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DATA SERIES

REPORT

Clarifying Multimorbidity to Improve Targeting and Delivery of Clinical Services for Medicaid Populations

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Cynthia Boyd, MD, MPH*

Bruce Leff, MD*

Carlos Weiss, MD, MHS*

Jennifer Wolff, PhD*

Rebecca Clark

Thomas Richards, MS

The Johns Hopkins University

**Co-principal investigators and contributed equally to this report.*

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Targeting Clinical Opportunities within Medicaid Populations: Online Resources

Clarifying Multimorbidity Patterns to Improve Targeting and Delivery of Clinical Services for Medicaid Populations is one of a number of tools being produced by the Center for Health Care Strategies (CHCS) through the **Rethinking Care Program**. This national initiative, made possible by Kaiser Permanente, was developed by CHCS to design and test better approaches to care for Medicaid's highest-need, highest-cost beneficiaries.

In tandem with this report, CHCS together with its partners at Johns Hopkins have developed a variety of online resources to support Medicaid stakeholders in more effectively targeting interventions for high-need, high-cost beneficiaries. Additional materials include:

Data Brief: Clarifying Multimorbidity to Improve Targeting and Delivery of Clinical Services for Medicaid Populations – Provides a high-level summary of analysis findings and addresses implications for how states can use the findings to develop more effective models of care for high-risk populations.

Multimorbidity Pattern and Clinical Opportunities Tables – Includes the following resources for each of 13 index conditions:

- Summary tables detailing the five most costly patterns for each index condition;
- Data tables for the 16 most common multimorbidity patterns identified for each index condition, including prevalence, utilization, and expenditure data for each; and
- Clinical opportunities tables that catalog promising clinical models for specific patterns of multimorbidity. A bibliography for all the studies listed in the clinical opportunities tables is also available.

Literature Review: Evidence-Based Clinical Models Not Specific to a Multimorbidity Pattern – Provides a summary of clinical models that have been developed and tested for patients with multimorbidity, regardless of the specific underlying conditions.

Visit www.chcs.org to download these resources.

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Overview

Although the Medicaid program finances essential health services for more than 60 million Americans, expenditures are highly concentrated.¹ Roughly 50 percent of Medicaid expenditures are incurred among just five percent of its beneficiaries.² Adults with disabilities and elderly individuals account for the majority of these high-cost beneficiaries. Analyses conducted by R. Kronick, T. Gilmer, and the Center for Health Care Strategies (*The Faces of Medicaid II*) using Chronic Illness and Disability Payment System (CDPS) categories further indicate that Medicaid expenditures were largely attributable to people with multimorbidity.³ Identifying clinical opportunities for Medicaid beneficiaries with multimorbidity, who are predominantly represented in disabled and aged eligibility pathways, is of considerable importance to state efforts to manage spending. However, it is not yet clear how to target clinical interventions to improve the effectiveness of Medicaid programs because this requires clarification of multimorbidity in Medicaid as well as linked clinical strategies relevant to the most prevalent, highest cost, or clinically relevant combinations of co-occurring conditions. Therefore, the purposes of this project were to identify subgroups of Medicaid beneficiaries that can be managed through targeted clinical programs and to identify opportunities to improve quality and cost outcomes.

¹ Enrollment projection for 2010 based on Centers for Medicare and Medicaid Services, Office of the Actuary, National Health Statistics Group.

² The Henry J Kaiser Family Foundation. Top 5% of Enrollees Accounted for More than Half of Medicaid Spending in 2004. 2009; <http://facts.kff.org/chart.aspx?ch=471>.

³ R.G. Kronick, M. Bella, T.P. Gilmer and S.A. Somers. *The Faces of Medicaid II: Recognizing the Care Needs of People with Multiple Chronic Conditions*. Center for Health Care Strategies, Inc., October 2007.

Methods

This project builds upon the work of R. Kronick, T. Gilmer, and the Center for Health Care Strategies outlined in *The Faces of Medicaid II (Faces II)*, which comprehensively examined national utilization and costs of the Medicaid program and identified the high expenditures that are attributable to beneficiaries with multimorbidity. In this analysis we draw upon Medicaid Analytic eXtract (MAX) data,⁴ which include information regarding individual Medicaid beneficiaries' eligibility, service use, and expenditures. In light of previous research demonstrating variability in disease ascertainment using one year of claims alone,⁵ we analyzed claims data from 2001 and 2002 in order to ascertain multimorbidity. Annual expenditures are reported for calendar year 2002.

Inclusion Criteria

We focused on Medicaid beneficiaries ages 21 years or older who were eligible for the program on the basis of being elderly or having a disability. These are eligibility pathways in which high-cost beneficiaries are disproportionately concentrated. In order to maximize the accuracy of disease ascertainment using administrative claims, individuals enrolled in comprehensive prepaid care plans for any month were excluded, as were Medicaid beneficiaries receiving only partial Medicaid benefits such as wrap-around coverage. In this project we focused on three specific eligibility pathways: (1) **disabled adults**, beneficiaries less than 65 years of age eligible for Medicaid on the basis of disability; (2) **disabled duals**; beneficiaries less than 65 years of age dually eligible for both Medicare and Medicaid on the basis of disability; and (3) **aged duals**; beneficiaries dually eligible for both Medicare and Medicaid on the basis of being 65 years or older. Few beneficiaries age 65 and older met eligibility criteria for Medicaid but were not eligible for Medicare and these individuals were excluded from these analyses. Note, although the initial analysis also examined Medicaid expenditures and services use for the dually eligible population, these data are not reported on since Medicare claims were not available for this analysis.

Additional exclusion criteria were applied as follows. First, as in *Faces II*, six states were excluded altogether due to the very large percent of beneficiaries enrolled in comprehensive prepaid health plans (i.e., managed care) within each state (AZ, DE, HI, MD, OR, TN). Second, individuals were excluded when 70% or more of people in the same state and same eligibility pathway were enrolled in comprehensive prepaid health plans. Operationally, this resulted in adults with disabilities being excluded in the states of MI, NM, and PA. Third, 1,856,254 individuals enrolled in Medicaid for less than a full calendar year were excluded as they represent a different type of management opportunity than the focus of this report. A total of 5,187,176 Medicaid beneficiaries met all eligibility criteria and represent the final study sample for this analysis (Attachment 1).

Categorization of Expenditures

To succinctly and meaningfully describe annual Medicaid expenditures, MAX expenditure type of service categories were systematically consolidated into summary expenditure categories as further specified in the Appendix and quantified in Attachment 2. Summary expenditure categories included: pharmacy, long term care, hospital / emergency room, non-hospital physician services and coordination, and "other." Given the limited diagnoses reported on long-term care claims and more limited opportunities for modification of recurring long-term care expenditures more, the decision was made to present in summary tables overall Medicaid expenditures, **excluding** expenditures associated with long-term care services. However, given the high costs associated with long-term care we do report long-term

⁴ Center for Medicare & Medicaid Services. Medicaid Analytic eXtract (MAX) General Information. 2009; http://www.cms.hhs.gov/MedicaidDataSourcesGenInfo/07_MAXGeneralInformation.asp. Accessed November 25, 2009.

⁵ R.G. Kronick, et al., op. cit.

care costs separately in pattern-specific tables (see Multimorbidity Pattern Analyses and Clinical Opportunities summaries for 13 index conditions at www.chcs.org).

Definitions of “Very High Cost” and “High Cost” Beneficiaries

Individuals whose care was most costly, and who therefore represented potential opportunities for better care quality and cost management, were identified with high cost “flags” based on rank-order of beneficiaries by calendar year for 2002 total Medicaid spending. Two groups were flagged based on ranking that was specific to each state and eligibility pathway: the top 1.0% through 5.0% **very high cost** beneficiaries; and, the top 5.01% through 20% **high cost** beneficiaries. Beneficiaries in the top 1% and higher according to annual expenditures were not examined for two reasons. First, they represent a small group with extreme costs that are up to 10 times higher than the 99th percentile. In addition, these extreme costs are less likely to be responsive to general programs targeting improved treatment of chronic diseases.

Literature Search Methods

We first developed pre-defined categories intended to help readers understand the type of guidance that is available. Evidence-based clinical pearls refer to potentially useful pieces of information that may refer to a specific circumstance. Some of these pearls have not yet been studied in many clinical settings. Reshaping of a single disease focused care delivery model refers to evidence-based models that may be well suited to patients with multimorbidity because they address processes of care such as medication management, care coordination or care transitions. Evidence-based practice guidelines or systematic reviews refer to guidelines for a clinical condition that address a second condition as well. Evidence-based model for specific multimorbidity patterns refers to a care model intervention that was designed for the specific multimorbidity pattern and has been tested. We also identified evidence-based models for multimorbid patients that are not specific to a multimorbidity pattern. The models in this last category are broadly applicability across multimorbidity patterns, and were therefore compiled separately rather than listing them repeatedly for each multimorbidity pair. This final taxonomy was:

1. Evidence-based clinical “pearl” for the specific multimorbidity pattern.
2. Reshaping of single disease focused evidence-based clinical care delivery model to the care of multimorbid patients.
3. Evidence-based clinical practice guidelines or systematic reviews for the multimorbidity patterns.
4. Specific evidence-based models for the specific multimorbidity pattern.
5. Evidence-based models for multimorbid patients not specific to the multimorbidity pattern

We performed a series of structured literature searches in order to find evidence of clinical opportunities that correspond to the high-priority multimorbidity patterns found in Medicaid. There were several purposes to this search. Primarily, we intended to glean from the existing literature examples of programs that are likely to improve care quality or control care costs while focusing on people with multimorbidity. Because multimorbidity has generally been underappreciated, the therapeutic interventions or care management strategies designed with multimorbidity in mind are relatively uncommon and can be difficult to identify. Because relevant information is contained in the literature of many disciplines, and in databases that we did not search, our results toward this goal should be viewed as providing examples that can orient users to the type of work done in the field and thus facilitate the additional investigation of best practices for a specific multimorbidity pattern. We cannot predict how each Medicaid plan will choose, in the context of its local resources and opportunities, to improve care for its beneficiary population with multimorbidity. However, we hope that by providing concrete examples, when available, we can facilitate states’ next steps toward finding solutions to fit a particular problem. In addition, our purpose was to convey some sense of the state of the art for

multimorbidity patterns. When there have been evidence-based practice guidelines for a multimorbidity pattern (e.g. HTN and stroke), we intend to alert readers to those guidelines and recommend they be reviewed before focusing on specific trials even if the guideline's presentation is organized around one chronic condition.

