic whites average \$13,631 per year, which is 1.67 times the \$8,148 average for blacks, and almost three times the \$4,696 average for Hispanics (Exhibit 22). In part, the very large racial/ethnic differences in long term care expenditures likely reflects differences in pathways to eligibility—among non-Hispanic whites it seems likely that a relatively large proportion of the aged Medicaid beneficiaries became eligible as a result of nursing home placement, while the greater levels of poverty among Hispanics, and, to some extent, among blacks, results in a larger number of community-dwelling persons in these groups becoming eligible for SSI. In part, however, differences in long term care utilization and expenditures across racial/ethnic groups may represent differences in: demographic characteristics (e.g., age and geography); the availability of informal support, from both family and non-family caregivers; the ability to pay for more formalized caregiver support that is not covered; preferences; the level of functional status; and/or the treatment of otherwise similar people. Further investigation is needed to more fully understand the patterns observed here.

**Exhibit 22: Average Annual Medicaid Expenditures, by Type of Beneficiary, Category of Service, and Race/Ethnicity, 2002**



Among dual-eligible disabled, long term care expenditures for non-Hispanic whites are 1.95 times long term care expenditures for blacks, and 1.8 times the level of long term care expenditures for Hispanics. Among the Medicaid-only disabled, the level of long term care expenditures is lower and the racial/ethnic differences are smaller than among dual eligibles, but even among the Medicaid-only disabled, long term care expenditures are significantly higher for non-Hispanic whites than for blacks or Hispanics.

Acute care expenditures among Medicaid-only beneficiaries with disabilities are higher among Hispanics (\$11,846 per year in 2002) than among non-Hispanic whites (\$10,640), and lower among blacks (\$9,246). The relationship between race/ethnicity and expenditures is clearly quite different for acute care expenditures than for long term care expenditures.

Among beneficiaries with disability, the prevalence of chronic disease is much higher among Hispanics than among non-Hispanic whites (Exhibit 23). The prevalence of diabetes is 45% higher among Hispanics (20%) than among non-Hispanic whites (13.8%), Hispanic beneficiaries are substantially more likely than non-Hispanic whites to be diagnosed with cardiovascular, renal, metabolic, infectious, and hematological disease. The toll of HIV/AIDS is apparent, with the prevalence among Hispanics over three times the rate for non-Hispanic whites. Hispanics are much less likely than whites to be diagnosed with high-cost psychiatric illness (schizophrenia), and also less likely to be diagnosed with medium-cost psychiatric illness (primarily bipolar disorder). Hispanics are also much less likely than whites to be diagnosed with developmental disabilities.

The picture for blacks is more mixed—much higher rates than non-Hispanic whites for HIV, for high-cost hematological disease (primarily sickle-cell anemia), and a somewhat greater prevalence of diabetes, cardiovascular disease, and substance abuse. But there is much lower prevalence among blacks than whites for many other types of disease—less bipolar disorder (medium-cost psychiatric illness), and less disease in major categories such as CNS, pulmonary, gastrointestinal, cancer, and developmental disabilities.

