

Clinically Appropriate and Cost-Effective Placement (CACEP):

Improving Health Care Quality and Efficiency

Final Report Appendices

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**Appendix A:
Patient Care Management Initiatives in the Affordable
Care Act**

Initiative	Description
Patient-Centered Medical Homes	
Medicaid Health Home State Plan Option	This is a state option, specific to Medicaid. Health home services include comprehensive care management, care coordination, health promotion, and patient and family support. States who agree to the terms are eligible for a 90% match for payments to health homes for eight quarters beginning January 1, 2011.
Community Health Teams to Support the Patient-Centered Medical Home	The health teams will facilitate collaboration between primary care providers and community-based health resources. Each health team must incorporate community-based prevention initiatives and patient education into the delivery of health care.
Federally Qualified Health Center (FQHC) Advanced Primary Care (APC) Practice Demonstration	This Medicare demonstration will give support to FQHCs that function as patient-centered medical homes and assess their impact on access, quality, and costs. Currently, these health centers provide primary and preventive health care to medically underserved low income groups of patients and are located in lower income rural and inner city communities.
Multi-Payer Advanced Primary Care Demonstration	This demonstration allows Medicare to join Medicaid and private insurers in state-based health reform initiatives aimed at improving the delivery of primary care.
Care Transitions	
Community-Based Care Transitions Program	This five-year, home-based chronic care management pilot funds eligible organizations that provide improved care transition services to high-risk, high-cost beneficiaries with multiple chronic conditions or other risk factors as defined by the Secretary. Hospitals and community-based entities can apply to participate.
Accountable Care Organizations	
Medicaid Global Payment System Demonstration Project	This project, to be tested in no more than five states, will adjust state payments to an eligible safety net hospital from fee-for-service payments to monthly capitated payments for years FY 2010 through FY 2012.
Medicare Shared Savings Program	The goal of the program is to promote accountability, coordinate items and services under Medicare Parts A and B, and encourage investment in infrastructure and redesigned care processes for high-quality and efficient service delivery.
Dual Eligibles	
Integrated Care for Dual Eligibles	This provision established the Federal Coordinated Health Care Office within the Centers for Medicare and Medicaid Services (CMS) to more effectively integrate benefits and improve coordination between state and federal governments for individuals eligible for both Medicare and Medicaid (“dual eligibles”).
Geriatric Care	
Geriatric assessments and care plans	This Innovation Center initiative will test the use of geriatric assessments and care plans to coordinate care to people with multiple chronic conditions and an inability to perform two or more activities of daily living (ADLs) or cognitive impairment.

Initiative	Description
Independence at Home Demonstration Program	This demonstration tests a payment incentive and service delivery model that utilizes home-based primary care teams—directed by physicians and nurse-practitioners—to reduce Medicare expenditures and improve health outcomes for chronically ill Medicare beneficiaries.
Telehealth	
Supporting care coordination of chronically-ill individuals with health information technology (HIT)	The Innovation Center is authorized to test care coordination for chronically ill individuals at high risk of hospitalization through a HIT-enabled provider network that includes care coordinators, chronic disease registry, and home telehealth technology.
Facilitate inpatient care of hospitalized individuals	The Innovation Center is also authorized to test the use of electronic monitoring by specialists based at integrated health systems to improve services to patients at local community hospitals.
Shared Decision Making	
Program to facilitate shared decision-making	A contracted entity will create standards for decision aids—educational tools to help patients, caregivers, and providers understand treatment options and make informed medical care decisions. The provision also provides grants to develop Shared Decision-Making Resource Centers. These centers will provide technical assistance to providers and develop and share best practices. It is not Medicare or Medicaid specific.
Long Term Care	
Medicaid Money Follows the Person Rebalancing Demonstration	This demonstration authorizes the Secretary to award competitive grants to states to help transition Medicaid-eligible individuals from long-term institutional care to community-based long-term care. For individuals to be eligible to participate in the demonstration, they must reside in an inpatient facility for not less than 90 consecutive days.
Community First Choice Option	This program allows states the option of offering home- and community-based attendant services and supports to disabled Medicaid beneficiaries whose incomes do not exceed 150% FPL and who would otherwise require institutional care. These services are intended to assist disabled Medicaid beneficiaries with accomplishing activities of daily living. As an incentive, the law provides for a 6% increase in the Federal Medical Assistance Percentage (FMAP).
Payment/System Reform	
Center for Medicare and Medicaid Innovation (CMMI)	The CMMI is given broad authority to test payment models, including state all-payer payment reform models and other state options; however, the CMMI is required to focus on models that preserve or enhance quality and reduce program expenditures.
Medicare Hospital Value-Based Purchasing (VBP) Program	This program establishes a hospital VBP initiative where value-based incentive payments are made to hospitals for discharges occurring on or after October 1, 2012.
National Pilot Program on Medicare Payment Bundling	This program establishes a national pilot encouraging hospitals, doctors, and post-acute care providers to improve patient care and achieve savings for the Medicare program through bundled payment models. The pilot program was initially set to be conducted for a 5-year period beginning January 1, 2013.

**Appendix B:
Analytic Methodology**

Determining Primary Chronic Conditions

Crosswalk of Measures of Functional Status across Post-Acute
Care Assessment Tools

List of MS-DRGs Included in Simulation Filters

List of Variables Used in Multinomial Logistic Regression

Determining Primary Chronic Conditions

Primary chronic conditions were determined by mapping each chronic condition onto one of the Medicare Advantage Hierarchical Chronic Conditions (HCC), and ranking the conditions from highest to lowest risk according to the HCC community risk score. Disease interactions (e.g. patients with both congestive heart failures [CHF] and chronic obstructive pulmonary disease [COPD]) were ranked as the highest risk. Each episode was categorized by the highest risk disease interaction or chronic condition present in the episode. Two chronic conditions – glaucoma and cataracts – do not have a comparable HCC with an associated risk score, and these chronic conditions were ranked as the lowest in severity.

For a crosswalk of disease interactions and HCCs to chronic conditions, see Exhibit B.1 below.

Exhibit B.1: Crosswalk between Primary Chronic Condition and HCC Factors from CY2011 Proposed Rule^a

Disease Interaction	Description	Risk Score: Community	Chronic Condition 1	Chronic Condition 2	Chronic Condition 3
CHF*COPD	Congestive Heart Failure*Chronic Obstructive Pulmonary Disease	0.255	Heart Failure and Chronic Obstructive Pulmonary Disease		
DIABETES*CHF	Diabetes*Congestive Heart Failure	0.237	Diabetes and Heart Failure		
CHF*RENAL	Congestive Heart Failure*Renal Disease	0.201	Heart Failure and Chronic Kidney Disease		
HCC	Description	Risk Score: Community	Chronic Condition 1	Chronic Condition 2	Chronic Condition 3
HCC9	Lung and Other Severe Cancers	1.006	Lung Cancer		
HCC39	Bone/Joint/Muscle Infections/Necrosis	0.423	Osteoporosis		
HCC111	Chronic Obstructive Pulmonary Disease	0.388	Chronic Obstructive Pulmonary Disease		
HCC40	Rheumatoid Arthritis and Inflammatory Connective Tissue Disease	0.376	Rheumatoid Arthritis/Osteoarthritis		
HCC170	Hip Fracture/Dislocation	0.363	Hip/Pelvic Fracture		
HCC85	Congestive Heart Failure	0.361	Heart Failure		
HCC52	Dementia without Complication	0.343	Alzheimer's Disease	Alzheimer's Disease and Related Disorders or Senile	
HCC100	Ischemic or Unspecified Stroke	0.333	Stroke / Transient Ischemic Attack		
HCC11	Colorectal, Bladder, and Other Cancers	0.330	Colorectal Cancer		

Appendix B

HCC	Description	Risk Score: Community	Chronic Condition 1	Chronic Condition 2	Chronic Condition 3
HCC58	Major Depressive, Bipolar, and Paranoid Disorders	0.318	Depression		
HCC86	Acute Myocardial Infarction	0.283	Acute Myocardial Infarction		
HCC87	Unstable Angina and Other Acute Ischemic Heart Disease	0.283	Ischemic Heart Disease		
HCC96	Specified Heart Arrhythmias	0.276	Atrial Fibrillation		
HCC139	Chronic Kidney Disease, Mild or Unspecified (Stages 1-2 or Unspecified)	0.227	Chronic Kidney Disease		
HCC12	Breast, Prostate, and Other Cancers and Tumors	0.180	Female Breast Cancer	Prostate Cancer	Endometrial Cancer
HCC19	Diabetes without Complication	0.124	Diabetes		
N/A	N/A	N/A	Glaucoma		
N/A	N/A	N/A	Cataract		

^a Advance Notice of Methodological Changes for Calendar Year (CY) 2011 for Medicare Advantage (MA) Capitation Rates, Part C and Part D Payment Policies and 2011 Call Letter. February 19, 2010. Baltimore, MD: Centers for Medicare & Medicaid Services.