The literature search employed the MEDLINE using the PubMed interface,⁶ Cochrane Library⁷ and National Guideline Clearinghouse⁸ databases. In order to adequately represent a truly expansive literature, we employed a sliding scale of emphasis such that emphasis was shifted according to the amount of research and research synthesis already conducted for a clinical condition. For example, the American College of Cardiology and American Heart Association have published many guidelines concerning CHD, each of which has focused on a particular aspect of that condition.⁹ For multimorbidity pairs including CHD, our review emphasized large randomized controlled trials and guidelines based on a systematic literature review and grading of the evidence; observational evidence was generally not included. In contrast, for chronic pain the number of randomized controlled trials is much smaller and there are no comparable guidelines. Therefore, consideration was afforded results from controlled trials and even observational evidence that may be used to guide practice, pending more research. Similarly, we employed no exclusion criteria for most searches. However, when more than 1,000 titles were available for a given step in a search (detailed below) we limited the search to human adults and the English language. If there were still more than 1,000 titles available, the search was limited to controlled clinical trials or randomized controlled clinical trials.

The literature search was constructed using Medical Subject Headings (MeSH) terms used by the National Library of Medicine,¹⁰ whenever a term was available. These terms were identified through a search of the MeSH database. We examined the branches in the terminology tree above and below the first term in the MeSH database, which were determined to be as best possible matches for our clinical conditions. In this manner, for example, our term for mood stabilizers drugs was found to be best represented by the MeSH term "antimanic agents." We next performed pair-wise searches in MEDLINE that combined the index condition and each comorbid condition. We also performed the following searches for each index condition combined with: a guideline publication type; the MeSH term patient care management; the keywords comorbid or multimorbid; and the MeSH term comorbidity. We reviewed the titles and abstracts for the results from these searches for appropriate articles. Our attention was next turned to the Cochrane Library where we used MeSH terms to examine Cochrane reviews for our clinical conditions. If there were no Cochrane reviews, then other reviews listed in the Cochrane Library database were also examined. Finally, we searched the National Guideline Clearinghouse for relevant guidelines. This database does not use MeSH terms so the search was performed using several versions of the clinical condition (e.g., both stroke and cerebrovascular accident).

⁶ U.S. National Library of Medicine. PubMed. 2009; <http://www.ncbi.nlm.nih.gov/pubmed>. Accessed November 25, 2009.

⁷ The Cochrane Collaboration. The Cochrane Library. Evidence for healthcare decision-making. 2009; <http://www3.interscience.wiley.com/cgi-bin/mrwhome/106568753/HOME>. Accessed November 25, 2009.

⁸ Agency for Health Care Research and Quality. National Guideline Clearinghouse. 2009; <http://www.guideline.gov/>. Accessed November 25, 2009.

⁹ American College of Cardiology. Clinical Statements/Guidelines. 2009; <http://www.acc.org/qualityandscience/clinical/statements.htm>. Accessed November 25, 2009.

¹⁰ U.S. National Library of Medicine. MeSH database 2009; <http://www.ncbi.nlm.nih.gov/mesh>. Accessed November 25, 2009.

Pattern Analyses

Ascertainment of clinical conditions

To identify high-priority multimorbidity patterns for targeting by Medicaid purchasers and plans, we selected conditions based on their prevalence, potential for modification of clinical course, and costs of management, as described in the appendix. **For the purposes of our analyses, a condition was defined as a clinical entity that can be managed in a relatively homogenous manner.** A condition may encompass more than an International Classification of Disease (ICD) diagnosis code for a disease. For example, chronic lower tract respiratory diseases, chronic bronchitis, emphysema and asthma were studied as a group, but other lung diseases such as lung cancer or radiation or drug-related pneumonitis were not included in this grouping. Potential targets for clinical coordination and care management could include taking a specific drug such as anticoagulation drugs (warfarin), or a marker of health status, such as receipt of an article of durable medical equipment or a hospital bed or home oxygen therapy.

Selection of conditions for pattern analyses

A multi-step process was used to inform the development and selection of conditions for the pattern analysis. First, in conjunction with a literature review and project team members' clinical experience, a list of more than 50 potential conditions were generated for consideration. Each condition was then evaluated on its prevalence, cost, and its opportunity for clinical management, recognizing that some (e.g., mental health, substance abuse) conditions might be underrepresented in administrative claims. The draft list of conditions was reviewed using a modified Delphi approach by geriatric and generalist physician experts in the management of patients with multimorbidity. Participants were asked to rate each item on the draft list of candidate conditions according to cost, prevalence, and opportunity. This input was used to inform the development of a list of 31 conditions for pattern analyses (see Table 1).

Stage I single-level labels from the CDPS grouper software program (the building blocks of the CDPS system) were linked to the clinically derived list of conditions to identify ICD diagnosis codes. To avoid confusion, we would like to clarify that these are not the CDPS categorizations reported in *Faces II*. When available, we used CDPS Stage I single-level labels to create flags for items in our list of clinical conditions. A number of conditions of interest to us were not represented in CDPS single-level labels. For these conditions, we developed coding logic to identify them from administrative claims using a combination of durable medical equipment codes, ICD codes, revenue codes, and drug (NDC)¹¹ codes.

¹¹ Food and Drug Administration. National Drug Code Directory. 2009; <http://www.fda.gov/Drugs/InformationOnDrugs/ucm142438.htm>. Accessed November 25, 2009.

Table 1. Prevalence of Clinically Relevant Conditions, by Medicaid Eligibility Pathway						
Condition	Adults with Disabilities		Elderly Duals (>65)		Duals (<65)	
	People	%	People	%	People	%
1 Anticoagulation drugs (warfarin)	47,241	2.5%	126,711	7.0%	58,808	3.9%
2 Antiepileptic drugs	92,778	4.9%	53,170	2.9%	85,116	5.7%
3 Antipsychotic or mood stabilizer drugs	579,758	30.9%	338,688	18.7%	504,724	33.7%
4 Anxiety disorder or benzodiazepine use	511,973	27.2%	315,938	17.5%	373,030	24.9%
5 Asthma and/or chronic obstructive pulmonary disease	349,478	18.6%	177,831	9.8%	142,330	9.5%
6 Back or spine disorders	425,565	22.6%	130,733	7.2%	136,145	9.1%
7 Cerebrovascular accident/stroke	104,787	5.6%	189,431	10.5%	69,143	4.6%
8 Chronic pain	334,687	17.8%	221,012	12.2%	250,983	16.8%
9 Chronic renal failure/ESRD	46,718	2.5%	46,740	2.6%	49,960	3.3%
10 Congestive heart failure	111,792	5.9%	216,853	12.0%	79,604	5.3%
11 Continuous positive airway pressure machine	9,465	0.5%	1,821	0.1%	6,553	0.4%
12 Coronary heart disease	429,083	22.8%	350,899	19.4%	200,462	13.4%
13 Dementia	22,965	1.2%	234,805	13.0%	33,484	2.2%
14 Depressive disorders	745,680	39.7%	476,145	26.4%	554,861	37.0%
15 Developmental disorders	94,757	5.0%	12,831	0.7%	104,876	7.0%
16 Diabetes	320,197	17.0%	286,235	15.8%	193,258	12.9%
17 Dizziness	110,376	5.9%	59,133	3.3%	34,275	2.3%
18 Drug and alcohol disorders	243,747	13.0%	28,033	1.6%	89,538	6.0%
19 Electrolyte imbalance	160,375	8.5%	150,016	8.3%	87,039	5.8%
20 Gastrointestinal bleed	65,506	3.5%	37,665	2.1%	24,057	1.6%
21 Hepatitis or chronic liver disease	92,545	4.9%	11,404	0.6%	27,269	1.8%
22 HIV or AIDs	40,383	2.1%	649	0.0%	14,782	1.0%
23 Home oxygen therapy	44,626	2.4%	43,928	2.4%	29,068	1.9%
24 Hospital bed distributed	11,518	0.6%	29,181	1.6%	16,050	1.1%
25 Hypertension	559,056	29.8%	500,366	27.7%	264,327	17.6%
26 Neurologic disorders	20,830	1.1%	5,231	0.3%	16,701	1.1%
27 Non-stroke plegias and palsies	56,255	3.0%	9,352	0.5%	40,740	2.7%
28 Obesity	11,879	0.6%	1,840	0.1%	3,219	0.2%
29 Personality disorders	35,557	1.9%	3,157	0.2%	19,196	1.3%
30 Prednisone use	93,437	5.0%	77,045	4.3%	77,940	5.2%
31 Schizophrenia	160,223	8.5%	29,208	1.6%	111,482	7.4%
Overall	1,879,172	100%	1,806,908	100%	1,498,096	100%

Psychiatric comorbidity

Recognizing that psychiatric comorbidity is highly prevalent, categorization of comorbidity was customized by index condition. Index conditions that might be considered to have (relatively) less psychiatric comorbidity (Asthma and/or Chronic Obstructive Pulmonary Disease, Cerebrovascular Accident (stroke), Congestive Heart Failure, Coronary Heart Disease, Diabetes, Hypertension, Chronic Renal Failure or End Stage Renal Disease) were examined with a single broad psychiatric comorbidity indicator of comorbidity. Index conditions that commonly co-occur with mental health conditions (Chronic Pain, Dementia, Depressive Disorders, Developmental Disorders, Drug and Alcohol Disorders, and Schizophrenia) employed a more refined approach to better identify relevant interventions. Our approach to categorization of psychiatric comorbidity is further specified in the Appendix.

