CHCS

Center for
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Multimorbidity Pattern Analyses and Clinical Opportunities: *Coronary Heart Disease*

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*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.*

Overview

This set of tables is part of the *Faces of Medicaid* analysis, *Clarifying Multimorbidity to Improve Targeting and Delivery of Clinical Services for Medicaid Populations*, undertaken by the Center for Health Care Strategies (CHCS) and The Johns Hopkins University School of Medicine and Bloomberg School of Public Health. The analysis sought to help policymakers identify intervention strategies with the potential to both improve quality and reduce costs for adult Medicaid beneficiaries with multiple chronic conditions.

The following tables summarize multimorbidity data on coronary heart disease for adult Medicaid-only beneficiaries with disabilities under the age of 65, and inventory potential clinical opportunities for addressing multimorbidity associated with coronary heart disease. For this analysis, "multimorbidity patterns" are defined as the specific and often multiple conditions that a person has (e.g., a person with depression, hypertension, chronic pain, and asthma), as opposed to a simple tally of the number of conditions that someone has (e.g., a person with five chronic conditions). The tables are intended to aid policymakers in identifying subgroups of Medicaid beneficiaries who stand to benefit from targeted care management and tailoring intervention strategies to improve health outcomes and reduce costs. Contents include:

1. *Multimorbidity Summary Table* **(Table 1)**: This table lists the five most costly patterns of multimorbidity (based on total annual costs, excluding long-term care expenditures) for coronary heart disease. These data can be used to help prioritize care management opportunities to improve outcomes and control costs. Prevalence, costs, and hospitalization rates are summarized for:

   - Beneficiaries who *only* have the specific coronary heart disease pattern, without additional comorbidities.
   - Beneficiaries who have the specific coronary heart disease pattern *plus* potentially other comorbidities. In other words, all individuals represented in this group have the conditions specified in the stated multimorbidity pattern, but any individual may have other conditions as well. This broader approach has a greater likelihood of capturing all individuals with coronary heart disease and the identified comorbidities in the population.

2. *Multimorbidity Pattern Table* **(Table 2)**: This table details the 16 most prevalent multimorbidity patterns for coronary heart disease, including prevalence, cost, and hospitalization data for each. Data include beneficiaries who *only* have the specific conditions in each multimorbidity pattern.

3. *Clinical Opportunities Table* **(Table 3)**: A series of literature searches was conducted for the multimorbidity patterns that the analysis identified as high-priority opportunities from a prevalence, clinical, and cost perspective. In addition to presenting actionable, clinical opportunities for Medicaid stakeholders responsible for care management program design, this clinical opportunities table helps identify gaps in knowledge around clinical management of these conditions. Literature is categorized as follows:

   - Clinical "pearls" that offer recommendations relevant to an aspect of care for individuals with the specified multimorbidity pattern;
   - Single disease-specific models that address processes important to caring for individuals with multimorbidity, such as care coordination and medication management;
   - Relevant clinical practice guidelines and systematic reviews; and
   - Evidence-based models for the specific multimorbidity pattern.

Table 1: Coronary Heart Disease Multimorbidity Summary

This table lists the five most costly patterns of multimorbidity -- based on total annual costs, excluding long-term care expenditures -- for coronary heart disease. These data can be used to help prioritize care management opportunities to improve outcomes and control costs.