Crosswalk of Measures of Functional Status across Post-Acute Care Assessment Tools

OASIS		MDS		IRF-PAI	
Caregiver Support					
(M0340) Lives Alone	Patient lives alone. 0 = No, 1 = Yes.	(A5) Marital Status	Identification and background information: marital status. 1 = Never married, 2 = Married, 3 = Widowed, 4 = Separated, 5 = Divorced.	(16) Pre-Hospital Living Setting	The setting where the patient was living prior to being hospitalized: 01)Home; 02)Board & Care; 03)Transitional Living; 04)Intermediate Care (nursing home); 05)Skilled Nursing Facility (nursing home) 06)Acute Unit of Own Facility; 07)Acute Unit of Another Facility; 08)Chronic Hospital; 09)Rehabilitation Facility; 10)Other; 12)Alternate Level of Care (ALC) Unit; 13)Subacute Setting; 14)Assisted Living Residence.
(M0350) Paid Help	Assisting person(s): paid help. 0 = No, 1 = Yes.	(A9E) Family Member Responsible	Identification and background information: responsibility/legal guardian - family member responsible. 0 = No, 1 = Yes.		
(M0350) Person Residing in Home	Assisting person(s): person residing in the home (excluding paid help). 0 = No, 1 = Yes.	(A9F) Patient Responsible for Self	Identification and background information - responsibility/legal guardian - patient responsible for self. 0 = No, 1 = Yes.	(17) Pre-Hospital Living With	The relationship of any individuals who resided with the patient prior to the patient's hospitalization. This item is used only if code 01 (Home) in Item 16 (Prehospital Living Setting) was coded.
(M0350) Relatives/Friends/Neighbors Living Outside Home	Assisting person(s): relatives, friends, or neighbors living outside the home. 0 = No, 1 = Yes.	(A9G) None of Above Legal Guardian	Identification and background information: responsibility/legal guardian - none of above. 0 = No, 1 = Yes.		
(M0350) Unknown Assisting Persons	Assisting person(s): unknown. 0 = No, 1 = Yes.	(AB3) Lived Alone Prior to Entry	Demographic information: lived alone (prior to entry). 0 = No, 1 = Yes, 2 = In other facility.		
(M0360) Primary Caregiver	Primary caregiver taking lead responsibility. 00 = No one person, 01 = Spouse or significant other, 02 = Daughter or son, 03 = Other family member, 04 = Friend or neighbor or community or church member, 05 = Paid help, UK = Unknown, Spaces = M0350.				
Caregiver Support	0= Lives alone, no paid help, no help outside home and no caregiver 1= Does not live alone, has paid help, or relatives outside the home, and primary caregiver	Caregiver Support	0= No Support, never married, widowed, separated or divorced, lives alone prior to entry 1= Married, did not live alone prior to entry	Caregiver Support	0= did not live at home prior to living at hospital 1= lived at home prior to hospital

Appendix B

OASIS		MDS		IRF-PAI	
Dressing					
M1810 (M0650) Current Dress Upper	This field indicates the patient's current ability to dress the upper body safely. 00=Able to get clothes out of closets and drawers, put them on and remove them from the upper body without assistance. 01=Able to dress upper body without assistance if clothing is laid out or handed to the patient. 02=Someone must help the patient put on upper body clothing. 03=Patient depends entirely upon another person to dress the upper body. UK=Unknown	(G1GA) Dressing Self Performance	Physical functioning and structural problems: dressing - ADL self-performance. 0 = Independent, 1 = Supervision, 2 = Limited assistance, 3 = Extensive assistance, 4 = Total dependence, 8 = Activity did not occur, (-) = Unknown.	39Da) Self-Care: Dressing-Upper: Admission	A score (0-7) indicating the patient's ability to dress the upper body at admission. Dressing the upper body includes dressing and undressing above the waist, as well as applying and removing a prosthesis or orthosis when applicable.
M1820 (M0660) Current Dress Lower	This field indicates the patient's current ability to dress the lower body safely.00=Able to obtain, put on, and remove clothing and shoes without assistance.01=Able to dress lower body without assistance if clothing and shoes are laid out or handed to the patient.02=Someone must help the patient put on undergarments, slacks, socks or nylons, and shoes.03=Patient depends entirely upon another person to dress lower body.UK=Unknown			(39Ea) Self-Care: Dressing-Lower: Admission	A score (0-7) indicating the patient's ability to dress the lower body at admission. Dressing the lower body includes dressing and undressing from the waist down, as well as applying and removing a prosthesis or orthosis when applicable.
Dressing	Invert scores (00=3, 01=2, etc.) and rescale to 0-7 scale by multiplying score by 7/3. Sum individual scores.	Dressing	Invert scores (0=4, 1=3, etc.) and rescale to 0-7 scale by multiplying score by 7/4. A value of 8 is assumed to be 4 = Total dependence. Multiply individual score by 2.	Dressing	Sum individual scores.

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OASIS		MDS		IRF-PAI	
Bathing					
M1830 Current Bathing	<p>This field indicates the patient's current ability to wash entire body safely.</p> <p>00=Able to bathe self in shower or turn independently, including getting in and out of tub/shower.</p> <p>01=With the use of devices, is able to bathe self in shower or tub independently including getting in and out of the tub/shower.;</p> <p>02=Able to bathe in shower or tub with the intermittent assistance of another person: (a) for intermittent supervision or encouragement or reminders, OR (b) to get in and out of the shower or tub, OR (c) for washing difficult to reach areas.</p> <p>03=Able to participate in bathing self in shower or tub, but requires presence of another person throughout the bath for assistance or supervision</p> <p>04=Unable to use the shower or tub, but able to bathe self independently with or without the user of devices at the sink in chair, or on commode.</p> <p>05=Unable to use the shower or tub, but able to participate in bathing self in bed, at the sink, in bedside chair, on commode, with the assistance or supervision of another person throughout the bath.</p> <p>06=Unable to participate effectively in bathing and is bathed totally by another person.</p>	(G2A) Bathing Self Performance	<p>Physical functioning and structural problems: bathing - bath self performance.</p> <p>0 = Independent, 1 = Supervision, 2 = Physical help limited to transfer only, 3 = Physical help in part of bathing activity, 4 = Total dependence, 8 = Activity itself did not occur during entire seven days.</p>	(39Ca) Self-Care: Bathing: Admission	<p>A score (0-7) indicating the patient's ability to bathe at admission. Bathing includes washing, rinsing, and drying the body from the neck down in either a tub, shower, or sponge/bed bath.</p>
Bathing	Invert scores (00=5, 01=4, etc.) and rescale to 0-7 scale by multiplying score by 7/5.	Bathing	Invert scores (0=4, 1=3, etc.) and rescale to 0-7 scale by multiplying score by 7/4. A value of 8 is assumed to be 4 = Total dependence.	Bathing	Keep value as is.

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OASIS		MDS		IRF-PAI	
Toileting					
M1845 Current Toileting Hygiene	This field indicates the patient's current ability to maintain perineal hygiene safely. 00=Able to manage toileting hygiene and clothing management without assistance. 01=Able to manage toileting hygiene and clothing management without assistance if supplies/implements are laid out for the patient. 02=Someone must help the patient to maintain toileting hygiene and/or adjust clothing. 03=Patient depends entirely upon another person to maintain toileting hygiene.	(G11A) Toilet Use Self Performance	Physical functioning and structural problems: toilet use - ADL self-performance. 0 = Independent, 1 = Supervision, 2 = Limited Assistance, 3 = Extensive assistance, 4 = Total dependence, 8 = Activity did not occur, (-) = Unknown.	(39Fa) Self-Care: Toileting: Admission	A score (0-7) indicating the patient's ability to maintain perineal hygiene and adjusting clothing before and after using a toilet, commode, bedpan, or urinal at admission.
Toileting	Invert scores (00=3, 01=2, etc.) and rescale to 0-7 scale by multiplying score by 7/3.	Toileting	Invert scores (0=4, 1=3, etc.) and rescale to 0-7 scale by multiplying score by 7/4. A value of 8 is assumed to be 4 = Total dependence.	Toileting	Keep value as is.
Transferring					
M1850 Transferring	This field indicates the patient's current ability to move safely from bed to chair, or ability to turn and position self in bed if patient is bedfast. 00=Able to independently transfer. 01=Able to transfer with minimal human assistance or with use of an assistive device. 02=Able to bear weight and pivot during the transfer but unable to transfer self. 03=Unable to transfer self and is unable to bear weight or pivot when transferred by another person. 04=Bedfast, unable to transfer but is able to turn and position self in bed. 05=Bedfast, unable to transfer and is unable to turn and position self.	(G1BA) Transfer Self Performance	Physical functioning and structural problems: transfer - ADL self-performance. 0 = Independent, 1 = Supervision, 2 = Limited assistance, 3 = Extensive assistance, 4 = Total dependence, 8 = Activity did not occur, (-) = Unknown.	(39Ia) Transfers - Bed, chair, wheelchair: Admission	A score (0-7) indicating the patient's ability to transfer from a bed to a chair and back, or from a bed to a wheelchair and back, or coming to a standing position if walking is the typical mode of locomotion at admission.
Transferring	Invert scores (00=5, 01=2, etc.) and rescale to 0-7 scale by multiplying score by 7/5.	Transferring	Invert scores (0=4, 1=3, etc.) and rescale to 0-7 scale by multiplying score by 7/4. A value of 8 is assumed to be 4 = Total dependence.	Transferring	Keep value as is.