Identification of conditions in MAX claims

Diagnostic claims from calendar year 2002 inpatient, long term care, pharmacy, and other services MAX files were used to generate condition flags of interest for study participants. For individuals enrolled in Medicaid during calendar years 2001 and 2002, diagnostic information from calendar year 2001 was used to augment diagnostic classifications. To be classified as having a condition for which classification is entirely based on ICD codes, individuals must have incurred at least one claim in any of the following files/services: inpatient, skilled nursing facility, or home health care, home, nursing facility, custodial care facility, hospice, ESRD treatment facility, outpatient hospital, or Part B medical claim. All codes, not just primary diagnostic codes, were reviewed. Given concern regarding false positive condition ascertainment related to rule-out procedures, administrative claims and codes related to diagnostic services, imaging, laboratory services, and air and water ambulance were not used for disease ascertainment (see Appendix for detail). To identify conditions based on prescription drugs, the Multum¹² February 2005 list of NDC codes was reviewed to identify specific drugs (i.e., benzodiazepines, warfarin (anticoagulation therapy)). Prescription drug claims for these specific medications were flagged.

A total of 13 index conditions were selected for detailed examination and pattern analysis based on their high prevalence, high costs, and/or potential opportunities for improved management. These conditions included: (1) Asthma and/or Chronic Obstructive Pulmonary Disease; (2) Cerebrovascular Accident (stroke); (3) Chronic Pain; (4) Congestive Heart Failure; (5) Coronary Heart Disease; (6) Dementia; (7) Depressive Disorders; (8) Developmental Disorders; (9) Diabetes; (10) Drug and Alcohol Disorders; (11) Hypertension; (12) Chronic Renal Failure or End Stage Renal Disease; and (13) Schizophrenia. All 31 conditions were considered potential co-existing conditions in related pattern analyses, with some collapsing of psychiatric condition categories as previously described.

Pattern analyses methods

A phased approach was used to develop pattern tables for each of the 13 index conditions across the 3 eligibility pathways. Which co-occurring conditions were included with each index condition was based on prevalence and expenditures (overall Medicaid expenditures, excluding long-term care services) in relation to the index condition. From the initial list of 31 conditions, we selected the most common 15 co-occurring conditions for inclusion in the pattern analysis. Among the remaining 15 conditions, we selected an additional five conditions based on either high per-capita costs or relevance to clinical management of the index condition. A total of 20 conditions were included in the initial pattern tables for each of the 13 conditions.

Individuals with the specified index condition were categorized into a mutually exclusive pattern based on the presence or absence of the 20 co-occurring conditions that were initially considered. Information

¹² Multum. Products. 2009; <http://www.multum.com/Products.htm>. Accessed November 25, 2009.

regarding numbers of individuals and Medicaid expenditures (excluding long-term care expenditures) were aggregated within each pattern. Because pattern analyses examine mutually exclusive patterns, and 20 co-occurring conditions were initially considered, thousands of patterns were initially derived, most of which included very few numbers of individuals.

The second phase of this process involved identifying a reduced number of co-occurring conditions to include in a final pattern analysis for each index condition and eligibility pathway. The initial pattern table was sorted from highest to lowest overall Medicaid expenditures. Within each eligibility pathway, conditions were identified that were most costly and that were represented in patterns that collectively accounted for 50% cumulative prevalence of beneficiaries were selected for inclusion in the final pattern analysis. Although the numbers of patterns were fewer, several thousand patterns typically remained.

Study Sample Characteristics

During calendar year 2002, a total of 5,187,176 of 50,328,054 individuals met screening eligibility criteria of continuous enrollment throughout the calendar year in fee-for-service Medicaid for the 45 states and 3 eligibility pathways of interest. The study sample was distributed fairly evenly by eligibility pathway, including: disabled adults (1,879,172), aged duals (1,806,908), and disabled duals (1,498,096; Table 2 below). Simple prevalence of the 13 index conditions varied considerably by both condition and eligibility pathway. Depressive disorders were uniformly most highly prevalent, and were found to be present among 39.7% of disabled adults, 26.4% of aged duals, and 37.0% of disabled duals. The percentage of study participants who were not categorized as having any of the 13 index conditions ranged from a low of 26.5% of disabled adults, to 35.8% of aged duals.

Table 2. Prevalence of 13 Index Conditions, by Medicaid Eligibility Pathway						
Condition	Adults with Disabilities		Elderly Duals (>65)		Duals (<65)	
	People	%	People	%	People	%
1 Asthma and/or chronic obstructive pulmonary disease	349,478	18.6%	177,831	9.8%	142,330	9.5%
2 Cerebrovascular accident/stroke	104,787	5.6%	189,431	10.5%	69,143	4.6%
3 Chronic pain	334,687	17.8%	221,012	12.2%	250,983	16.8%
4 Chronic renal failure/ESRD	46,718	2.5%	46,740	2.6%	49,960	3.3%
5 Congestive heart failure	111,792	5.9%	216,853	12.0%	79,604	5.3%
6 Coronary heart disease	429,083	22.8%	350,899	19.4%	200,462	13.4%
7 Dementia	22,965	1.2%	234,805	13.0%	33,484	2.2%
8 Depressive disorders	745,680	39.7%	476,145	26.4%	554,861	37.0%
9 Developmental disorders	94,757	5.0%	12,831	0.7%	104,876	7.0%
10 Diabetes	320,197	17.0%	286,235	15.8%	193,258	12.9%
11 Drug and alcohol disorders	243,747	13.0%	28,033	1.6%	89,538	6.0%
12 Hypertension	559,056	29.8%	500,366	27.7%	264,327	17.6%
13 Schizophrenia	160,223	8.5%	29,208	1.6%	111,482	7.4%
14 None of Above	498,292	26.5%	646,934	35.8%	502,062	33.5%
Overall	1,879,172	100%	1,806,908	100%	1,498,096	100%

Main Results

Multimorbidity Patterns

Index condition pattern analysis tables

Pattern analysis techniques employ logic rules to sort individuals into mutually exclusive patterns. Each of the 16 most highly prevalent multimorbidity patterns are presented for the 13 index conditions (see Multimorbidity Pattern Analyses and Clinical Opportunities summary tables). The data tables presented focus on non-dual Medicaid beneficiaries with disabilities under age 65 (Although initial analysis also examined Medicaid expenditures and service use for the dual eligible population, these data are not reported because without Medicare data, the portrait for duals is incomplete). For the purpose of clarity, we provide a brief orientation to the tables here, using chronic pain among adults with disabilities under 65 as an example (see *Multimorbidity Pattern Analyses and Clinical Opportunities: Chronic Pain*). In each table, footnotes indicate the denominator of numbers of individuals for whom the index condition was ascertained as being present, along with their aggregate calendar year 2002 Medicaid expenditures, excluding long-term care. As shown in footnote # 1 of the same table, 334,687 disabled adults with chronic pain incurred approximately \$5.5 billion in Medicaid expenditures excluding long-term care during calendar year 2002.

In each table, the columns to the left of the bolded line distinguish the specific co-occurring conditions that were considered in the final pattern analysis for each index condition within a given eligibility pathway. Each of the rows (1-16) represents a unique multimorbidity pattern; the presence of a checkmark indicates that the condition was ascertained and is present in the pattern. For example, row 2 presents the pattern of chronic pain and depressive disorders, without any other co-occurring conditions among the other 18 conditions considered in the context of chronic pain in this eligibility pathway. Row 3 presents information regarding the pattern of chronic pain as well as back or spine disorders, but none of the other conditions. The row shaded gold, in which all conditions are designated as absent (no checkmark), represents the pattern of an index condition alone, without any co-occurring conditions. Row 1 indicates that among adults with disabilities with chronic pain, chronic pain only (without any of the other 19 co-occurring conditions) was the most common pattern with a prevalence of 4.2%.

Co-occurring conditions are ordered from left to right based on highest to lowest overall prevalence among beneficiaries with the index condition. Among adults with disabilities with chronic pain, depression was the most highly prevalent co-occurring condition, followed by hypertension and then coronary heart disease. The concentration of blue cells on the left side of the table reflects in part the higher prevalence of these conditions among individuals with chronic pain. Several of the conditions that were included: drug and alcohol disorders, diabetes, congestive heart failure, hepatitis/chronic liver disease, stroke, prednisone use, dizziness, gastrointestinal bleed, anticoagulation drugs (warfarin), chronic renal failure/end stage renal disease, HIV/AIDs, and personality disorders did not appear in any of the most common 16 multimorbidity patterns among Medicaid adults with disabilities with chronic pain. These conditions do appear in less common patterns that are not displayed on this table.