**Exhibit 23: Distribution of CDPS Categories among Beneficiaries with Disability, by Race/Ethnicity**

CDPS Category	Total	White	Black	Hispanic	Hispanic vs. White	Black vs. White
Cardiovascular, very high	0.9%	0.7%	1.3%	1.2%	1.67	1.86
Cardiovascular, medium	5.8%	5.5%	6.5%	5.1%	0.93	1.20
Cardiovascular, low	11.0%	11.7%	9.3%	12.1%	1.04	0.80
Cardiovascular, extra low	14.2%	12.4%	18.1%	14.5%	1.17	1.46
Cardiovascular, total	31.9%	30.2%	35.2%	32.8%	1.09	1.17
Psychiatric, high	9.1%	9.1%	9.8%	6.3%	0.69	1.07
Psychiatric, medium	2.8%	3.7%	1.3%	1.6%	0.43	0.36
Psychiatric, low	17.6%	19.4%	13.4%	19.4%	1.00	0.69
Psychiatric, total	29.5%	32.2%	24.5%	27.3%	0.85	0.76
Skeletal, medium	0.3%	0.3%	0.4%	0.3%	0.95	1.37
Skeletal, low	4.1%	4.2%	3.8%	5.1%	1.24	0.91
Skeletal, very low	5.7%	6.5%	4.1%	6.0%	0.92	0.62
Skeletal, extra low	9.2%	9.7%	8.0%	8.8%	0.90	0.82
Skeletal, total	19.4%	20.7%	16.3%	20.2%	0.98	0.79
CNS, high	0.7%	0.8%	0.6%	0.7%	0.88	0.67
CNS, medium	2.7%	3.1%	2.0%	2.9%	0.93	0.65
CNS, low	18.8%	20.2%	16.1%	17.8%	0.88	0.80
CNS, total	22.3%	24.1%	18.7%	21.4%	0.89	0.78
Pulmonary, very high	0.5%	0.6%	0.5%	0.7%	1.25	0.85
Pulmonary, high	1.6%	1.7%	1.6%	1.5%	0.90	0.93
Pulmonary, medium	1.8%	1.9%	1.7%	1.6%	0.82	0.88
Pulmonary, low	15.6%	16.3%	14.4%	15.5%	0.95	0.89
Pulmonary, total	19.6%	20.4%	18.1%	19.3%	0.95	0.89
Gastro, high	0.5%	0.6%	0.4%	0.9%	1.58	0.78
Gastro, medium	3.2%	3.2%	2.9%	4.1%	1.26	0.90
Gastro, low	12.3%	13.3%	10.4%	11.5%	0.87	0.78
Gastro, total	16.0%	17.1%	13.7%	16.5%	0.97	0.80
Diabetes, type 1 high	0.3%	0.3%	0.4%	0.5%	1.57	1.25
Diabetes, type 1 medium	4.5%	4.1%	5.2%	5.5%	1.36	1.28
Diabetes, type 2 medium	1.5%	1.3%	1.6%	2.6%	2.01	1.20
Diabetes, type 2 low	8.6%	8.1%	8.8%	11.4%	1.41	1.08
Diabetes total	14.9%	13.8%	15.9%	20.0%	1.45	1.16
Skin, high	1.2%	1.2%	1.2%	1.0%	0.84	1.02
Skin, low	1.4%	1.4%	1.3%	1.4%	0.96	0.88
Skin, very low	6.3%	6.8%	5.5%	6.3%	0.94	0.81
Skin, total	8.9%	9.4%	8.0%	8.7%	0.93	0.85
Renal, very high	2.3%	1.6%	3.6%	3.6%	2.30	2.31
Renal, medium	4.4%	4.9%	3.3%	4.1%	0.85	0.68
Renal, low	3.6%	3.8%	2.9%	5.0%	1.34	0.76
Renal, total	10.3%	10.2%	9.8%	12.8%	1.25	0.96