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OASIS		MDS		IRF-PAI	
Locomotion					
M1860 Ambulation/Lo comotion	This field indicates the patient's current ability to walk safely, once in a standing position, or use a wheelchair, once in a seated position, on a variety of surfaces. 00=Able to independently walk on even and uneven surfaces and negotiate stairs with or without railings (i.e., needs no human assistance or assistive device). 01=With the use of a one-handed device (e.g. cane, single crutch, hemiwalker), able to independently walk on even and uneven surfaces and negotiate stairs with or without railings. 02=Requires use of a two-handed device (e.g., walker or crutches) to walk alone on a level surface and/or requires human supervision or assistance to negotiate stairs or steps or uneven surfaces. 03=Able to walk only with the supervision or assistance of another person at all times. 04=Chairfast, unable to ambulate but is able to wheel self independently. 05=Chairfast, unable to ambulate and is unable to wheel self. 06=Bedfast, unable to ambulate or be up in a chair.	(G1EA) Locomotion on Unit Self Performance	Physical functioning and structural problems: locomotion on unit - ADL self-performance. 0 = Independent, 1 = Supervision, 2 = Limited assistance, 3 = Extensive assistance, 4 = Total dependence, 8 = Activity did not occur, (-) = Unknown.	(39La) Locomotion - Walk/wheelchair: Admission	A score (0-7) indicating the patient's ability to walk or use a wheelchair on a level surface at admission. This item indicates the most frequent mode of locomotion the patient uses - 'walk' or 'wheelchair'.
		(G1FA) Locomotion off Unit Self Performance	Physical functioning and structural problems: locomotion off unit - ADL self-performance. 0 = Independent, 1 = Supervision, 2 = Limited assistance, 3 = Extensive assistance, 4 = Total dependence, 8 = Activity did not occur, (-) = Unknown.	(39Laa) Locomotion - Walk/wheelchair/b oth: Admission	A score (0-7) indicating the patient's ability to both walk and use a wheelchair at admission. This item indicates that the patient uses 'both' means of locomotion about equally.
Locomotion	Invert scores (00=6, 01=5, etc.) and rescale to 0-7 scale by multiplying score by 7/6. Multiply individual score by 2.	Locomotion	Invert scores (0=4, 1=3, etc.) and rescale to 0-7 scale by multiplying score by 7/4. A value of 8 is assumed to be 4 = Total dependence. Sum individual scores.	Locomotion	Sum individual scores.

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OASIS		MDS		IRF-PAI	
Feeding					
M1870 (M0710) Current Feeding	<p>This field indicates the patient's current ability to feed self meals and snacks safely.</p> <p>00=Able to independently feed self.</p> <p>01=Able to feed self independently but requires: (a) meal set-up; OR (b) intermittent assistance or supervision from another person; OR (c) a liquid, pureed or ground meat diet.</p> <p>02=Unable to feed self and must be assisted or supervised throughout the meal/snack.</p> <p>03=Able to take in nutrients orally and receives supplemental nutrients through a nasogastric tube or gastrostomy.</p> <p>04=Unable to take in nutrients orally and is fed nutrients through a nasogastric tube or gastrostomy.</p> <p>05=Unable to take in nutrients orally or by tube feeding.</p> <p>UK=Unknown</p>	(G1HA) Eating Self Performance	<p>Physical functioning and structural problems: eating - ADL self-performance. 0 = Independent, 1 = Supervision, 2 = Limited assistance, 3 = Extensive assistance, 4 = Total dependence, 8 = Activity did not occur, (-) = Unknown.</p>	(39Aa) Self-Care: Eating: Admission	<p>A score (0-7) indicating the patient's ability to eat at admission. Eating includes the ability to use suitable utensils to bring food to the mouth, as well as the ability to chew and swallow the food once the meal is presented in the customary manner on a table or tray.</p>
Feeding	Invert scores (00=5, 01=4, etc.) and rescale to 0-7 scale by multiplying score by 7/5.	Feeding	Invert scores (0=4, 1=3, etc.) and rescale to 0-7 scale by multiplying score by 7/4. A value of 8 is assumed to be 4 = Total dependence.	Feeding	Keep value as is.

List of MS-DRGs Included in Simulation Filters

Exhibit B.2: MS-DRG Filter Used in Model 1A

MS-DRGs with High HHA Utilization (N=80)	
025: Craniotomy & endovascular intracranial procedures w MCC	293: Heart failure & shock w/o CC/MCC
026: Craniotomy & endovascular intracranial procedures w CC	300: Peripheral vascular disorders w CC
064: Intracranial hemorrhage or cerebral infarction w MCC	308: Cardiac arrhythmia & conduction disorders w MCC
065: Intracranial hemorrhage or cerebral infarction w CC	309: Cardiac arrhythmia & conduction disorders w CC
066: Intracranial hemorrhage or cerebral infarction w/o CC/MCC	310: Cardiac arrhythmia & conduction disorders w/o CC/MCC
069: Transient ischemia	312: Syncope & collapse
086: Traumatic stupor & coma, coma <1 hr w CC	313: Chest pain
101: Seizures w/o MCC	314: Other circulatory system diagnoses w MCC
163: Major chest procedures w MCC	326: Stomach, esophageal & duodenal proc w MCC
164: Major chest procedures w CC	329: Major small & large bowel procedures w MCC
166: Other resp system O.R. procedures w MCC	330: Major small & large bowel procedures w CC
177: Respiratory infections & inflammations w MCC	377: G.I. hemorrhage w MCC
189: Pulmonary edema & respiratory failure	391: Esophagitis, gastroent & misc digest disorders w MCC
190: Chronic obstructive pulmonary disease w MCC	392: Esophagitis, gastroent & misc digest disorders w/o MCC
191: Chronic obstructive pulmonary disease w CC	460: Spinal fusion except cervical w/o MCC
	462: Bilateral or multiple major joint procs of lower extremity w/o MCC
192: Chronic obstructive pulmonary disease w/o CC/MCC	467: Revision of hip or knee replacement w CC
193: Simple pneumonia & pleurisy w MCC	468: Revision of hip or knee replacement w/o CC/MCC
207: Respiratory system diagnosis w ventilator support 96+ hours	469: Major joint replacement or reattachment of lower extremity w MCC
208: Respiratory system diagnosis w ventilator support <96 hours	470: Major joint replacement or reattachment of lower extremity w/o MCC
216: Cardiac valve & oth maj cardiothoracic proc w card cath w MCC	480: Hip & femur procedures except major joint w MCC
217: Cardiac valve & oth maj cardiothoracic proc w card cath w CC	481: Hip & femur procedures except major joint w CC
219: Cardiac valve & oth maj cardiothoracic proc w/o card cath w MCC	482: Hip & femur procedures except major joint w/o CC/MCC
220: Cardiac valve & oth maj cardiothoracic proc w/o card cath w CC	484: Major joint & limb reattachment proc of upper extremity w/o CC/MCC
233: Coronary bypass w cardiac cath w MCC	490: Back & neck proc exc spinal fusion w CC/MCC or disc device/neurostim
234: Coronary bypass w cardiac cath w/o MCC	491: Back & neck proc exc spinal fusion w/o CC/MCC
235: Coronary bypass w/o cardiac cath w MCC	493: Lower extrem & humer proc except hip,foot,femur w CC
236: Coronary bypass w/o cardiac cath w/o MCC	
237: Major cardiovasc procedures w MCC or thoracic aortic aneurysm repair	494: Lower extrem & humer proc except hip,foot,femur w/o CC/MCC
238: Major cardiovasc procedures w/o MCC	551: Medical back problems w MCC
239: Amputation for circ sys disorders exc upper limb & toe w MCC	552: Medical back problems w/o MCC
242: Permanent cardiac pacemaker implant w MCC	602: Cellulitis w MCC
243: Permanent cardiac pacemaker implant w CC	603: Cellulitis w/o MCC
252: Other vascular procedures w MCC	638: Diabetes w CC
253: Other vascular procedures w CC	682: Renal failure w MCC
264: Other circulatory system O.R. procedures	812: Red blood cell disorders w/o MCC
280: Acute myocardial infarction, discharged alive w MCC	853: Infectious & parasitic diseases w O.R. procedure w MCC
282: Acute myocardial infarction, discharged alive w/o CC/MCC	870: Septicemia or severe sepsis w MV 96+ hours
287: Circulatory disorders except AMI, w card cath w/o MCC	871: Septicemia or severe sepsis w/o MV 96+ hours w MCC
291: Heart failure & shock w MCC	981: Extensive O.R. procedure unrelated to principal diagnosis w MCC
292: Heart failure & shock w CC	982: Extensive O.R. procedure unrelated to principal diagnosis w CC