Columns to the right of the bolded line present prevalence and expenditures associated with each of the 16 multimorbidity patterns. The first two columns to the right of the double line present the pattern prevalence and cumulative pattern prevalence for the 16 most common multimorbidity patterns, respectively. For the 16 patterns, prevalence among adults with disabilities with chronic pain ranges from 4.2% for those with only chronic pain (i.e., without any of the other 14 co-occurring conditions),

to 0.51% for those with chronic pain plus depression, spine disorders, antipsychotic or mood stabilizer drug use, and anxiety disorder or benzodiazepam use. As shown in the next column, the 16 patterns presented in the table account for cumulative prevalence of 20.0% of disabled Medicaid beneficiaries with chronic pain. The following column to the right presents annual per-capita hospitalizations for each pattern. Hospitalizations ranged from a low of 0.13 hospitalizations per capita (e.g., 13 hospitalizations for every 100 beneficiaries with chronic pain) among adults with disabilities with chronic pain, hypertension, and back or spine disorders (row 9) to 0.45 hospitalizations per capita among their counterparts with chronic pain and coronary heart disease (row 11). For each index condition, the three patterns that represent the highest annual per capita hospitalization rates have been shaded in blue.

The far right columns on each Table present several expenditure metrics for each pattern. The 4th column to the right of the bolded line indicates that annual 2002 per-capita expenditures ranged from a low of \$5,466 among Medicaid beneficiaries with disabilities with chronic pain, hypertension, and back or spine disorders (row 9), to \$13,973 for their counterparts with chronic pain and antipsychotic or mood stabilizer drugs (row 8). The following three columns present pattern-specific and cumulative total annual expenditures, excluding long-term care expenditures, as well as long-term care expenditures among individuals with the index condition – this is the percentage of the total annual costs which are listed in footnote 2, specific to each footnote and eligibility pathway. The most costly three patterns, presented as a proportion of overall annual Medicaid expenditures, excluding long-term care (column 5) are shaded in red. Beneficiaries with chronic pain alone (row 1) accounted for 1.8% of Medicaid expenditures among beneficiaries with disabilities with chronic pain. The 16 patterns together accounted for 10.1% of Medicaid expenditures among beneficiaries with disabilities with chronic pain (row 16; column 6).

Finally, we present the proportion of individuals within each pattern who were “very high” and “high” cost, as defined above in Methods. As the footnotes explain, we describe the percent of individuals within each pattern who are among the top 1-5% most expensive beneficiaries within each eligibility pathway (“very high cost”; column 8). Thus, any pattern that accounts for more than 4% of very high cost beneficiaries is disproportionately costly relative to what would be expected. This is the case for 2 of the 16 patterns presented for Medicaid beneficiaries with disabilities with chronic pain (rows 11, 16). Collectively, these data suggest that some patterns (e.g., rows 1 and 2 – beneficiaries with disabilities with chronic pain alone and chronic pain and depression) represent opportunities based on the combination of their prevalence and costs, whereas others (e.g., row 11, chronic pain and coronary heart disease) represent opportunities based on higher than expected service use, such as hospitalizations. The same logic applies to the far-right column, which presents the proportion of individuals within each pattern who are represented among beneficiaries in the top 5.01 through 20th percentile of Medicaid expenditures (“high cost”; column 9). The three patterns with the highest “high cost” prevalence values are shaded in green.

Summary Tables

Recognizing the importance of synthesizing complex information for decision-making, a series of summary tables were constructed that provide the five most costly patterns that were identified for each index condition. The purpose of these tables is to facilitate prioritization of efforts to improve management of high-risk and high-cost Medicaid beneficiaries. Because the proportion of beneficiaries who fall within most specific mutually exclusive patterns is relatively small, the summary tables present information for each pattern using two approaches to define the denominator of interest.

1. “Restrictive” approach: Prevalence and expenditure information for beneficiaries who *only* have the specified pattern and no others.
2. “Broad” approach: Prevalence and expenditure information for beneficiaries who have the specified pattern, regardless of other comorbidities (“rolling up the pattern analysis tail”).

In the following text, we provide a brief orientation to the summary tables (see *Multimorbidity Pattern Analyses and Clinical Opportunities* summary tables) and overview of key findings.

Focusing again on adults with disabilities with chronic pain, the footnote of the summary table (see *Multimorbidity Pattern Analyses and Clinical Opportunities: Chronic Pain*) lists co-occurring conditions that were included in final pattern table, regardless of whether they appear in the five patterns that are presented. The first three of the five patterns that are presented were shaded red in the chronic pain pattern (non-summary) table, indicating they accounted for the greatest percentage of annual expenditures among adults with disabilities with chronic pain. Taking the first row as an example, columns in the table include from left to right: the specific multimorbidity pattern (chronic pain alone but none of the other conditions listed in the footnote), pattern prevalence among the population with chronic pain (4.2%), overall population prevalence among all adults with disabilities (0.75%), cost per capita (\$7,140, excluding long-term care), Medicaid expenditures among individuals within the specific pattern as a percentage of expenditures for all adults with disabilities with chronic pain (1.8%), and Medicaid expenditures excluding long-term care among individuals within the specific pattern as a percentage of expenditures for all adults with disabilities (0.5%).

The shaded rows present information for each pattern listed in the row above, using the “broad” eligibility criteria. Taking row one, prevalence and expenditure data are presented for all adults with disabilities with chronic pain as well as any of the other conditions listed in the footnote. Looking across the shaded row, we see that adults with disabilities with chronic pain and other co-existing conditions accounted for 100% of expenditures for adults with disabilities with chronic pain. Adults with disabilities with chronic pain as well as any of the other conditions listed in the footnote, comprised 17.8% of all adults with disabilities and accounted for 27.6% of all expenditures for adults with disabilities, with per capita costs totaling \$16,401.

Because chronic pain is commonly accompanied by psychiatric comorbidity we employed a refined approach for defining co-occurring psychiatric conditions. Three of the five highest cost patterns for adults with disabilities with chronic pain included depressive disorders; three included antipsychotic or mood stabilizer drug use. Turning to the chronic pain summary tables for the other two Medicaid eligibility pathways, we see the same trend, that depressive disorders were commonly present in the five most costly patterns for beneficiaries with chronic pain. Collectively, these data indicate that efforts to improve management of individuals with chronic pain should also target depressive symptoms.

More broadly, the high prevalence of psychiatric comorbidity is perhaps the most striking finding from these summary tables. Perhaps the most striking finding in a review of the summary tables across the range of index conditions and eligibility pathways (including non-dual adults with disabilities under 65 as well as dually eligible adults under 65 and those 65 or older.) is the overwhelming presence of psychiatric conditions with high cost and prevalence multimorbidity patterns. In fact, of the 195 multimorbidity patterns presented in the summary tables (13 index conditions, in 3 eligibility pathways, with 5 summary patterns presented for each), psychiatric conditions appear in 139 (71.3%). Psychiatric comorbidity has been recognized previously as an important issue in management of the Medicaid population. In groundbreaking work funded by CHCS, the *Faces of Medicaid III*, psychiatric illness was found among the 5% most costly chronic illness pairs in the population of adults with disabilities. The pattern analyses and summary tables in this analysis reinforce that key message. In addition, the approach taken to identifying psychiatric conditions in this analysis should prove exceptionally useful to Medicaid purchasers and plans in developing targeted clinical interventions to help manage these beneficiaries and their costs.

Clinical Opportunities

Clinical opportunities to improve quality and cost outcomes

Identifying high-priority multimorbidity patterns among Medicaid beneficiaries was undertaken in order to identify subgroups of Medicaid beneficiaries that can be managed from a clinical and management standpoint through targeted clinical programs and to identify clinical opportunities to improve quality and cost outcomes. Thus, after developing pattern analyses and summary tables, we performed a literature search using the methods described above to identify, existing clinical opportunities for multimorbid patients.

The clinical opportunities tables from the literature search may be found in each of the Multimorbidity Pattern Analyses and Clinical Opportunities summary tables at www.chcs.org. There are 13 tables, one for each index condition. In addition, we present an inventory of evidence-based models for the care of multimorbid patients that are not specific to a multimorbidity pattern or index condition. Many of the interventions that are not specific to a multimorbid pattern are described by Boulton and colleagues in a comprehensive review of successful models of comprehensive care for older adults with chronic conditions.¹³ That report identifies a number of types of general models that were associated with positive outcomes for patients with chronic conditions and multimorbidity. The models fell into the following general categories: interdisciplinary primary care; models that supplement primary care; transitional care; acute care in patients' homes; nurse-physician teams for residents of nursing homes; and models of comprehensive care in hospitals. Not all of these models may be immediately applicable to the manner in which Medicaid plans and purchasers currently exert their influence in health care delivery. However, in the current era of health care payment reform, the Medicaid system and the manner in which it interfaces with the health care delivery will likely evolve. As this evolution continues, knowledge of these models should prove useful to Medicaid. In addition, we present studies on models that have been studied in Medicaid populations and issues in patient management in a Medicaid context.

For each literature source, the author's last name and year of publication is listed, along with a very brief summary of the information from the source. An alphabetized bibliography listing all the citations is available online. For orientation, we provide a brief walk through of the clinical opportunities tables

¹³ C. Boulton, A.F. Green, L.B. Boulton, J.T. Pacala, C. Snyder and B. Leff. Successful models of comprehensive care for older adults with chronic conditions: evidence for the Institute of Medicine's "Retooling for an Aging America" report. *Journal of the American Geriatric Society*, 2009 Dec; 57(12) 2328-37.

here, using chronic pain as an example (see *Multimorbidity Pattern Analyses and Clinical Opportunities: Chronic Pain*). Under the title row, in the second row is the designation of the index condition, in this case chronic pain, and the comorbid conditions for which the literature was searched. For chronic pain these were depression, antipsychotic medication use, and anxiety as a combined comorbid condition (upper section of table), and, spine disorders (down lower in the table). The literature search revealed two items which were categorized as evidence-based clinical pearls (first column from the left) for the specific multimorbidity pattern. One such pearl (Damush 2008) found that among patients with chronic pain, those who are depressed employ different self management strategies compared with those who are not depressed. We thought that this represented a pearl because it may be useful information in planning self-care strategies and because adapting depression screening for patients with pain may help target patient self-management plans. In the column titled “Single-disease focused care delivery model addressing processes relevant to the care of multimorbid patients,” we list the IMPACT model of collaborative care of depression in primary care settings. We believe this is a clinical delivery model that could be adapted to specifically target and care for patients with depression and chronic pain. In the third column from the right, we described several models that specifically focused on the co-morbid conditions of interest, and in the column furthest to the right, we found several examples of evidence-based clinical practice guidelines or systematic reviews for chronic pain multimorbidity patterns.