Medicaid-Only Adult Beneficiaries with Disabilities, Under Age 65

	Multimorbidity Pattern	Prevalence among beneficiaries with coronary heart disease	Prevalence among overall population	Per capita cost	Percent of total annual costs among beneficiaries with coronary heart disease	Percent of total annual costs among overall population	Per capita hospitalizations
	Coronary Heart Disease						
1	**+** Psychiatric Disorders	3.76%	0.86%	$7,423	1.81%	0.60%	0.14
		69.06%	15.77%	$17,616	79.05%	26.23%	1.00
2	**+** Psychiatric Disorders, Hypertension	2.30%	0.53%	$7,173	1.07%	0.36%	0.22
		38.92%	8.89%	$19,553	49.45%	16.41%	1.23
3	**+** Psychiatric Disorders, Hypertension, Diabetes	1.41%	0.32%	$9,824	0.90%	0.30%	0.37
		16.66%	3.80%	$23,612	25.56%	8.48%	1.52
4	Coronary Heart Disease only (no comorbidities among conditions considered)	3.87%	0.88%	$3,441	0.87%	0.29%	0.11
		100.00%	22.83%	$15,391	100.00%	33.18%	0.87
5	**+** Psychiatric Disorders, Chronic pain, Back or Spine Disorders	1.25%	0.28%	$10,171	0.82%	0.27%	0.34
		15.54%	3.55%	$20,778	20.98%	6.96%	1.29

Co-occurring conditions that were considered include: Depressive disorders, hypertension, coronary heart disease, asthma and/or chronic obstructive pulmonary disease, back or spine disorders, antipsychotic or mood stabilizer drugs, drug and alcohol disorders, diabetes, anxiety disorder or benzodiazepam use, congestive heart failure, hepatitis or chronic liver disease, stroke, prednisone use, dizziness, gastrointestinal bleed, anticoagulation drugs (warfarin), chronic renal failure/end stage renal disease, HIV or AIDS, and personality disorders.

KEY

☐ Beneficiaries with only coronary heart disease and the specified multimorbidity pattern (no other comorbidities).
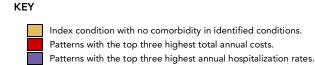
▨ Beneficiaries with coronary heart disease, the specified multimorbidity pattern, and potentially other additional comorbidities, varying by individual.

Table 2: Coronary Heart Disease Multimorbidity Patterns

This table presents the 16 most prevalent co-occurring conditions for coronary heart disease (columns in the left half), and prevalence, hospitalization, and cost data for each pattern (columns in the right half). These data reveal patterns that are prime for targeted interventions across a number of variables of interest, including: population prevalence, per capita costs, and annual hospitalization rate. For each pattern, these variables are calculated for individuals who have the specified conditions and no other comorbidities. The condition columns are ordered from most prevalent (left) to least prevalent (right) in the coronary heart disease population. A checkmark represents the presence of the specified condition. Unless noted, all cost estimates exclude long-term care costs.

Medicaid-Only Adult Beneficiaries with Disabilities, Under Age 65

Coronary Heart Disease +

#	Psychiatric disorders	Hypertension	Asthma and/or chronic obstructive pulmonary disease	Chronic pain	Diabetes	Back or spine disorders	Drug and alcohol disorders	Congestive heart failure	Stroke	Hepatitis or chronic liver disease	Dizziness	Prednisone use	Chronic renal failure/end stage renal disease	Home oxygen therapy	Schizophrenia	Non-stroke plegias and palsies	HIV or AIDS	Developmental disorders	Pattern Prevalence, %[1]	Cumulative Prevalence, %	Annual Hospitalization rate per capita	Per Capita Costs, excl. Long-term Care	% Total Annual Costs, excl. Long-term Care[2]	Cumulative % of Total Annual Costs, excl. Long-term Care	% Total Annual Long-term Care costs	Very High-Cost Prevalence, %[3]	High-Cost Prevalence, %[4]
1																			3.87%	3.87%	0.11	$3,441	0.87%	0.87%	1.23%	0.54%	3.28%
2	✓																		3.76%	7.63%	0.14	$7,423	1.81%	2.68%	2.45%	1.00%	9.58%
3	✓	✓																	2.30%	9.94%	0.22	$7,173	1.07%	3.75%	0.95%	1.24%	10.95%
4		✓																	2.23%	12.17%	0.20	$4,581	0.66%	4.42%	0.52%	0.80%	5.76%
5	✓					✓													1.76%	13.93%	0.13	$6,389	0.73%	5.15%	0.34%	0.78%	8.63%
6	✓	✓		✓															1.41%	15.34%	0.37	$9,824	0.90%	6.05%	0.84%	2.77%	21.22%
7		✓				✓													1.39%	16.73%	0.33	$7,631	0.69%	6.74%	0.44%	2.19%	12.66%
8	✓	✓				✓													1.38%	18.12%	0.19	$7,254	0.65%	7.39%	0.34%	0.84%	12.22%
9	✓			✓		✓													1.25%	19.36%	0.34	$10,171	0.82%	8.22%	0.26%	3.31%	18.98%
10						✓													1.01%	20.37%	0.10	$3,385	0.22%	8.44%	0.12%	0.37%	2.58%
11	✓	✓		✓		✓													1.00%	21.37%	0.42	$10,963	0.71%	9.15%	0.28%	4.14%	23.88%
12	✓		✓																0.92%	22.29%	0.22	$7,763	0.47%	9.61%	0.36%	1.54%	13.37%
13	✓			✓															0.83%	23.13%	0.42	$11,561	0.63%	10.24%	0.57%	4.63%	18.65%
14	✓				✓														0.77%	23.90%	0.21	$9,098	0.45%	10.69%	0.63%	1.46%	15.74%
15		✓				✓													0.71%	24.60%	0.17	$4,700	0.22%	10.91%	0.11%	0.59%	5.43%
16			✓																0.71%	25.31%	0.18	$4,450	0.20%	11.11%	0.17%	0.86%	5.11%