Exhibit B.3: MS-DRG Filter Used in Models 3 and 4

DRGs With High HHA Utilization (N=89)	
057: Degenerative nervous system disorders w/o MCC	300: Peripheral vascular disorders w CC
066: Intracranial hemorrhage or cerebral infarction w/o CC/MCC	303: Atherosclerosis w/o MCC
069: Transient ischemia	308: Cardiac arrhythmia & conduction disorders w MCC
101: Seizures w/o MCC	309: Cardiac arrhythmia & conduction disorders w CC
163: Major chest procedures w MCC	310: Cardiac arrhythmia & conduction disorders w/o CC/MCC
164: Major chest procedures w CC	312: Syncope & collapse
166: Other resp system O.R. procedures w MCC	313: Chest pain
178: Respiratory infections & inflammations w CC	314: Other circulatory system diagnoses w MCC
181: Respiratory neoplasms w CC	326: Stomach, esophageal & duodenal proc w MCC
189: Pulmonary edema & respiratory failure	329: Major small & large bowel procedures w MCC
190: Chronic obstructive pulmonary disease w MCC	330: Major small & large bowel procedures w CC
191: Chronic obstructive pulmonary disease w CC	377: G.I. hemorrhage w MCC
192: Chronic obstructive pulmonary disease w/o CC/MCC	378: G.I. hemorrhage w CC
193: Simple pneumonia & pleurisy w MCC	379: G.I. hemorrhage w/o CC/MCC
194: Simple pneumonia & pleurisy w CC	389: G.I. obstruction w CC
195: Simple pneumonia & pleurisy w/o CC/MCC	391: Esophagitis, gastroent & misc digest disorders w MCC
208: Respiratory system diagnosis w ventilator support <96 hours	392: Esophagitis, gastroent & misc digest disorders w/o MCC
216: Cardiac valve & oth maj cardiothoracic proc w card cath w MCC	394: Other digestive system diagnoses w CC
219: Cardiac valve & oth maj cardiothoracic proc w/o card cath w MCC	460: Spinal fusion except cervical w/o MCC
220: Cardiac valve & oth maj cardiothoracic proc w/o card cath w CC	462: Bilateral or multiple major joint procs of lower extremity w/o MCC
227: Cardiac defibrillator implant w/o cardiac cath w/o MCC	467: Revision of hip or knee replacement w CC
233: Coronary bypass w cardiac cath w MCC	469: Major joint replacement or reattachment of lower extremity w MCC
234: Coronary bypass w cardiac cath w/o MCC	470: Major joint replacement or reattachment of lower extremity w/o MCC
236: Coronary bypass w/o cardiac cath w/o MCC	482: Hip & femur procedures except major joint w/o CC/MCC
237: Major cardiovasc procedures w MCC or thoracic aortic aneurysm repair	491: Back & neck proc exc spinal fusion w/o CC/MCC
238: Major cardiovasc procedures w/o MCC	494: Lower extrem & humer proc except hip,foot,femur w/o CC/MCC
242: Permanent cardiac pacemaker implant w MCC	536: Fractures of hip & pelvis w/o MCC
243: Permanent cardiac pacemaker implant w CC	552: Medical back problems w/o MCC
244: Permanent cardiac pacemaker implant w/o CC/MCC	563: Fx, sprn, strn & disl except femur, hip, pelvis & thigh w/o MCC
246: Perc cardiovasc proc w drug-eluting stent w MCC or 4+ vessels/stents	602: Cellulitis w MCC
247: Perc cardiovasc proc w drug-eluting stent w/o MCC	603: Cellulitis w/o MCC
249: Perc cardiovasc proc w non-drug-eluting stent w/o MCC	638: Diabetes w CC
251: Perc cardiovasc proc w/o coronary artery stent w/o MCC	640: Nutritional & misc metabolic disorders w MCC
252: Other vascular procedures w MCC	641: Nutritional & misc metabolic disorders w/o MCC
253: Other vascular procedures w CC	682: Renal failure w MCC
254: Other vascular procedures w/o CC/MCC	683: Renal failure w CC
264: Other circulatory system O.R. procedures	689: Kidney & urinary tract infections w MCC
280: Acute myocardial infarction, discharged alive w MCC	690: Kidney & urinary tract infections w/o MCC
281: Acute myocardial infarction, discharged alive w CC	812: Red blood cell disorders w/o MCC
282: Acute myocardial infarction, discharged alive w/o CC/MCC	872: Septicemia or severe sepsis w/o MV 96+ hours w/o MCC
286: Circulatory disorders except AMI, w card cath w MCC	885: Psychoses
287: Circulatory disorders except AMI, w card cath w/o MCC	948: Signs & symptoms w/o MCC
291: Heart failure & shock w MCC	981: Extensive O.R. procedure unrelated to principal diagnosis w MCC
292: Heart failure & shock w CC	982: Extensive O.R. procedure unrelated to principal diagnosis w CC
293: Heart failure & shock w/o CC/MCC	

Appendix B

DRGs With Moderate HHA Utilization (N=546)	
001: Heart transplant or implant of heart assist system w MCC	084: Traumatic stupor & coma, coma >1 hr w/o CC/MCC
002: Heart transplant or implant of heart assist system w/o MCC	086: Traumatic stupor & coma, coma <1 hr w CC
005: Liver transplant w MCC or intestinal transplant	087: Traumatic stupor & coma, coma <1 hr w/o CC/MCC
006: Liver transplant w/o MCC	088: Concussion w MCC
007: Lung transplant	089: Concussion w CC
008: Simultaneous pancreas/kidney transplant	090: Concussion w/o CC/MCC
009: Bone marrow transplant	091: Other disorders of nervous system w MCC
010: Pancreas transplant	092: Other disorders of nervous system w CC
011: Tracheostomy for face,mouth & neck diagnoses w MCC	093: Other disorders of nervous system w/o CC/MCC
012: Tracheostomy for face,mouth & neck diagnoses w CC	096: Bacterial & tuberculous infections of nervous system w/o CC/MCC
013: Tracheostomy for face,mouth & neck diagnoses w/o CC/MCC	100: Seizures w MCC
021: Intracranial vascular procedures w PDX hemorrhage w CC	102: Headaches w MCC
022: Intracranial vascular procedures w PDX hemorrhage w/o CC/MCC	103: Headaches w/o MCC
026: Craniotomy & endovascular intracranial procedures w CC	113: Orbital procedures w CC/MCC
027: Craniotomy & endovascular intracranial procedures w/o CC/MCC	114: Orbital procedures w/o CC/MCC
029: Spinal procedures w CC or spinal neurostimulators	115: Extraocular procedures except orbit
030: Spinal procedures w/o CC/MCC	116: Intraocular procedures w CC/MCC
032: Ventricular shunt procedures w CC	117: Intraocular procedures w/o CC/MCC
033: Ventricular shunt procedures w/o CC/MCC	121: Acute major eye infections w CC/MCC
034: Carotid artery stent procedure w MCC	122: Acute major eye infections w/o CC/MCC
035: Carotid artery stent procedure w CC	123: Neurological eye disorders
036: Carotid artery stent procedure w/o CC/MCC	125: Other disorders of the eye w/o MCC
037: Extracranial procedures w MCC	129: Major head & neck procedures w CC/MCC or major device
038: Extracranial procedures w CC	130: Major head & neck procedures w/o CC/MCC
039: Extracranial procedures w/o CC/MCC	131: Cranial/facial procedures w CC/MCC
041: Periph/cranial nerve & other nerv syst proc w CC or periph neurostim	133: Other ear, nose, mouth & throat O.R. procedures w CC/MCC
042: Periph/cranial nerve & other nerv syst proc w/o CC/MCC	134: Other ear, nose, mouth & throat O.R. procedures w/o CC/MCC
054: Nervous system neoplasms w MCC	135: Sinus & mastoid procedures w CC/MCC
055: Nervous system neoplasms w/o MCC	136: Sinus & mastoid procedures w/o CC/MCC
056: Degenerative nervous system disorders w MCC	137: Mouth procedures w CC/MCC
058: Multiple sclerosis & cerebellar ataxia w MCC	138: Mouth procedures w/o CC/MCC
059: Multiple sclerosis & cerebellar ataxia w CC	139: Salivary gland procedures
060: Multiple sclerosis & cerebellar ataxia w/o CC/MCC	146: Ear, nose, mouth & throat malignancy w MCC
063: Acute ischemic stroke w use of thrombolytic agent w/o CC/MCC	147: Ear, nose, mouth & throat malignancy w CC
067: Nonspecific cva & precerebral occlusion w/o infarct w MCC	148: Ear, nose, mouth & throat malignancy w/o CC/MCC
068: Nonspecific cva & precerebral occlusion w/o infarct w/o MCC	149: Dysequilibrium
070: Nonspecific cerebrovascular disorders w MCC	150: Epistaxis w MCC
071: Nonspecific cerebrovascular disorders w CC	151: Epistaxis w/o MCC
072: Nonspecific cerebrovascular disorders w/o CC/MCC	152: Otitis media & URI w MCC
073: Cranial & peripheral nerve disorders w MCC	153: Otitis media & URI w/o MCC
074: Cranial & peripheral nerve disorders w/o MCC	154: Other ear, nose, mouth & throat diagnoses w MCC
075: Viral meningitis w CC/MCC	155: Other ear, nose, mouth & throat diagnoses w CC
077: Hypertensive encephalopathy w MCC	156: Other ear, nose, mouth & throat diagnoses w/o CC/MCC
078: Hypertensive encephalopathy w CC	158: Dental & Oral Diseases w CC
079: Hypertensive encephalopathy w/o CC/MCC	159: Dental & Oral Diseases w/o CC/MCC
081: Nontraumatic stupor & coma w/o MCC	165: Major chest procedures w/o CC/MCC