Conclusions

Pattern Analysis to Identify Clinical Opportunities to Maximize Cost and Quality Outcomes for Medicaid Purchasers and Plans

A major advance in this work is the fact that the pattern analysis focuses on conditions that can be managed homogeneously (e.g., depression), rather than as broad disease categories (e.g., mental illness) that defy targeted clinical management.

Some examples of combinations of conditions that may merit use or development of targeted interventions as suggested by this report are:

- There is value in targeting coronary heart disease with concordant conditions, i.e. conditions whose pathophysiology and treatment overlap, such as CHD and HTN or CHF, and value in identifying which elements of care are most important. In this example, blood pressure control is likely one of the most important clinical targets in people with CHD. While this is not unexpected, these results also suggest that the ability to tailor such interventions for populations with specific types of psychiatric diseases (i.e., schizophrenia and depression/affective disorders) represents an opportunity to improve care and efficiency. As one example, a program where mental health care was integrated with cardiovascular (and risk factor care) may be very high yield in terms of improving care and costs. This holds true to varying degrees across eligibility categories. In this report we found that psychiatric conditions were the highest-priority comorbid condition among people with CHD, using percent of total annual costs as the benchmark, across all eligibility pathways.
- The results suggest that psychiatric conditions (anxiety or benzodiazepine use, depressive disorders, antipsychotic or mood stabilizer medication use, or personality disorders) disproportionately drive costs and hospitalizations. While these conditions are not usually associated with older age, we found that this pattern was true even among aged duals, for whom Medicaid claims under-represent expenditures. As one example, psychiatric conditions were the highest priority comorbid condition among aged duals with CHF, using percent of total annual costs as the benchmark. Few programs are available that are adapted to the mental health needs of older beneficiaries.

The ultimate goal of this work is to place the findings from pattern analyses within a clinical context that can help Medicaid plans and purchasers improve the quality and cost-effectiveness of care delivered to Medicaid beneficiaries. To this end, we undertook a literature search for clinical opportunities that target these combinations. This is an area that is ripe for evaluations of new innovations.

Key Findings from Literature Search for Clinical Opportunities

Review of the clinical opportunities tables and the inventory of evidence-based models for the care of multimorbid patients not specific to a multimorbidity pattern or index condition point to several key findings that will be useful to Medicaid plans and purchasers, as they develop approaches to caring for multimorbid beneficiaries.

In general, there were a relatively high number of clinical pearls and clinical care delivery models (some specific for multimorbidity patterns, others focused on general multimorbidity). A number of clinical practice guidelines acknowledge the existence of comorbidity. That said, there was a dearth of findings of clinical opportunities for multimorbidity for the index conditions developmental disabilities and chronic pain. Conversely, there were robust findings for those with dual diagnoses, i.e. substance abuse and psychiatric comorbidity. In addition, there were many examples of clinical interventions for drug

and alcohol disorders whose scope could be expanded to include co-occurring medical morbidities. More information was found for concordant comorbid conditions, as opposed to discordant clinical conditions. The relative wealth of information in this area should point Medicaid towards these models as starting points which could be built upon in making progress in the care of multimorbid beneficiaries.

In looking across the clinical opportunities tables, i.e. across index conditions, several observations merit reporting. First, within each index condition one will find both positive and negative studies, often for interventions that are relatively similar. One example may be found in the table for CHF. Many CHF disease management programs have been developed and studied, some with strong positive results in terms of preventing readmission to hospital and other outcomes, others with negative results. We believe this underscores several key lessons concerning complex care delivery models, including the importance of targeting the appropriate clinical intervention to the appropriate sub-population to achieve an intended clinical outcome and the importance of local environmental factors in a program's success. The inventory of evidence-based models for the care of multimorbid patients not specific to a multimorbidity pattern or index condition should be particularly useful for Medicaid to consider as there are several components in those models that are useful themes in managing multimorbid patients. These theme components include risk assessment, multidimensional assessment, use of nurses for care delivery, use of enabling technology such telemedicine, targeting several key clinical outcomes that transcend one particular disease, and, use of transitional care components. These components can and should be considered in the development of any clinical model targeted at a specific multimorbidity pattern

Examination of the clinical opportunities looking down the various columns is also instructive. Some pearls are supported by an extensive evidence base (e.g. the importance of blood pressure control in the setting of diabetes care), while others are supported by a less robust evidence base. The reshaping of single-disease-focused, evidence-based clinical care delivery model to the care of multimorbid patients entries ought to be viewed as “incubator” models. That is, they represent well-tested models that could be adapted to serve patients with multimorbidity with either a specific pattern sense or a more general sense. We found a number of evidence-based clinical practice guidelines or systematic reviews that may be useful. It is important to recognize that entries in this column universally represented clinical practice guidelines or reviews that focused on an index condition and referred to a comorbid condition in passing. We were unable to find any clinical practice guideline that was specifically developed to advise on the management of an index condition *and* a comorbid condition. We are aware that several such clinical practice guidelines are in development. Finally, we did find more specific evidence-based models for specific multimorbidity patterns than expected. These models also represent excellent sources for Medicaid to look towards as it develops approaches to the care of the multimorbid.

Important Methodological Considerations Affecting Examination of Multimorbidity

We have also identified several key methodological lessons from our work.

As noted above, in order for pattern analyses to be meaningful, only a relatively small number of conditions should be examined in any single analysis; otherwise an impossibly large number of morbidity patterns will emerge and render the analysis difficult to interpret meaningfully. Thus, these pattern analyses were developed by employing a select list of conditions, chosen on the basis of cost and prevalence. A corollary of this is our use, where appropriate, of non-ICD based conditions (e.g. using pharmacy or DME claims to identify conditions).

Our method focuses on clinically relevant co-occurring conditions that can be linked to clinical opportunities. In order to examine construct validity, we examined the association of these conditions with being a high-cost beneficiary. However, in contrast to many previously-developed grouping

strategies, we did not develop these groupings by maximizing the ability to predict future utilization^{13,14}. Unlike the approach here, predictive approaches have found it useful to examine non-modifiable variables such as age, gender and previous health care utilization. The methodology presented here may be used alongside an approach that intends to predict high cost utilization. For example, both approaches could be applied to the same population in order to identify the subgroup of beneficiaries who are both expected to have the highest future utilization and have clinical patterns of multimorbidity which can be linked to specific clinical opportunities. We are unaware of previous studies that have examined the relevance in terms of clinical decision-making of predictive approaches, or have linked the groups created by other approaches to specific clinical opportunities. Additional studies would be needed to formally examine the correlation between our approach and other grouping approaches.

An important issue that has emerged from our work is that long-term care patients' claims are largely fixed monthly charges with static diagnostic condition coding. In fact, long term care claims commonly lack any diagnostic codes, obviously limiting our ability to identify multimorbidity. This suggests that the opportunity to improve cost and quality outcomes in this high cost group may lie in understanding trajectories into long term care, as well as understanding diagnostic information collected across other types of services, and / or payors (e.g. Medicare for duals) or from other sources, such as the Minimum Data Set (MDS) which contains better data on diagnoses.

A critically important issue is the validity of diagnostic claims for dually eligible beneficiaries (both aged duals and duals with disabilities). As described in *Faces of Medicaid II*, there are a substantial proportion of beneficiaries without a chronic condition claim. Ascertainment of diagnostic information was enhanced by the use of pharmacy data. However, given that the greatest contributor to diagnostic information is from a hospital claim (nine diagnoses possible), the absence of diagnostic data from hospitalizations for aged duals and duals with disabilities remains an important issue. This issue points to the imperative for obtaining linked Medicaid and Medicare files.

Key Lessons

- A major advance in this work is the fact that the pattern analysis focuses on clinical conditions that can be clinically managed homogeneously and targeted by clinical management (e.g. depression), rather than as broad disease categories (e.g. mental illness).
- Novel methods were developed to examine multimorbidity patterns for specific index clinical conditions.
- Approximately two-thirds of Medicaid beneficiaries, regardless of eligibility pathway, had at least one of 13 index clinical conditions.
- A number of specific multimorbidity patterns were consistently associated with high per capita spending across eligibility pathways and across some types of expenditures
- Caution is warranted when interpreting multimorbidity and total annual costs due to paradoxical reporting of ICD diagnoses in long-term care and other claim types.
- For any given chronic condition, the top 16 patterns of comorbid clinical conditions ranked by prevalence account for a significant percentage of the population and a significant percentage of costs, although this varies by eligibility pathway and index clinical condition.
- Psychiatric comorbidity is highly prevalent across all 3 eligibility pathways and 13 index clinical conditions. While psychiatric comorbidity has been previously recognized as an important issue

¹⁴ R. Winkelman and S. Mehmud. *A Comparative Analysis of Claims-Based Tools for Health Risk Assessment*. 2007. Society of Actuaries. Schaumburg, Illinois. <http://www.soa.org/files/pdf/risk-assessmentc.pdf>.

in the Medicaid population, this research highlights and quantifies the pervasive nature in which psychiatric comorbidity influences patients with a broad array of index conditions, many of which are themselves, not psychiatric in nature. This finding held true across all Medicaid pathways, including Medicaid beneficiaries ages 65 and older.