continued

**Exhibit 23: Distribution of CDPS Categories among Beneficiaries with Disability, by Race/Ethnicity (continued)**

CDPS Category	Total	White	Black	Hispanic	Hispanic vs. White	Black vs. White
Substance abuse, low	3.0%	2.5%	3.8%	3.6%	1.42	1.50
Substance abuse, very low	2.6%	2.6%	2.6%	1.8%	0.69	0.99
Substance abuse, total	5.6%	5.2%	6.4%	5.4%	1.05	1.24
Cancer, high	1.3%	1.4%	1.2%	1.4%	1.07	0.86
Cancer, medium	1.8%	1.9%	1.4%	1.9%	0.97	0.73
Cancer, low	0.8%	0.8%	0.8%	0.9%	1.10	1.00
Cancer, total	3.9%	4.1%	3.4%	4.2%	1.03	0.83
DD, medium	1.9%	2.2%	1.3%	1.3%	0.62	0.61
DD, low	5.5%	6.3%	4.1%	4.3%	0.68	0.65
DD, total	7.3%	8.5%	5.4%	5.6%	0.66	0.64
Genital, extra low	2.7%	2.8%	2.5%	3.0%	1.09	0.89
Metabolic, high	1.7%	1.5%	1.9%	1.9%	1.27	1.24
Metabolic, medium	1.1%	1.0%	1.2%	1.2%	1.14	1.18
Metabolic, very low	3.1%	2.8%	3.5%	3.3%	1.16	1.24
Metabolic, total	4.2%	3.9%	6.6%	6.4%	1.65	1.71
Pregnancy, complete	0.7%	0.6%	1.0%	0.8%	1.37	1.82
Pregnancy, incomplete	0.5%	0.4%	0.6%	0.5%	1.42	1.66
Pregnancy, total	1.2%	1.0%	1.7%	1.3%	1.39	1.76
Eye, low	0.6%	0.6%	0.7%	1.1%	1.83	1.15
Eye, very low	6.1%	6.2%	5.7%	6.7%	1.09	0.93
Eye, total	6.7%	6.7%	6.4%	7.8%	1.15	0.94
Cerebrovascular, low	3.7%	3.6%	4.0%	3.7%	1.03	1.12
AIDS, high	1.8%	1.0%	3.2%	3.3%	3.32	3.17
Infectious, high	0.3%	0.2%	0.3%	0.3%	1.25	1.45
HIV, medium	0.1%	0.1%	0.2%	0.3%	4.36	3.76
Infectious, medium	1.0%	1.0%	1.1%	1.2%	1.17	1.13
Infectious, low	1.0%	1.1%	0.8%	1.0%	0.89	0.66
Infectious, total	8.0%	7.0%	9.7%	9.8%	1.39	1.37
Hematological, extra high	0%	0%	0%	0.1%	1.49	1.06
Hematological, very high	0.3%	0%	1.0%	0.2%	4.21	23.07
Hematological, medium	0.9%	0.7%	1.2%	1.0%	1.31	1.68
Hematological, low	1.3%	1.3%	1.1%	1.4%	1.03	0.86
Hematological, total	2.5%	2.1%	3.4%	2.6%	1.20	1.59
<b>Sample Size</b>	<b>3,892,661</b>	<b>2,447,955</b>	<b>1,157,263</b>	<b>287,443</b>		

Note: Table excludes Asian/Pacific Islanders, Native Americans, and beneficiaries with unknown race/ethnicity.

The CDPS risk score provides a summary measure of the burden of illness, and shows that among beneficiaries with disabilities, the burden of disease is substantially higher among Hispanics than among blacks or non-Hispanic whites, and much lower than average among Asians/Pacific Islanders (Exhibit 24). The CDPS score of 1.08 for Hispanics means that, given the prevalence of disease in the Hispanic population in 2002, expenditures for Hispanics in 2003 are expected to be 8% above the average expenditures for all beneficiaries with disability. Black beneficiaries are predicted to have spending slightly above average (1.02), indicating that they have a slightly heavier than average diagnostic burden, but not much different than average. Asian/Pacific Islanders have a much lighter than average diagnostic burden, with predicted spending based on age, gender, and diagnoses only 83% of the overall average.

Although the predicted spending for blacks based on gender, age, and diagnoses is 2% higher than average, actual acute care spending for blacks is 8% lower than average (\$725 per month for blacks compared to a \$789 per month average). This difference may in part be due to disparities in the mix of Medicaid-only and dual eligible beneficiaries, in part to differences across states in the level of spending and in the distribution of beneficiaries by race, and, in part, to differences in the treatment received by blacks compared to non-Hispanic whites. Expenditures are lower on blacks and Asian/Pacific Islanders than would be expected based on their diagnoses, age, and gender, while expenditures on Hispanics and non-Hispanic whites are higher than would be expected. Further work is needed to more fully understand these results.