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DRGs With Moderate HHA Utilization (N=546)	
167: Other resp system O.R. procedures w CC	258: Cardiac pacemaker device replacement w MCC
168: Other resp system O.R. procedures w/o CC/MCC	259: Cardiac pacemaker device replacement w/o MCC
175: Pulmonary embolism w MCC	260: Cardiac pacemaker revision except device replacement w MCC
176: Pulmonary embolism w/o MCC	261: Cardiac pacemaker revision except device replacement w CC
179: Respiratory infections & inflammations w/o CC/MCC	262: Cardiac pacemaker revision except device replacement w/o CC/MCC
180: Respiratory neoplasms w MCC	263: Vein ligation & stripping
182: Respiratory neoplasms w/o CC/MCC	265: AICD lead procedures
183: Major chest trauma w MCC	289: Acute & subacute endocarditis w CC
184: Major chest trauma w CC	290: Acute & subacute endocarditis w/o CC/MCC
185: Major chest trauma w/o CC/MCC	294: Deep vein thrombophlebitis w CC/MCC
186: Pleural effusion w MCC	295: Deep vein thrombophlebitis w/o CC/MCC
187: Pleural effusion w CC	297: Cardiac arrest, unexplained w CC
188: Pleural effusion w/o CC/MCC	299: Peripheral vascular disorders w MCC
196: Interstitial lung disease w MCC	301: Peripheral vascular disorders w/o CC/MCC
197: Interstitial lung disease w CC	302: Atherosclerosis w MCC
198: Interstitial lung disease w/o CC/MCC	304: Hypertension w MCC
199: Pneumothorax w MCC	305: Hypertension w/o MCC
200: Pneumothorax w CC	306: Cardiac congenital & valvular disorders w MCC
201: Pneumothorax w/o CC/MCC	307: Cardiac congenital & valvular disorders w/o MCC
202: Bronchitis & asthma w CC/MCC	311: Angina pectoris
203: Bronchitis & asthma w/o CC/MCC	315: Other circulatory system diagnoses w CC
204: Respiratory signs & symptoms	316: Other circulatory system diagnoses w/o CC/MCC
205: Other respiratory system diagnoses w MCC	327: Stomach, esophageal & duodenal proc w CC
206: Other respiratory system diagnoses w/o MCC	328: Stomach, esophageal & duodenal proc w/o CC/MCC
215: Other heart assist system implant	331: Major small & large bowel procedures w/o CC/MCC
217: Cardiac valve & oth maj cardiothoracic proc w card cath w CC	332: Rectal resection w MCC
218: Cardiac valve & oth maj cardiothoracic proc w card cath w/o CC/MCC	333: Rectal resection w CC
221: Cardiac valve & oth maj cardiothoracic proc w/o card cath w/o CC/MCC	334: Rectal resection w/o CC/MCC
222: Cardiac defib implant w cardiac cath w AMI/HF/shock w MCC	335: Peritoneal adhesiolysis w MCC
223: Cardiac defib implant w cardiac cath w AMI/HF/shock w/o MCC	336: Peritoneal adhesiolysis w CC
224: Cardiac defib implant w cardiac cath w/o AMI/HF/shock w MCC	337: Peritoneal adhesiolysis w/o CC/MCC
225: Cardiac defib implant w cardiac cath w/o AMI/HF/shock w/o MCC	338: Appendectomy w complicated principal diag w MCC
226: Cardiac defibrillator implant w/o cardiac cath w MCC	339: Appendectomy w complicated principal diag w CC
228: Other cardiothoracic procedures w MCC	340: Appendectomy w complicated principal diag w/o CC/MCC
229: Other cardiothoracic procedures w CC	341: Appendectomy w/o complicated principal diag w MCC
230: Other cardiothoracic procedures w/o CC/MCC	342: Appendectomy w/o complicated principal diag w CC
231: Coronary bypass w PTCA w MCC	343: Appendectomy w/o complicated principal diag w/o CC/MCC
232: Coronary bypass w PTCA w/o MCC	344: Minor small & large bowel procedures w MCC
235: Coronary bypass w/o cardiac cath w MCC	345: Minor small & large bowel procedures w CC
241: Amputation for circ sys disorders exc upper limb & toe w/o CC/MCC	346: Minor small & large bowel procedures w/o CC/MCC
245: AICD generator procedures	347: Anal & stomal procedures w MCC
248: Perc cardiovasc proc w non-drug-eluting stent w MCC or 4+ ves/stents	348: Anal & stomal procedures w CC
250: Perc cardiovasc proc w/o coronary artery stent w MCC	349: Anal & stomal procedures w/o CC/MCC
255: Upper limb & toe amputation for circ system disorders w MCC	350: Inguinal & femoral hernia procedures w MCC
256: Upper limb & toe amputation for circ system disorders w CC	351: Inguinal & femoral hernia procedures w CC
257: Upper limb & toe amputation for circ system disorders w/o CC/MCC	352: Inguinal & femoral hernia procedures w/o CC/MCC
353: Hernia procedures except inguinal & femoral w MCC	433: Cirrhosis & alcoholic hepatitis w CC

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DRGs With Moderate HHA Utilization (N=546)	
354: Hernia procedures except inguinal & femoral w CC	435: Malignancy of hepatobiliary system or pancreas w MCC
355: Hernia procedures except inguinal & femoral w/o CC/MCC	436: Malignancy of hepatobiliary system or pancreas w CC
356: Other digestive system O.R. procedures w MCC	437: Malignancy of hepatobiliary system or pancreas w/o CC/MCC
357: Other digestive system O.R. procedures w CC	438: Disorders of pancreas except malignancy w MCC
358: Other digestive system O.R. procedures w/o CC/MCC	439: Disorders of pancreas except malignancy w CC
368: Major esophageal disorders w MCC	440: Disorders of pancreas except malignancy w/o CC/MCC
369: Major esophageal disorders w CC	441: Disorders of liver except malig,cirr,alc hepa w MCC
370: Major esophageal disorders w/o CC/MCC	442: Disorders of liver except malig,cirr,alc hepa w CC
371: Major gastrointestinal disorders & peritoneal infections w MCC	443: Disorders of liver except malig,cirr,alc hepa w/o CC/MCC
372: Major gastrointestinal disorders & peritoneal infections w CC	444: Disorders of the biliary tract w MCC
373: Major gastrointestinal disorders & peritoneal infections w/o CC/MCC	445: Disorders of the biliary tract w CC
374: Digestive malignancy w MCC	446: Disorders of the biliary tract w/o CC/MCC
375: Digestive malignancy w CC	453: Combined anterior/posterior spinal fusion w MCC
376: Digestive malignancy w/o CC/MCC	454: Combined anterior/posterior spinal fusion w CC
380: Complicated peptic ulcer w MCC	455: Combined anterior/posterior spinal fusion w/o CC/MCC
381: Complicated peptic ulcer w CC	457: Spinal fus exc cerv w spinal curv/malig/infec or 9+ fus w CC
382: Complicated peptic ulcer w/o CC/MCC	458: Spinal fus exc cerv w spinal curv/malig/infec or 9+ fus w/o CC/MCC
383: Uncomplicated peptic ulcer w MCC	459: Spinal fusion except cervical w MCC
384: Uncomplicated peptic ulcer w/o MCC	461: Bilateral or multiple major joint procs of lower extremity w MCC
386: Inflammatory bowel disease w CC	465: Wnd debrid & skn grft exc hand, for musculo-conn tiss dis w/o CC/MCC
387: Inflammatory bowel disease w/o CC/MCC	466: Revision of hip or knee replacement w MCC
388: G.I. obstruction w MCC	468: Revision of hip or knee replacement w/o CC/MCC
390: G.I. obstruction w/o CC/MCC	471: Cervical spinal fusion w MCC
393: Other digestive system diagnoses w MCC	472: Cervical spinal fusion w CC
395: Other digestive system diagnoses w/o CC/MCC	473: Cervical spinal fusion w/o CC/MCC
405: Pancreas, liver & shunt procedures w MCC	474: Amputation for musculoskeletal sys & conn tissue dis w MCC
406: Pancreas, liver & shunt procedures w CC	475: Amputation for musculoskeletal sys & conn tissue dis w CC
407: Pancreas, liver & shunt procedures w/o CC/MCC	476: Amputation for musculoskeletal sys & conn tissue dis w/o CC/MCC
408: Biliary tract proc except only cholecyst w or w/o c.d.e. w MCC	477: Biopsies of musculoskeletal system & connective tissue w MCC
409: Biliary tract proc except only cholecyst w or w/o c.d.e. w CC	478: Biopsies of musculoskeletal system & connective tissue w CC
410: Biliary tract proc except only cholecyst w or w/o c.d.e. w/o CC/MCC	479: Biopsies of musculoskeletal system & connective tissue w/o CC/MCC
411: Cholecystectomy w c.d.e. w MCC	483: Major joint & limb reattachment proc of upper extremity w CC/MCC
412: Cholecystectomy w c.d.e. w CC	484: Major joint & limb reattachment proc of upper extremity w/o CC/MCC
414: Cholecystectomy except by laparoscope w/o c.d.e. w MCC	485: Knee procedures w pdx of infection w MCC
415: Cholecystectomy except by laparoscope w/o c.d.e. w CC	486: Knee procedures w pdx of infection w CC
416: Cholecystectomy except by laparoscope w/o c.d.e. w/o CC/MCC	487: Knee procedures w pdx of infection w/o CC/MCC
417: Laparoscopic cholecystectomy w/o c.d.e. w MCC	488: Knee procedures w/o pdx of infection w CC/MCC
418: Laparoscopic cholecystectomy w/o c.d.e. w CC	489: Knee procedures w/o pdx of infection w/o CC/MCC
419: Laparoscopic cholecystectomy w/o c.d.e. w/o CC/MCC	490: Back & neck proc exc spinal fusion w CC/MCC or disc device/neurostim
420: Hepatobiliary diagnostic procedures w MCC	493: Lower extrem & humer proc except hip,foot,femur w CC
421: Hepatobiliary diagnostic procedures w CC	495: Local excision & removal int fix devices exc hip & femur w MCC
422: Hepatobiliary diagnostic procedures w/o CC/MCC	496: Local excision & removal int fix devices exc hip & femur w CC
423: Other hepatobiliary or pancreas O.R. procedures w MCC	497: Local excision & removal int fix devices exc hip & femur w/o CC/MCC
424: Other hepatobiliary or pancreas O.R. procedures w CC	498: Local excision & removal int fix devices of hip & femur w CC/MCC