- There are a number of eligibility pathway-specific examples of high-priority multimorbidity patterns based on high per capita annual expenditures, such as dementia among aged duals with congestive heart failure or chronic pain among duals with disabilities with congestive heart failure.
- A literature search collected examples of clinical pearls, opportunities to reshape single disease clinical delivery models, clinical guidelines and systematic reviews, interventions targeting a specific combination of conditions, and interventions targeting multimorbidity more broadly.
- The number of opportunities in the literature addressing co-management of clinical conditions varies across multimorbidity patterns, as does the quality of the evidence.

Appendix I: Detailed Description of Data Validation and Definition Setting

Overview of Data Validation

Extensive analyses were conducted to validate our understanding of the 2001 and 2002 Medicaid Analytic eXtract (MAX) files. This process included a data exploration for all states, all files, and all years to determine:

- Raw data counts of people and claims before and after exclusions;
- Age/sex and race distributions;
- People and total paid by eligibility code;
- Eligibility pathway by 12-month enrollment and age group;
- Eligibility pathway by plan type;
- Major expenditure buckets by eligibility pathway;
- Capitation by eligibility pathway; and
- Local and/or unknown procedure codes accounting for a significant portion of total paid amounts.

This process identified that there were some missing and incomplete files from some states. Subsequently, we pursued an exhaustive data exploration on a small number of states (4). This process included examination of:

- Age/sex distributions;
- Medicare eligibility;
- Number of months enrolled;
- Characteristics of attaining and losing enrollment and gaps in enrollment;
- CDPS stage 1 label assignment and distribution;
- Duplication of claims across years;
- Select field frequency distributions;
- Characteristics of capitation claims;
- Characteristics of people and claims enrolled in comprehensive prepaid health plans;
- Characteristics of DME claims in other services file versus pharmacy file;
- Yearly and monthly paid expenditures;
- Medicaid expenditures by service type;
- People with utilization but no enrollment in the month of service;
- Local procedure coding;
- Procedures listed as “other services”;
- Match of National Drug Codes to Cerner Multum Lexicon; and
- Intersection of enrolled people from both years (i.e., how many people are enrolled in one or the other or both years and for how many months?).

The final inclusion and exclusion eligibility criteria for our analyses were based upon the protocols outlined by R. Kronick, T. Gilmer, and the Center for Health Care Strategies^o in conjunction with our own examination and descriptive analyses of MAX files for 45 states.

^oR.G. Kronick, M. Bella and T.P. Gilmer. *The Faces of Medicaid III: Refining the Portrait of People with Multiple Chronic Conditions*. Center for Health Care Strategies, Inc., October 2009.

Additional Specification of Approach to Expenditures

Total annual Medicaid expenditures were initially examined using the summary variables provided by the MAX data. To more succinctly and meaningfully describe Medicaid expenditures, MAX file expenditure categories were synthesized into expenditure buckets that were indicative of clinically homogenous types of services, as summarized in the Appendix Table, below. Summary expenditure buckets were created for pharmacy, long-term care, hospital / emergency room, non-hospital physician services and coordination, and “other.”

Appendix Table: Approach to Summarizing Expenditures from MAX Files			
Detailed Cost Category	MAX Type of Service Code	Summary Cost Category	Detailed Cost Categories
1. Pharmacy	16	1. Pharmacy	1
2. Long-Term Care-Institutional	2,4,5,7	2. Long Term Care	2,3
3. Long-Term Care-Community	13,26,30,35,38,52,54		
4. Hospital Facility	1	4. Hospital/ER	4,5,10,11
5. Hospital Physician	8*		
6. Hospital Outpatient	11		
7. Non-Hospital Physician E&M	8**, 12**, 37**	7. Non-Hospital Physician and Coordination	7, 13
8. Diagnostic Imaging, Laboratory	15		
9. Durable Medical Equipment	51		
10. ER->admission			
11. ER w/o admission			
12. Other Non-Hospital, Non-E&M Services	8***, 9,10,12,33,34,36, 37,53		
13. Case Management	22,31		
14. Capitated Payment	20,21		
15. Local Codes/unknown	19		
16. Other	24,25,39,99	16. Other	6,8,9,12,14,15,16

* From MAX inpatient file; or, from Other Services file and MAX Place of Service = 21, 51 or 61. This includes E&M and non-E&M physician billings.

**From MAX Other Services file if MAX Place of Service is anything except 21, 51 or 61 and an E&M code. This could include long term care services (that are not in long term care file). See separate table for E&M billing codes.

***From MAX Other Services file if MAX Place of Service is anything except 21, 51 or 61 and not an E&M code. This could include long term care services (that are not in long term care file) that are not E&M as well as other services.

Expenditures were analyzed as aggregate annual Medicaid expenditures and as Medicaid expenditures per capita among enrolled beneficiaries within each eligibility pathway, regardless of service use. As detailed in Table 2, spending per capita varied across types of services. Overall annual expenditures for the 5,184,176 continuously enrolled Medicaid beneficiaries of interest were \$15,620 per capita in 2002, with institutional long-term care comprising the highest cost service type, at \$5,805 per capita, followed by pharmacy \$2,391 local codes \$1,962, community long term care \$1,493 and inpatient hospital \$1,262.

Appendix II: Pattern Analyses: Development Issues

Clinical Conditions Used to Examine Multimorbidity

The focus of our work was to identify high-priority multimorbidity patterns that represent opportunities for targeting by Medicaid purchasers and plans. The process of choosing conditions included in the pattern analyses considered tradeoffs between the cost of managing a condition, the prevalence of the condition, and how modifiable the clinical management of those conditions were thought to be vis-à-vis improving quality and maximizing cost efficiencies. Administrative claims for laboratory testing and diagnostic imaging were not used to ascertain conditions as we were concerned that reliance on such claims might lead to false positives associated with rule-out diagnoses.

For the purposes of our analyses, a condition was defined as a clinical entity that can be managed in a relatively homogenous manner. A condition may encompass more than an International Classification of Disease (ICD) diagnosis code for a disease. For example, potential targets for clinical coordination and care management could include taking a specific drug such as warfarin (Coumadin), or a marker of health status, such as receipt of a hospital bed or durable medical equipment. This approach is complementary to the approach taken in the previous *Faces II* analysis, in which Medicaid beneficiaries were found to experience a high degree of multimorbidity across physiologic systems (i.e., cardiovascular or infectious or psychiatric). In contrast, our goal was to examine a smaller scope of multimorbidity at a finer level of detail sufficient to advance the ability of Medicaid plans and purchasers in the clinical management of patients. Clinical and health system management opportunities are not at the physiologic system level (i.e., cardiovascular), but are targeted toward specific conditions.

Selecting Conditions for Pattern Analyses

A multi-step process was used to inform the development and choice of building block conditions for the pattern analysis. In conjunction with literature review, project team members, building on their extensive clinical experience in internal medicine, geriatric medicine, and health services delivery, generated a long list of potential conditions for consideration and then rated each condition based on its prevalence, cost, and the opportunity for clinical management it presented. We focused on conditions that had potential in each of these three dimensions. Conditions that were prevalent and costly, but presented little opportunity for clinical management to improve costs or quality outcomes were dropped from consideration.

We then identified “missing conditions” that clinical experience and/or the literature indicate are prevalent, costly, and represent opportunities for management, but might be underrepresented in administrative claims when standard approaches are employed. In this realm, we focused on a number of conditions, but especially mental health and substance abuse-related conditions, understanding their special relevance to Medicaid programs. We discussed this general approach with potential end users at a CHCS-sponsored conference in Washington, DC, in March 2008.

We reviewed our draft list of conditions using a modified Delphi approach with a group of geriatric physicians and health services researchers at Johns Hopkins and asked participants to rate each item on our draft list of candidate conditions according to cost, prevalence, and opportunity. This input informed the development of a near final list of conditions for pattern analysis.

After the above process we were able to delineate four axes to facilitate our analyses:

Axis 1 – Disease groups:

- 1) **Major Chronic Diseases:** diabetes, chronic obstructive pulmonary disease, asthma, coronary heart disease, chronic heart failure, cerebrovascular disease, hyperlipidemia, and hypertension.
- 2) **Disabled Adult Children:** developmental delays / mental retardation, amyotrophic lateral sclerosis, blindness, -plegias and -palsies.
- 3) **Psychiatric and Substance Use:** street drugs, alcohol disorders, schizophrenia, bipolar affective disorder, major depressive disorder, anxiety disorder, and personality disorder.
- 4) **Chronic Infections:** HIV/AIDS and hepatitis/chronic liver disease.
- 5) **Dementias.**

Axis 2 – Secondary conditions that affect people’s experience of disease outcomes and utilization:

- Chronic pain;
- Insomnia;
- Back pain;
- Obesity;
- Dizziness;
- Urinary incontinence; and
- Hospital bed use.

Axis 3 – Nonspecific clinical factors that affect outcomes and utilization:

- Anticoagulation use;
- Prednisone use;
- Home oxygen;
- Continuous positive airway pressure machine;
- Anemia;
- Chronic renal failure/end stage renal disease; and
- Electrolyte imbalances.

Axis 4 – Psychoactive drugs:

- Antiepileptics;
- Mood stabilizers;
- Anti-psychotics; and
- Benzodiazepine use.

To create definitions of specific conditions that were not dependent on ICD codes, we reviewed the Multum¹¹ February 2005 list of NDC codes to select specific drugs that may represent opportunities for better medication management (i.e., benzodiazepines, warfarin (anticoagulation therapy)). Prescription drug claims for these specific medications were then flagged as a “condition” like those based on ICD codes for diagnostic data.