**Exhibit 24: Acute Care Expenditures and CDPS Risk Scores among Beneficiaries with Disability, by Race/Ethnicity, 2002**

Race/Ethnicity	CDPS Score	Acute Care Expenditures Per Month	Acute Care Ratio	N
White	1.00	\$830	1.05	2,447,955
Black	1.02	\$725	0.92	1,157,263
AmerEsk	1.02	\$877	1.11	41,013
AsianPI	0.83	\$587	0.74	167,089
Hispanic	1.08	\$896	1.14	293,086
Unknown	0.98	\$752	0.95	654,473
<b>Total</b>	<b>1.00</b>	<b>\$789</b>	<b>1.00</b>	<b>4,760,879</b>

## Endnotes

- <sup>1</sup> S. Allen and A. Croke. *The Faces of Medicaid: The Complexities of Caring for People with Chronic Illnesses and Disabilities*, Center for Health Care Strategies, Inc., October 2000.
- <sup>2</sup> 2006 Medicaid spending from Urban Institute and Kaiser Commission on Medicaid and the Uninsured estimates based on CMS- 64 reports. Estimates available at: [www.statehealthfacts.org/comparetable.jsp?ind=177&cat=4](http://www.statehealthfacts.org/comparetable.jsp?ind=177&cat=4).
- <sup>3</sup> For an alternative view on Medicaid's sustainability, see R. Kronick and D. Rousseau. "Is Medicaid Sustainable? Spending Projections for the Program's Second Forty Years." *Health Affairs*, Mar-Apr 2007, 26:2. 271-87.
- <sup>4</sup> J.S. Crowley and M. O'Malley. *Profiles of Medicaid's High-Cost Populations*. Washington, DC: The Kaiser Commission on Medicaid and the Uninsured, December 2006.
- <sup>5</sup> [www.cms.hhs.gov/MedicaidDataSourcesGenInfo/07\\_MAXGeneralInformation.asp](http://www.cms.hhs.gov/MedicaidDataSourcesGenInfo/07_MAXGeneralInformation.asp)
- <sup>6</sup> There are a number of other diagnostic classification systems in widespread use, including the DxCG family of systems and the ACG system (J.P. Weiner, A. Dobson, S.L. Maxwell, K. Coleman, B. Starfield, G.F. Anderson. "Risk-adjusted Medicare capitation rates using ambulatory and inpatient diagnoses." *Health Care Financing Review*. 1996 Spring;17(3):77-99; G.C. Pope, J. Kautter, R.P. Ellis, A.S. Ash, J.Z. Ayanian, L.I. Iezzoni, M.J. Ingber, J.M. Levy, J. Robst. "Risk adjustment of Medicare capitation payments using the CMS-HCC model." *Health Care Financing Review*, Summer 2004; 25(4):119-41.). The major results presented in this report would be similar regardless of the choice of classification system.
- <sup>7</sup> R. Kronick, T. Gilmer, T. Dreyfus, and L. Lee. "Improving Health-Based Payment for Medicaid Beneficiaries: CDPS." *Health Care Financing Review*, Spring 2000, 21(3):29-64.
- <sup>8</sup> In these results, profiles using diagnoses taken from claims for services performed during calendar year 2002 are presented. If services received during calendar 2001 (for the subset of beneficiaries who were eligible in both 2001 and 2002) had also been included, the number of diagnoses would be greater. In the 2002 data presented below, 22% of disabled beneficiaries had no CDPS diagnosis; 24% had a diagnosis in only one CDPS major category; and 54% had diagnoses in two or more CDPS categories. Using two years of diagnostic information, the comparable figures are 14% with no CDPS diagnosis; 18% with one major CDPS diagnostic category; and 68% with two or more.
- <sup>9</sup> 2005 SSI Annual Statistical Report, Table 22. Social Security Administration, Washington, DC.
- <sup>10</sup> The estimated breakdown for schizophrenia and other mental illness is drawn from data in S. Kochar, C.G. Scott, Disability Patterns Among SSI Recipients, *Social Security Bulletin*, 58(1), Spring 1995, 3-14.
- <sup>11</sup> T. Gilmer, R. Kronick, P. Fishman, and T. Ganiats. "The Medicaid Rx Model: Pharmacy-Based Risk Adjustment for Public Programs." *Medical Care*, 2001, 39(11):1188-1202.