KEY

- Index condition with no comorbidity in identified conditions.
- Patterns with the top three highest total annual costs.
- Patterns with the top three highest annual hospitalization rates.
- Patterns with the top three high-cost prevalence rates.

[1] Prevalence of this pattern among beneficiaries with coronary heart disease.

[2] $6.6 billion, excluding long-term care costs, was spent by Medicaid on 429,083 disabled Medicaid-only beneficiaries with coronary heart disease. Results are presented for the top 16 out of 15,291 total patterns observed for people with coronary heart disease.

[3] The proportion of beneficiaries with this specific multimorbidity pattern who are represented among beneficiaries in the top 1st to 5th percentile of costs in the overall population of Medicaid-only adult beneficiaries with disabilities.

[4] The proportion of beneficiaries with this specific multimorbidity pattern who are represented among beneficiaries in the top 5.01st to 20th percentile of costs in the overall population of Medicaid-only adult beneficiaries with disabilities.

Table 3: Coronary Heart Disease Clinical Opportunities

The following table inventories evidence-based models of care for coronary heart disease and associated multimorbid patterns, including references published since 2000. This resource provides an actionable complement to the multimorbidity cost and prevalence data presented earlier. It is intended to guide Medicaid stakeholders in tailoring implementation strategies to improve care for beneficiaries with these multimorbidity patterns.

A bibliography of full citations alphabetized by author is available at **www.chcs.org**.