An interim report included detailed multimorbidity pattern figures that incorporated both graphic representations of the proportion of high-cost beneficiaries within each multimorbidity pattern in the upper panel, along with estimates of population prevalence in the lower panel. Specific pattern keys of interest were identified using a multi-staged approach across the specified “axes” of interest (five subgroups of major chronic diseases, secondary conditions, nonspecific clinical factors, and psychoactive

drugs). The overall study sample prevalence was determined within each of the specified axes of interest, with population prevalence being recalculated as additional conditions of interest were added for consideration. The specific patterns that were displayed were those that were most prevalent within each of the three eligibility pathways of interest (and therefore differed across the figures).

While the figures provided substantive information regarding the combination of prevalent multimorbidity patterns and costs, the complexity of the data limited the utility for decision-making. Using axes to identify patterns appeared to impede the interpretation with regard to generalizations across patterns and eligibility pathways. Therefore, in this report we identify high prevalence, high-cost multimorbidity patterns in a streamlined manner using index conditions to facilitate the identification of the most promising targets for action among states.

A total of 13 index conditions were identified in conjunction with CHCS experts. These conditions included asthma and COPD, chronic pain, chronic renal disease, congestive heart failure, coronary heart disease, developmental disorders, depression, dementia, diabetes, drug and alcohol abuse, hypertension, schizophrenia, and stroke. Recognizing that psychiatric comorbidity is both frequent and variable, categorization of psychiatric comorbidity was customized by index condition based on potential to intervene. More specifically, index conditions that might be considered “medical” in nature with (relatively) less psychiatric comorbidity (asthma and/or chronic obstructive pulmonary disease, cerebrovascular accident (stroke), congestive heart failure, coronary heart disease, diabetes, hypertension, chronic renal failure or end stage renal disease) employed a broad grouping of psychiatric comorbidity. Index conditions observed as most commonly co-occurring with mental health conditions (chronic pain, dementia, depressive disorders, developmental disorders, drug and alcohol disorders, and schizophrenia) incorporated more refined psychiatric comorbidity categorization, with an emphasis on identification of relevant interventions.

Figure 1: Categorization of Psychiatric Conditions for Pattern Analyses

First-Tier Flags	Second Tier*	Third Tier†
Depression (dx)	Depression	Psychiatric condition
Depression medications (rx)		Psychiatric condition
Antipsychotics (rx)	Antipsych/mood stabilizers	Psychiatric condition
Mood stabilizers (rx)		Psychiatric condition
Anxiety (dx)	Anxiety/benzo use	Psychiatric condition
Benzodiazepam (rx)		Psychiatric condition
Personality disorders (dx)	Personality disorders	Psychiatric condition
Schizophrenia (dx)	Schizophrenia	Schizophrenia
Dementia (dx)	Dementia	Dementia
Dementia (rx)		
	Chronic Pain	Chronic Pain
	Drugs and Alcohol	Drugs and Alcohol
	Developmental Disorders	Developmental Disorders

KEY

- The condition was as an index condition and as a hopper candidate when developmental disorders, chronic pain / opioid use, drugs / alcohol, schizophrenia, depression/dep meds, dementia are the index condition being analyzed.
- Will be used as a hopper candidate (in addition to yellow highlighted conditions) when developmental disorders, chronic pain / opioid use, drugs / alcohol, schizo, depression/dep meds, dementia are the index condition being analyzed.
- Will be used as a combined "psychiatric condition" category when analyzing index conditions 1-7 (lines 5-11)

* Combining First Tier.

† As comorbid condition for index conditions other than schizo, depress/dep meds, dementia, chronic pain/opiod, drugs and alcohol, developmental.

dx = condition flagged from medical claim diagnoses; rx=condition flagged from prescription drug claims.

In the first stage of the index condition approach, index conditions were identified, and pattern analyses generated for the most costly multimorbidity patterns. For the first phase, we chose which conditions would be examined as comorbid i.e. conditions that might coexist with each of the 13 index conditions. To do this we examined the simple prevalence of comorbid conditions as well as the per-capita costs for people with the comorbid conditions, both among people with the index condition. Based on rank, the 15 most common comorbid conditions according to prevalence were included in the pattern analyses. Among the next five ranked by prevalence we also included comorbid conditions that were among the top five ranked by cost. Finally, we continued identifying comorbid conditions up until there were 20 by choosing identifying conditions that were thought to modify the index condition most, where modifiability meant that they put the person at high risk of adverse outcomes (hospitalization, death) or that there were known interventions that can address the secondary condition. This was done among the top 10 comorbid conditions ranked by cost to identify the remaining potential comorbid conditions. In other words, conditions that were neither among the top 15 most prevalent nor among the top 20 most costly were not included in pattern analyses.

The second phase involved selection of the most costly patterns from each index condition, and compiling these patterns into a summary table for each eligibility pathway. This was done by generating pattern analyses for the 21 conditions (index condition plus 20 comorbid conditions), sorting those conditions according to total annual costs, exclusive of long-term care costs, and identifying the comorbid conditions that only showed up in patterns making up 50 percent of the population (ranked according to the pattern's total annual costs, exclusive of long-term care costs). The pattern analyses were re-run with those comorbid conditions. In other words, rare and non-costly patterns were not included in the analysis. Thus, while for each index conditions there were 20 potential comorbid conditions, in the final pattern analyses the number of comorbid conditions in the analysis varied.

Recognizing that many patterns are rare, summary tables include both patterns represented excluding all other hopper conditions, as well as patterns regardless of other conditions (rolling up the tail).

The next step was to select a “grouping” software program that would appropriately match our clinically derived list of conditions to administrative claims. We reviewed several groupers in depth, including: 1) HCC / DxGs;¹³ 2) CCS;¹⁴ 3) ACGs;¹⁵ and 4) CDPS.¹⁶ To be as efficient as possible, and because of its proven record as a useful classification and its public availability, we generated clinically-meaningful categories of common chronic conditions using the CDPS stage I single-level labels whenever possible. The CDPS stage I single-level labels are the building blocks of the CDPS system and match ICD codes to reasonably specific clinical conditions. To avoid possible confusion, we would like to clarify that these are not the CDPS categorizations reported in *Faces II*. We then matched the items from our list of conditions to CDPS Stage I single-level labels. A number of conditions of interest to us were not represented in CDPS single-level labels. For these conditions, we developed coding logic to identify them from administrative claims using a combination of durable medical equipment codes, ICD codes, revenue codes, and drug (NDC) codes.

Application of Condition Criteria to MAX Claims

Diagnostic claims from calendar year 2002 inpatient, long-term care, pharmacy, and other services MAX files were used to generate condition flags of interest for study participants. For those individuals who were enrolled in the Medicaid program in both calendar years 2001 and 2002, diagnostic information from calendar year 2001 was used to augment diagnostic classifications. To be classified as having a condition for those conditions for which classification is entirely based on ICD codes, Medicaid beneficiaries must have incurred at least one of any of the following: inpatient, skilled nursing facility, or

home health care, home, nursing facility, custodial care facility, hospice, ESRD treatment facility; or at least one outpatient hospital or Part B medical claim with one or more ICD diagnosis codes for that condition. All codes, not just primary diagnostic codes, were reviewed.

To exclude claims for rule-out procedures, we excluded “rule-out” codes as follows:

First, we excluded diagnoses from select ICD *procedure codes*:

- Intravascular imaging (002-0029);
- Diagnostic radiology (87-8799);
- Other diagnostic radiology (88-8898);
- Microscopic examination (90-919);
- General eye exam (501-9503);
- Nonoperative hearing procedure (9541-9543); and
- Hearing exam (9547).

Second, we excluded diagnoses with specific MAX *place of service codes* including:

- Air or water ambulance (41, 42);
- Independent lab (81); or
- Other/unknown (99).

We excluded diagnoses associated with specific CPT *codes* for:

- Venupuncture (36415);
- Capillary blood specimen (36416);
- Biopsy (70000);
- Ultrasound procedure (76999);
- Diagnostic nuclear medicine (78000);
- Unlisted microbiology procedure (87999);
- Cytopathology (88104); cytogenetics (88291);
- Surgical pathology (88302, 88309);
- Western blot (88371);
- Screening audiometry (92551);
- Electrocardiogram (93000);
- Echocardiogram (93350); and
- Specimen handling (99000, 99001).