- <sup>12</sup> Among beneficiaries with disability, 22% are under 18 years of age. Acute care expenditures are similar for disabled children (\$9,861 per year) and disabled adults (\$10,226 per year), but long term care expenditures are much higher for disabled adults (\$4,079) than for disabled children (\$1,743).
- <sup>13</sup> The stage 1 groups are not mutually exclusive or hierarchical—some beneficiaries diagnosed with schizophrenia may also have been diagnosed with an affective psychosis.
- <sup>14</sup> Following the implementation of the Medicare Part D prescription drug benefit in January 2006, almost all of the prescription drug expenditures for dual eligibles moved to Medicare, and Medicaid acute care spending for dual eligibles has decreased by approximately 50% (see Exhibit 1).
- <sup>15</sup> Exhibit 9 focuses on results for Medicaid-only beneficiaries with disabilities and does not present results on patterns of comorbidities for the aged or for adults and children without disabilities. The focus is on beneficiaries with disabilities because both the cost and quality challenges of managing patients with multiple comorbidities are much greater than for adults or children without disabilities. The management challenges for dual eligibles (both those with disabilities and the aged) are even more complex than for Medicaid-only beneficiaries, but the absence of Medicare utilization and expenditure information in the data set limits the ability to describe cost and utilization patterns for that group.
- <sup>16</sup> J.D. Piette and E.A. Kerr. “The Impact of Comorbid Chronic Conditions on Diabetes Care.” *Diabetes Care*, March 2006, 29:725-731.
- <sup>17</sup> As discussed within this report, the prevalence of serious mental illness is underestimated in claims data; however, there is little reason to expect that the estimated strength of the relationship between mental illness and particular physical illnesses would change much even if mental illness were more completely reported.
- <sup>18</sup> *Crossing the Quality Chasm: A New Health System for the 21st Century*. Committee on Quality of Health Care in America, Institute of Medicine Washington, DC, USA: National Academies Press; 2001.
- <sup>19</sup> D. Esposito, E. Fries Taylor, M. Gold, and K. Andrews. *Evaluation of the Medicaid Value Program: Health Supports for Consumers with Chronic Conditions*. Mathematica Policy Research, Inc., August 2007.
- <sup>20</sup> “Caring for Comorbid Patients.” Presentation by Cynthia Boyd, MD, MPH at the *Medicaid Value Program: Health Supports for Consumers with Chronic Conditions* final meeting, San Francisco, April 25-26, 2007.
- <sup>21</sup> Piette, et al., op.cit.
- <sup>22</sup> The figure excludes respondents reported as Asian/Pacific Islanders, Native Americans, or of unknown race/ethnicity.

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## Additional CHCS Resources

The Center for Health Care Strategies (CHCS) works with Medicaid stakeholders across the country to design, implement, and evaluate programs that more effectively address the needs of adults with chronic conditions and disabilities. Visit [www.chcs.org](http://www.chcs.org) for information and resources from the following initiatives:

**Integrated Care Program:** Resources for developing programs to integrate the financing, delivery, and administration of primary, acute, behavioral health, and long-term care services and supports for adults who are dually eligible for Medicaid and Medicare, as well as those who receive services solely through Medicaid. Online materials include rate setting and risk adjustment tools, performance measure recommendations, and state resources.

**Managed Care for People with Disabilities Purchasing Institute:** Resources for developing, enhancing, or expanding managed care programs for SSI beneficiaries. Online materials include sample requests for proposals, contracts, health assessment tools, and other administrative resources.

**Medicaid Value Program: Health Supports for Consumers with Chronic Conditions:** Resources for designing/implementing programs for beneficiaries with multiple chronic conditions. Online materials include pilot project case studies and intervention logic models.

**Rethinking Care Program:** Under this new program, CHCS will work with regional or state multi-stakeholder collaborative teams to implement new care models and tools for improving the care of high-need, high-cost beneficiaries. The regional pilot projects will be linked to a national learning network of policy makers, researchers, and practitioners focused on disseminating replicable solutions to improve care for high-opportunity patient populations.

[www.chcs.org](http://www.chcs.org)

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