Clinical pearl for specific multimorbidity pattern	Single-disease focused clinical care delivery model for multimorbid patients	Clinical practice guidelines or systematic review for multimorbidity pattern	Model for specific multimorbidity pattern
Coronary Heart Disease+ Psychiatric Disorders			
Carney 2009. Treatment of patients with coronary artery disease and depression with sertraline and omega-3 fatty acids did NOT result in superior depression outcomes compared with sertraline and placebo.	Stimmel 2001. Describes strategies to maximize treatment outcomes in depression including public education initiatives and population-based interventions.	Davidson 2006. Summary of recommendations from NHLBI on assessment and treatment of depression in patients with cardiovascular disease.	Milani 2007. Cardiac rehabilitation after major cardiac event was associated with reductions in depressive symptoms and 73% reduction in mortality.
Whooley 2008. Among outpatients with coronary artery disease, association between depressive symptoms and cardiovascular events was explained mostly by physical inactivity.	Fortney 2007. Randomized trial of telemedicine-based collaborative care for depression showed improvements in mental health, health-related quality of life, and satisfaction.		Norris 2009. Pilot study of telephone follow-up in patients with coronary heart disease and depression. Demonstrated intervention was associated with improvement in depression scores.
	Fortney 2009. Describes steps for implementing collaborative care programs for depression.		
Coronary Heart Disease+ Hypertension			
Bourassa 2008. See below.	Coberley 2008. Cardiac disease case management program for patients with coronary artery disease and hyperlipidemia. Positive results. Could be adapted to include hypertension more explicitly.	Beswick 2009. Cochrane review of 39 trials of multiple risk factor intervention for reducing risk factor and mortality in primary prevention show limited effectiveness.	Sandhoff 2007. Clinical pharmacy service for managing the treatment of coronary artery disease in Kaiser system. Uses EMR to coordinate with all providers to reduce cardiac risk in CAD population. Focuses on lipids, hypertension, diabetes, and smoking cessation.
		BMC hypertension guideline 2008. Describes goals in context of coronary heart disease.	Holsclaw 2005. Patient satisfaction study of Kaiser Clinical Pharmacy Cardiac Risk Service. Satisfaction was high.
		Chobanian 2003. JNC-7 report on hypertension. Discusses hypertension in context of coronary artery disease, diabetes, and other comorbid conditions.	Smith 2008. Telemedicine intervention for improving diabetes care using chronic care model resulted in no improvements in metabolic outcomes or reduced risk of coronary artery disease. Overall, specialty telemedicine did not enhance the value of the chronic care model in primary care.

Clinical pearl for specific multimorbidity pattern	Single-disease focused clinical care delivery model for multimorbid patients	Clinical practice guidelines or systematic review for multimorbidity pattern	Model for specific multimorbidity pattern
Coronary Heart Disease+ Hypertension *(continued)*			
		Williams 2007. Guideline on core components of cardiac rehabilitation /secondary prevention programs to address risk factors such as hypertension, diabetes, etc.	Berthiaume 2007. Describes positive results of MCO multifactorial intervention program in secondary prevention of coronary artery disease focusing on lipid-lowering agents and antihypertensives.
			McConnell 2003. Clinical pharmacy cardiac risk service more than doubled the number of patients with coronary artery disease and diabetes who achieved goal dosage of ACE inhibitor.
Coronary Heart Disease+ Diabetes			
Bourassa 2008. Describes need for blood pressure and glycemic control to prevent coronary disease in diabetics.	Wanner, 2005; Fellstrom, 2009. Diabetics and non-diabetics on hemodialysis do not achieve mortality benefit from atorvastatin or rosuvastatin.	Rosenzweig 2008. Endocrine society clinical practice guideline for primary prevention of cardiovascular disease, including coronary artery disease, and type 2 diabetes.	Sandhoff 2007. See above.
Rachmani, 2002. A patient participation program was successful at improving cardiovascular outcomes in diabetics at low cost.	ACCORD Group 2008. Intensive glucose lowering increases mortality in people with cardiovascular disease or high cardiovascular risk.	Beswick 2009. See above.	Hoerger 2008. Describes effects of cardiometabolic syndrome on clinical outcomes and costs in diabetes in managed care setting. Useful economic analyses.
	West 2007. Motivational interviewing improves weight loss.	BMC hypertension guideline 2008. Describes goals in context of coronary heart disease.	Young 2009. DIAD Trial – Detection of Ischemia in Asymptomatic Diabetics. Screening for coronary disease in diabetics with myocardial perfusion imaging did not result in lower cardiac event rates.
		Chobanian 2003. See above.	McConnell 2003. See above.
		Williams 2007. See above.	
		Ryden 2007. Guidelines from the task force on diabetes and cardiovascular diseases.	
Coronary Heart Disease+ Chronic pain / Back and Spine Disorders			
Kauppila 2009. Review of 25 studies suggests that the association between atherosclerosis and low-back disorders is weak.	Dobscha 2009. Collaborative care for chronic pain in primary care. Randomized trial demonstrated improvements in variety of outcomes.		
Zhu 2007. Five-year observational study finds association between daily back pain and increased coronary heart events.			