Table 1: Study Participants and Medicaid Expenditures by State; 2002 MAX Files

State	Before Exclusions		Final Sample	
	People	Payments	People	Payments
AK	125,662	\$750,736,654	11,238	\$228,980,533
AL	867,197	\$2,835,792,196	139,161	\$1,502,311,998
AR	648,072	\$2,104,274,622	84,276	\$1,002,224,279
CA	10,082,104	\$23,570,887,315	958,567	\$10,359,903,729
CO	453,722	\$2,087,165,823	43,813	\$874,513,234
CT	497,180	\$3,288,171,220	20,564	\$435,319,946
DC	154,771	\$966,013,915	20,539	\$442,823,869
FL	2,799,154	\$9,461,704,091	82,717	\$1,150,522,518
GA	1,812,987	\$4,953,533,289	73,471	\$755,107,369
IA	363,677	\$1,856,260,396	60,614	\$1,059,603,490
ID	199,892	\$820,297,586	22,063	\$422,475,694
IL	2,132,554	\$8,084,044,317	211,195	\$3,868,412,056
IN	931,109	\$3,786,039,894	114,229	\$2,020,203,565
KS	314,827	\$1,582,433,147	36,799	\$683,112,308
KY	806,549	\$3,517,329,088	142,104	\$1,659,452,461
LA	1,065,810	\$3,394,468,556	154,258	\$1,791,619,950
MA	1,228,684	\$6,363,088,608	169,584	\$2,514,238,682
ME	366,299	\$1,813,527,691	120,200	\$800,222,169
MI	1,671,047	\$4,744,857,672	0	\$0
MN	725,283	\$4,589,286,964	68,132	\$1,740,317,600
MO	1,130,756	\$4,150,071,479	159,268	\$2,152,468,156
MS	723,179	\$2,458,243,514	113,712	\$1,148,820,208
MT	120,433	\$510,030,519	15,260	\$232,084,992
NC	1,505,412	\$6,228,128,920	172,135	\$2,054,195,255
ND	78,454	\$432,606,870	2,545	\$48,486,440
NE	268,953	\$1,208,655,163	20,889	\$499,740,905
NH	126,754	\$761,553,814	3,971	\$85,788,170
NJ	1,153,998	\$5,755,286,951	118,908	\$2,787,011,379
NM	471,366	\$1,727,474,675	25,261	\$445,530,156
NV	233,404	\$772,305,190	21,075	\$308,754,811
NY	4,546,162	\$31,591,342,690	710,459	\$18,681,712,492
OH	1,839,178	\$9,532,279,601	244,513	\$5,414,067,008
OK	740,089	\$2,112,915,323	60,327	\$977,711,540
PA	1,738,198	\$8,722,641,931	0	\$0
RI	211,750	\$1,246,000,586	33,846	\$709,002,340
SC	933,817	\$2,763,352,570	100,136	\$1,127,698,733
SD	118,781	\$503,899,315	4,291	\$62,611,140
TX	3,376,384	\$12,009,686,512	397,850	\$5,207,388,825
UT	300,166	\$924,070,040	6,738	\$184,702,545
VA	799,254	\$3,065,932,512	89,311	\$1,409,074,270
VT	163,438	\$615,868,420	27,443	\$282,605,582
WA	1,232,363	\$2,865,844,793	127,100	\$1,063,188,218
WI	817,420	\$3,977,439,569	115,622	\$1,946,474,261
WV	381,079	\$1,569,801,527	73,127	\$852,293,761
WY	70,686	\$293,493,569	6,865	\$150,804,444
Total	50,328,054	\$196,368,839,097	5,184,176	\$81,143,581,081

Table 2: Calendar Year 2002 Medicaid Expenditures by Cost Bucket Categories

Detailed Cost Bucket	Expenditures	Beneficiaries	Expenditures Per Beneficiary
Capitated	\$551,441,468	1,428,087	\$106
Case Management	\$778,603,834	893,840	\$150
DME	\$2,624,132,028	3,623,975	\$506
ER - Admission	\$34,797,777	348,176	\$7
ER - Nonadmission	\$321,522,547	1,263,117	\$62
Hospital Inpatient	\$6,542,720,987	1,009,470	\$1,262
Hospital Outpatient	\$2,348,750,581	2,597,627	\$453
Hospital Physician	\$528,295,417	909,223	\$102
Lab/Imaging	\$543,853,122	2,341,008	\$105
Local/Unknown	\$10,169,362,897	2,059,831	\$1,962
Community Long-Term Care	\$7,742,292,610	1,635,565	\$1,493
Institutional Long-Term Care	\$30,096,346,890	774,953	\$5,805
No Services	\$0	206,652	\$0
Non-Hospital Physician	\$584,713,479	2,410,737	\$113
Other	\$219,359,297	327,583	\$42
Other Ambulatory	\$5,494,256,852	4,029,447	\$1,060
Pharmacy	\$12,395,739,253	4,557,266	\$2,391
Total	\$80,976,189,039	5,184,176	\$15,620
Summary Cost Buckets	Expenditures	Beneficiaries	Expenditures Per Beneficiary
Pharmacy	\$12,395,739,253	4,557,266	\$2,391
Long-Term Care	\$37,838,639,500	2,050,880	\$7,299
Physician Coordination	\$1,363,317,313	2,732,339	\$263
Other	\$21,951,156,245	4,838,717	\$4,234
Inpatient Hospital	\$7,427,336,728	1,935,177	\$1,433
Total	\$80,976,189,039	5,184,176	\$15,620

Table 2: Calendar Year 2002 Medicaid Expenditures by Cost Bucket Categories and Eligibility Pathway (continued)

Detailed Cost Bucket	Disabled Adults			Aged Duals			Disabled Duals		
	Expenditures	Beneficiaries	Per Beneficiary	Expenditures	Beneficiaries	Per Beneficiary	Expenditures	Beneficiaries	Per Beneficiary
Capitated	\$306,573,891	555,567	\$163	\$86,003,601	456,902	\$48	\$158,863,976	415,618	\$106
Case Management	\$343,010,842	568,830	\$183	\$59,180,032	75,343	\$33	\$376,412,960	249,667	\$251
DME	\$1,026,537,466	1,271,822	\$546	\$690,061,930	1,282,147	\$382	\$907,532,632	1,070,006	\$606
ER - Admission	\$28,176,382	179,658	\$15	\$3,153,066	96,809	\$2	\$3,468,329	71,709	\$2
ER - Nonadmission	\$204,514,108	708,111	\$109	\$57,777,145	258,652	\$32	\$59,231,294	296,354	\$40
Hospital Inpatient	\$4,879,597,048	356,920	\$2,597	\$858,077,518	356,462	\$475	\$805,046,421	296,088	\$537
Hospital Outpatient	\$1,499,797,574	1,173,032	\$798	\$281,875,162	632,728	\$156	\$567,077,845	791,867	\$379
Hospital Physician	\$358,421,225	384,049	\$191	\$79,301,604	284,564	\$44	\$90,572,588	240,610	\$60
Lab/Imaging	\$427,251,134	1,202,019	\$227	\$47,527,147	596,827	\$26	\$69,074,841	542,162	\$46
Local/Unknown	\$3,302,985,981	615,644	\$1,758	\$1,941,345,664	763,102	\$1,074	\$4,925,031,252	681,085	\$3,288
Community Long-Term Care	\$1,925,966,265	515,624	\$1,025	\$3,215,291,943	621,695	\$1,779	\$2,601,034,402	498,246	\$1,736
Institutional Long-Term Care	\$5,327,658,359	99,921	\$2,835	\$16,969,318,971	521,295	\$9,391	\$7,799,369,560	153,737	\$5,206
No Services	\$0	92,940	\$0	\$0	70,075	\$0	\$0	43,637	\$0
Non-Hospital Physician	\$408,970,411	1,304,201	\$218	\$82,928,496	587,825	\$46	\$92,814,572	518,711	\$62
Other	\$103,955,071	110,014	\$55	\$56,929,963	114,729	\$32	\$58,474,263	102,840	\$39
Other Ambulatory	\$2,573,286,629	1,424,810	\$1,369	\$664,371,394	1,369,424	\$368	\$2,256,598,829	1,235,213	\$1,506
Pharmacy	\$4,441,298,325	1,621,799	\$2,363	\$3,697,522,859	1,591,168	\$2,046	\$4,256,918,069	1,344,299	\$2,842
Total	\$27,158,000,711	1,879,172	\$14,452	\$28,790,666,495	1,806,908	\$15,934	\$25,027,521,833	1,498,096	\$16,706
Summary Cost Buckets	Expenditures	Beneficiaries	Per Beneficiary	Expenditures	Beneficiaries	Per Beneficiary	Expenditures	Beneficiaries	Per Beneficiary
Pharmacy	\$4,441,298,325	1,621,799	\$2,363	\$3,697,522,859	1,591,168	\$2,046	\$4,256,918,069	2,842	\$2,265
Long-Term Care	\$7,253,624,624	2,050,880	\$3,860	\$20,184,610,914	910,762	\$11,171	\$10,400,403,962	6,942	\$5,535
Physician Coordination	\$751,981,253	2,732,339	\$400	\$142,108,528	638,048	\$79	\$469,227,532	313	\$250
Other	\$9,240,387,746	4,838,717	\$4,917	\$3,768,114,861	1,681,528	\$2,085	\$8,942,653,638	5,969	\$4,759
Inpatient Hospital	\$5,470,708,763	1,935,177	\$2,911	\$998,309,333	551,232	\$552	\$958,318,632	640	\$510
Total	\$27,158,000,711	1,879,172	\$14,452	\$28,790,666,495	1,806,908	\$15,934	\$25,027,521,833	1,498,096	\$16,706

Online Resources

Clarifying Multimorbidity Patterns to Improve Targeting and Delivery of Clinical Services for Medicaid Populations is one of a number of tools being produced by the Center for Health Care Strategies (CHCS) through the *Rethinking Care Program*. This national initiative, made possible by Kaiser Permanente, was developed by CHCS to design and test better approaches to care for Medicaid's highest-need, highest-cost beneficiaries. The initiative is linking state pilot demonstrations — currently underway in Colorado, Pennsylvania, New York, and Washington — with a national learning network committed to advancing Medicaid's capacity to serve these “high-opportunity” beneficiaries.

For more information about the *Rethinking Care Program*, as well as tools for improving care management for Medicaid beneficiaries with complex needs, visit www.chcs.org.

The Johns Hopkins Center on Aging and Health Program in Geriatrics Health Services Research is dedicated to patient-oriented and health services research that will further define and improve the health and well-being of older adults and the development of the next generation of systems of health care delivery. It seeks to foster interdisciplinary research essential for an aging population, to train research and policy leaders, and to translate this work into practice to improve the health of older adults and the health care delivery system in which they receive care.

The Center for Health Care Strategies (CHCS) is a nonprofit health policy resource center dedicated to improving health care quality for low-income children and adults, people with chronic illnesses and disabilities, frail elders, and racially and ethnically diverse populations experiencing disparities in care. CHCS works with state and federal agencies, health plans, providers and consumer groups to develop innovative programs that better serve Medicaid beneficiaries with complex and high-cost health care needs. Its program priorities are: enhancing access to coverage and services; improving quality and reducing racial and ethnic disparities; integrating care for people with complex and special needs; and building Medicaid leadership and capacity.