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DRGs With Moderate HHA Utilization (N=546)	
432: Cirrhosis & alcoholic hepatitis w MCC	499: Local excision & removal int fix devices of hip & femur w/o CC/MCC
500: Soft tissue procedures w MCC	581: Other skin, subcut tiss & breast proc w/o CC/MCC
501: Soft tissue procedures w CC	582: Mastectomy for malignancy w CC/MCC
502: Soft tissue procedures w/o CC/MCC	583: Mastectomy for malignancy w/o CC/MCC
504: Foot procedures w CC	584: Breast biopsy, local excision & other breast procedures w CC/MCC
505: Foot procedures w/o CC/MCC	585: Breast biopsy, local excision & other breast procedures w/o CC/MCC
507: Major shoulder or elbow joint procedures w CC/MCC	592: Skin ulcers w MCC
508: Major shoulder or elbow joint procedures w/o CC/MCC	593: Skin ulcers w CC
509: Arthroscopy	594: Skin ulcers w/o CC/MCC
510: Shoulder,elbow or forearm proc,exc major joint proc w MCC	596: Major skin disorders w/o MCC
511: Shoulder,elbow or forearm proc,exc major joint proc w CC	598: Malignant breast disorders w CC
512: Shoulder,elbow or forearm proc,exc major joint proc w/o CC/MCC	599: Malignant breast disorders w/o CC/MCC
513: Hand or wrist proc, except major thumb or joint proc w CC/MCC	600: Non-malignant breast disorders w CC/MCC
514: Hand or wrist proc, except major thumb or joint proc w/o CC/MCC	601: Non-malignant breast disorders w/o CC/MCC
515: Other musculoskelet sys & conn tiss O.R. proc w MCC	604: Trauma to the skin, subcut tiss & breast w MCC
516: Other musculoskelet sys & conn tiss O.R. proc w CC	605: Trauma to the skin, subcut tiss & breast w/o MCC
517: Other musculoskelet sys & conn tiss O.R. proc w/o CC/MCC	606: Minor skin disorders w MCC
537: Sprains, strains, & dislocations of hip, pelvis & thigh w CC/MCC	607: Minor skin disorders w/o MCC
538: Sprains, strains, & dislocations of hip, pelvis & thigh w/o CC/MCC	614: Adrenal & pituitary procedures w CC/MCC
540: Osteomyelitis w CC	615: Adrenal & pituitary procedures w/o CC/MCC
542: Pathological fractures & musculoskelet & conn tiss malig w MCC	617: Amputat of lower limb for endocrine,nutrit,& metabol dis w CC
543: Pathological fractures & musculoskelet & conn tiss malig w CC	618: Amputat of lower limb for endocrine,nutrit,& metabol dis w/o CC/MCC
544: Pathological fractures & musculoskelet & conn tiss malig w/o CC/MCC	619: O.R. procedures for obesity w MCC
545: Connective tissue disorders w MCC	620: O.R. procedures for obesity w CC
546: Connective tissue disorders w CC	621: O.R. procedures for obesity w/o CC/MCC
547: Connective tissue disorders w/o CC/MCC	622: Skin grafts & wound debrid for endoc, nutrit & metab dis w MCC
549: Septic arthritis w CC	624: Skin grafts & wound debrid for endoc, nutrit & metab dis w/o CC/MCC
550: Septic arthritis w/o CC/MCC	625: Thyroid, parathyroid & thyroglossal procedures w MCC
551: Medical back problems w MCC	626: Thyroid, parathyroid & thyroglossal procedures w CC
553: Bone diseases & arthropathies w MCC	627: Thyroid, parathyroid & thyroglossal procedures w/o CC/MCC
554: Bone diseases & arthropathies w/o MCC	628: Other endocrine, nutrit & metab O.R. proc w MCC
555: Signs & symptoms of musculoskeletal system & conn tissue w MCC	629: Other endocrine, nutrit & metab O.R. proc w CC
556: Signs & symptoms of musculoskeletal system & conn tissue w/o MCC	630: Other endocrine, nutrit & metab O.R. proc w/o CC/MCC
558: Tendonitis, myositis & bursitis w/o MCC	637: Diabetes w MCC
559: Aftercare, musculoskeletal system & connective tissue w MCC	639: Diabetes w/o CC/MCC
560: Aftercare, musculoskeletal system & connective tissue w CC	642: Inborn errors of metabolism
561: Aftercare, musculoskeletal system & connective tissue w/o CC/MCC	643: Endocrine disorders w MCC
564: Other musculoskeletal sys & connective tissue diagnoses w MCC	644: Endocrine disorders w CC
565: Other musculoskeletal sys & connective tissue diagnoses w CC	645: Endocrine disorders w/o CC/MCC
573: Skin graft &/or debrid for skn ulcer or cellulitis w MCC	652: Kidney transplant
574: Skin graft &/or debrid for skn ulcer or cellulitis w CC	653: Major bladder procedures w MCC
575: Skin graft &/or debrid for skn ulcer or cellulitis w/o CC/MCC	654: Major bladder procedures w CC
576: Skin graft &/or debrid exc for skin ulcer or cellulitis w MCC	655: Major bladder procedures w/o CC/MCC

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DRGs With Moderate HHA Utilization (N=546)	
577: Skin graft &/or debrid exc for skin ulcer or cellulitis w CC	656: Kidney & ureter procedures for neoplasm w MCC
578: Skin graft &/or debrid exc for skin ulcer or cellulitis w/o CC/MCC	657: Kidney & ureter procedures for neoplasm w CC
579: Other skin, subcut tiss & breast proc w MCC	658: Kidney & ureter procedures for neoplasm w/o CC/MCC
580: Other skin, subcut tiss & breast proc w CC	659: Kidney & ureter procedures for non-neoplasm w MCC
660: Kidney & ureter procedures for non-neoplasm w CC	725: Benign prostatic hypertrophy w MCC
661: Kidney & ureter procedures for non-neoplasm w/o CC/MCC	726: Benign prostatic hypertrophy w/o MCC
662: Minor bladder procedures w MCC	727: Inflammation of the male reproductive system w MCC
663: Minor bladder procedures w CC	728: Inflammation of the male reproductive system w/o MCC
664: Minor bladder procedures w/o CC/MCC	729: Other male reproductive system diagnoses w CC/MCC
665: Prostatectomy w MCC	730: Other male reproductive system diagnoses w/o CC/MCC
666: Prostatectomy w CC	734: Pelvic evisceration, rad hysterectomy & rad vulvectomy w CC/MCC
667: Prostatectomy w/o CC/MCC	735: Pelvic evisceration, rad hysterectomy & rad vulvectomy w/o CC/MCC
668: Transurethral procedures w MCC	736: Uterine & adnexa proc for ovarian or adnexal malignancy w MCC
669: Transurethral procedures w CC	737: Uterine & adnexa proc for ovarian or adnexal malignancy w CC
670: Transurethral procedures w/o CC/MCC	738: Uterine & adnexa proc for ovarian or adnexal malignancy w/o CC/MCC
671: Urethral procedures w CC/MCC	739: Uterine,adnexa proc for non-ovarian/adnexal malig w MCC
672: Urethral procedures w/o CC/MCC	740: Uterine,adnexa proc for non-ovarian/adnexal malig w CC
673: Other kidney & urinary tract procedures w MCC	741: Uterine,adnexa proc for non-ovarian/adnexal malig w/o CC/MCC
674: Other kidney & urinary tract procedures w CC	742: Uterine & adnexa proc for non-malignancy w CC/MCC
675: Other kidney & urinary tract procedures w/o CC/MCC	743: Uterine & adnexa proc for non-malignancy w/o CC/MCC
684: Renal failure w/o CC/MCC	745: D & C, conization, laparoscopy & tubal interruption w/o CC/MCC
685: Admit for renal dialysis	746: Vagina, cervix & vulva procedures w CC/MCC
686: Kidney & urinary tract neoplasms w MCC	747: Vagina, cervix & vulva procedures w/o CC/MCC
687: Kidney & urinary tract neoplasms w CC	748: Female reproductive system reconstructive procedures
688: Kidney & urinary tract neoplasms w/o CC/MCC	749: Other female reproductive system O.R. procedures w CC/MCC
691: Urinary stones w esw lithotripsy w CC/MCC	750: Other female reproductive system O.R. procedures w/o CC/MCC
692: Urinary stones w esw lithotripsy w/o CC/MCC	754: Malignancy, female reproductive system w MCC
693: Urinary stones w/o esw lithotripsy w MCC	755: Malignancy, female reproductive system w CC
694: Urinary stones w/o esw lithotripsy w/o MCC	756: Malignancy, female reproductive system w/o CC/MCC
695: Kidney & urinary tract signs & symptoms w MCC	758: Infections, female reproductive system w CC
696: Kidney & urinary tract signs & symptoms w/o MCC	759: Infections, female reproductive system w/o CC/MCC
697: Urethral stricture	760: Menstrual & other female reproductive system disorders w CC/MCC
698: Other kidney & urinary tract diagnoses w MCC	761: Menstrual & other female reproductive system disorders w/o CC/MCC
699: Other kidney & urinary tract diagnoses w CC	765: Cesarean section w CC/MCC
700: Other kidney & urinary tract diagnoses w/o CC/MCC	766: Cesarean section w/o CC/MCC
707: Major male pelvic procedures w CC/MCC	775: Vaginal delivery w/o complicating diagnoses
708: Major male pelvic procedures w/o CC/MCC	777: Ectopic pregnancy
709: Penis procedures w CC/MCC	778: Threatened abortion
710: Penis procedures w/o CC/MCC	781: Other antepartum diagnoses w medical complications
711: Testes procedures w CC/MCC	800: Splenectomy w CC
712: Testes procedures w/o CC/MCC	801: Splenectomy w/o CC/MCC
713: Transurethral prostatectomy w CC/MCC	802: Other O.R. proc of the blood & blood forming organs w MCC
714: Transurethral prostatectomy w/o CC/MCC	803: Other O.R. proc of the blood & blood forming organs w CC
715: Other male reproductive system O.R. proc for malignancy w CC/MCC	804: Other O.R. proc of the blood & blood forming organs w/o CC/MCC
716: Other male reproductive system O.R. proc for malignancy w/o CC/MCC	808: Major hematol/immun diag exc sickle cell crisis & coagul w MCC
717: Other male reproductive system O.R. proc exc malignancy w CC/MCC	809: Major hematol/immun diag exc sickle cell crisis & coagul w CC

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DRGs With Moderate HHA Utilization (N=546)	
718: Other male reproductive system O.R. proc exc malignancy w/o CC/MCC	810: Major hematol/immun diag exc sickle cell crisis & coagul w/o CC/MCC
722: Malignancy, male reproductive system w MCC	811: Red blood cell disorders w MCC
723: Malignancy, male reproductive system w CC	813: Coagulation disorders
724: Malignancy, male reproductive system w/o CC/MCC	814: Reticuloendothelial & immunity disorders w MCC
815: Reticuloendothelial & immunity disorders w CC	897: Alcohol/drug abuse or dependence w/o rehabilitation therapy w/o MCC
816: Reticuloendothelial & immunity disorders w/o CC/MCC	902: Wound debridements for injuries w CC
820: Lymphoma & leukemia w major O.R. procedure w MCC	903: Wound debridements for injuries w/o CC/MCC
821: Lymphoma & leukemia w major O.R. procedure w CC	904: Skin grafts for injuries w CC/MCC
822: Lymphoma & leukemia w major O.R. procedure w/o CC/MCC	905: Skin grafts for injuries w/o CC/MCC
823: Lymphoma & non-acute leukemia w other O.R. proc w MCC	906: Hand procedures for injuries
824: Lymphoma & non-acute leukemia w other O.R. proc w CC	907: Other O.R. procedures for injuries w MCC
825: Lymphoma & non-acute leukemia w other O.R. proc w/o CC/MCC	908: Other O.R. procedures for injuries w CC
826: Myeloprolif disord or poorly diff neopl w maj O.R. proc w MCC	909: Other O.R. procedures for injuries w/o CC/MCC
827: Myeloprolif disord or poorly diff neopl w maj O.R. proc w CC	914: Traumatic injury w/o MCC
828: Myeloprolif disord or poorly diff neopl w maj O.R. proc w/o CC/MCC	915: Allergic reactions w MCC
829: Myeloprolif disord or poorly diff neopl w other O.R. proc w CC/MCC	916: Allergic reactions w/o MCC
830: Myeloprolif disord or poorly diff neopl w other O.R. proc w/o CC/MCC	917: Poisoning & toxic effects of drugs w MCC
834: Acute leukemia w/o major O.R. procedure w MCC	918: Poisoning & toxic effects of drugs w/o MCC
835: Acute leukemia w/o major O.R. procedure w CC	919: Complications of treatment w MCC
836: Acute leukemia w/o major O.R. procedure w/o CC/MCC	920: Complications of treatment w CC
837: Chemo w acute leukemia as sdx or w high dose chemo agent w MCC	921: Complications of treatment w/o CC/MCC
839: Chemo w acute leukemia as sdx w/o CC/MCC	923: Other injury, poisoning & toxic effect diag w/o MCC
840: Lymphoma & non-acute leukemia w MCC	928: Full thickness burn w skin graft or inhal inj w CC/MCC
841: Lymphoma & non-acute leukemia w CC	929: Full thickness burn w skin graft or inhal inj w/o CC/MCC
842: Lymphoma & non-acute leukemia w/o CC/MCC	933: Extensive burns or full thickness burns w MV 96+ hrs w/o skin graft
843: Other myeloprolif dis or poorly diff neopl diag w MCC	934: Full thickness burn w/o skin grft or inhal inj
844: Other myeloprolif dis or poorly diff neopl diag w CC	935: Non-extensive burns
845: Other myeloprolif dis or poorly diff neopl diag w/o CC/MCC	939: O.R. proc w diagnoses of other contact w health services w MCC
846: Chemotherapy w/o acute leukemia as secondary diagnosis w MCC	940: O.R. proc w diagnoses of other contact w health services w CC
847: Chemotherapy w/o acute leukemia as secondary diagnosis w CC	941: O.R. proc w diagnoses of other contact w health services w/o CC/MCC
849: Radiotherapy	945: Rehabilitation w CC/MCC
854: Infectious & parasitic diseases w O.R. procedure w CC	946: Rehabilitation w/o CC/MCC
855: Infectious & parasitic diseases w O.R. procedure w/o CC/MCC	947: Signs & symptoms w MCC
856: Postoperative or post-traumatic infections w O.R. proc w MCC	950: Aftercare w/o CC/MCC
857: Postoperative or post-traumatic infections w O.R. proc w CC	959: Other O.R. procedures for multiple significant trauma w/o CC/MCC
858: Postoperative or post-traumatic infections w O.R. proc w/o CC/MCC	969: HIV w extensive O.R. procedure w MCC
862: Postoperative & post-traumatic infections w MCC	970: HIV w extensive O.R. procedure w/o MCC
863: Postoperative & post-traumatic infections w/o MCC	976: HIV w major related condition w/o CC/MCC
864: Fever	983: Extensive O.R. procedure unrelated to principal diagnosis w/o CC/MCC
865: Viral illness w MCC	984: Prostatic O.R. procedure unrelated to principal diagnosis w MCC
866: Viral illness w/o MCC	985: Prostatic O.R. procedure unrelated to principal diagnosis w CC
867: Other infectious & parasitic diseases diagnoses w MCC	987: Non-extensive O.R. proc unrelated to principal diagnosis w MCC

Appendix B

DRGs With Moderate HHA Utilization (N=546)

868: Other infectious & parasitic diseases diagnoses w CC	988: Non-extensive O.R. proc unrelated to principal diagnosis w CC
869: Other infectious & parasitic diseases diagnoses w/o CC/MCC	989: Non-extensive O.R. proc unrelated to principal diagnosis w/o CC/MCC
876: O.R. procedure w principal diagnoses of mental illness	
880: Acute adjustment reaction & psychosocial dysfunction	
881: Depressive neuroses	
882: Neuroses except depressive	
895: Alcohol/drug abuse or dependence w rehabilitation therapy	
896: Alcohol/drug abuse or dependence w/o rehabilitation therapy w MCC	

Appendix B

DRGs With Low HHA Utilization (Excluded from Analyses; N=102)	
003: ECMO or trach w MV 96+ hrs or PDX exc face, mouth & neck w maj O.R.	534: Fractures of femur w/o MCC
004: Trach w MV 96+ hrs or PDX exc face, mouth & neck w/o maj O.R.	535: Fractures of hip & pelvis w MCC
020: Intracranial vascular procedures w PDX hemorrhage w MCC	539: Osteomyelitis w MCC
023: Cranio w major dev impl/acute complex CNS PDX w MCC or chemo implant	541: Osteomyelitis w/o CC/MCC
024: Cranio w major dev impl/acute complex CNS PDX w/o MCC	548: Septic arthritis w MCC
025: Craniotomy & endovascular intracranial procedures w MCC	557: Tendonitis, myositis & bursitis w MCC
028: Spinal procedures w MCC	562: Fx, sprn, strn & disl except femur, hip, pelvis & thigh w MCC
031: Ventricular shunt procedures w MCC	566: Other musculoskeletal sys & connective tissue diagnoses w/o CC/MCC
040: Periph/cranial nerve & other nerv syst proc w MCC	595: Major skin disorders w MCC
052: Spinal disorders & injuries w CC/MCC	597: Malignant breast disorders w MCC
053: Spinal disorders & injuries w/o CC/MCC	616: Amputat of lower limb for endocrine,nutrit,& metabol dis w MCC
061: Acute ischemic stroke w use of thrombolytic agent w MCC	623: Skin grafts & wound debrid for endoc, nutrit & metab dis w CC
062: Acute ischemic stroke w use of thrombolytic agent w CC	744: D & C, conization, laparoscopy & tubal interruption w CC/MCC
064: Intracranial hemorrhage or cerebral infarction w MCC	757: Infections, female reproductive system w MCC
065: Intracranial hemorrhage or cerebral infarction w CC	767: Vaginal delivery w sterilization &/or D & C
076: Viral meningitis w/o CC/MCC	768: Vaginal delivery w O.R. proc except steril &/or D & C
080: Nontraumatic stupor & coma w MCC	770: Abortion w D & C, aspiration curettage or hysterotomy
082: Traumatic stupor & coma, coma >1 hr w MCC	774: Vaginal delivery w complicating diagnoses
083: Traumatic stupor & coma, coma >1 hr w CC	776: Postpartum & post abortion diagnoses w/o O.R. procedure
085: Traumatic stupor & coma, coma <1 hr w MCC	779: Abortion w/o D & C
094: Bacterial & tuberculous infections of nervous system w MCC	780: False labor
095: Bacterial & tuberculous infections of nervous system w CC	782: Other antepartum diagnoses w/o medical complications
097: Non-bacterial infect of nervous sys exc viral meningitis w MCC	799: Splenectomy w MCC
098: Non-bacterial infect of nervous sys exc viral meningitis w CC	838: Chemo w acute leukemia as sdx w CC or high dose chemo agent
099: Non-bacterial infect of nervous sys exc viral meningitis w/o CC/MCC	848: Chemotherapy w/o acute leukemia as secondary diagnosis w/o CC/MCC
124: Other disorders of the eye w MCC	853: Infectious & parasitic diseases w O.R. procedure w MCC
132: Cranial/facial procedures w/o CC/MCC	870: Septicemia or severe sepsis w MV 96+ hours
157: Dental & Oral Diseases w MCC	871: Septicemia or severe sepsis w/o MV 96+ hours w MCC
177: Respiratory infections & inflammations w MCC	883: Disorders of personality & impulse control
207: Respiratory system diagnosis w ventilator support 96+ hours	884: Organic disturbances & mental retardation
239: Amputation for circ sys disorders exc upper limb & toe w MCC	886: Behavioral & developmental disorders
240: Amputation for circ sys disorders exc upper limb & toe w CC	887: Other mental disorder diagnoses
283: Acute myocardial infarction, expired w MCC	894: Alcohol/drug abuse or dependence, left ama
284: Acute myocardial infarction, expired w CC	901: Wound debridements for injuries w MCC
285: Acute myocardial infarction, expired w/o CC/MCC	913: Traumatic injury w MCC
288: Acute & subacute endocarditis w MCC	922: Other injury, poisoning & toxic effect diag w MCC
296: Cardiac arrest, unexplained w MCC	927: Extensive burns or full thickness burns w MV 96+ hrs w skin graft
298: Cardiac arrest, unexplained w/o CC/MCC	949: Aftercare w CC/MCC
385: Inflammatory bowel disease w MCC	951: Other factors influencing health status
413: Cholecystectomy w c.d.e. w/o CC/MCC	955: Craniotomy for multiple significant trauma

Appendix B

DRGs With Low HHA Utilization (Excluded from Analyses; N=102)

425: Other hepatobiliary or pancreas O.R. procedures w/o CC/MCC	956: Limb reattachment, hip & femur proc for multiple significant trauma
434: Cirrhosis & alcoholic hepatitis w/o CC/MCC	957: Other O.R. procedures for multiple significant trauma w MCC
456: Spinal fus exc cerv w spinal curv/malig/infec or 9+ fus w MCC	958: Other O.R. procedures for multiple significant trauma w CC
463: Wnd debrid & skn grft exc hand, for musculo-conn tiss dis w MCC	963: Other multiple significant trauma w MCC
464: Wnd debrid & skn grft exc hand, for musculo-conn tiss dis w CC	964: Other multiple significant trauma w CC
480: Hip & femur procedures except major joint w MCC	965: Other multiple significant trauma w/o CC/MCC
481: Hip & femur procedures except major joint w CC	974: HIV w major related condition w MCC
492: Lower extrem & humer proc except hip,foot,femur w MCC	975: HIV w major related condition w CC
503: Foot procedures w MCC	977: HIV w or w/o other related condition
506: Major thumb or joint procedures	986: Prostatic O.R. procedure unrelated to principal diagnosis w/o CC/MCC
533: Fractures of femur w MCC	999: Ungroupable

List of Variables Used in Multinomial Logistic Regression

Variable
MS-DRG
Beneficiary Age
Beneficiary Race
Beneficiary Gender
Beneficiary Urban/Suburban
Beneficiary Census Region
HRR City/State
Dual Eligibility
HCC Count
Chronic Conditions
Index CCU Days
Lookback CCU Days
Index ICU
Lookback ICU Days
Index Length of Stay
Functional Score
Dress Upper Body
Dress Lower Body
Bathing
Toileting
Transfer to/from Bed
Locomotion on Unit
Locomotion off Unit
Eating

Appendix C:
Descriptive Statistics

60-Day Fixed-Length Pre-Acute Care Episodes

Nine-Month Fixed-Length Non-Post-Acute Care Community-
Based Episodes

60-Day Fixed-Length Post-Acute Care Episodes for MS-DRG
291 (Heart Failure & Shock w MCC)

Map of 10 CMS Regions

List of States by CMS Region

60-Day Fixed-Length Pre-Acute Care Episodes

Medicare Episode Payments by Care Setting and Primary Chronic Condition

During pre-acute episodes, or the 60-day period prior to the index hospitalization that initiates the post-acute episodes, Medicare payments vary considerably across care settings. The vast majority (74.5 percent) of Medicare episode payments for pre-acute episodes are represented by STACHs, which includes the index hospitalization (Exhibit E.1). The next largest care setting is physicians at 17.3 percent, followed by outpatient therapy at 4.5 percent. The use of formal post-acute care settings during the pre-acute episode is limited, ranging from 0.2 percent of Medicare episode payments represented by LTCHs to 1.2 percent of Medicare episode payments represented by SNFs.

Exhibit E.1: Medicare Episode Payment and Percent of Medicare Episode Payment by Setting for 60-Day Fixed-Length Pre-Acute Care Episodes (2007-2009)

Care Setting	Medicare Episode Payment	Percent of Medicare Episode Payment
HHA	\$1,470,810,140	0.4%
SNF	\$4,036,073,680	1.2%
IRF	\$1,578,105,820	0.5%
LTCH	\$517,111,460	0.2%
STACH	\$253,740,110,600	74.5%
Physician	\$58,795,045,920	17.3%
OP	\$15,278,782,260	4.5%
ER	\$3,345,145,100	1.0%
Hospice	\$1,414,853,540	0.4%
Other IP	\$563,773,540	0.2%
Total	\$340,739,812,120	100.0%

Source: Dobson | DaVanzo analysis of research-identifiable 5% SAF for all sites of service, 2007-2009, wage index adjusted by setting and geographic region, and standardized to 2009 dollars. All episodes have been extrapolated to reflect the universe of Medicare beneficiaries. Medicare Episode Payment includes care from all facility-based and ambulatory care settings and excludes beneficiary co-payments, DME, and Part D.

Exhibit E.2 shows the distribution of episodes, average number of chronic conditions, and average Medicare episode payments by primary chronic condition, sorted from highest to lowest community risk score. The episode is assigned the most severe chronic condition, (e.g., an “osteoporosis episode” will often contain numerous less-severe conditions). This mutually exclusive assignment of conditions allows us to conduct analyses by chronic condition without duplicating the number of episodes or any Medicare payments.

The most prevalent primary chronic condition is the combination CHF* COPD, representing 24.9 percent of episodes. Osteoporosis is the second most prevalent primary chronic condition and represents 15.0 percent of episodes. The distribution of episodes, average number of chronic conditions, and average Medicare episode payment vary considerably by primary chronic condition.

Exhibit E.2: Distribution of Episodes and Medicare Episode Payment by Primary Chronic Condition^a for 60-Day Fixed-Length Pre-Acute Care Episodes (2007-2009)

Primary Chronic Condition	Percent of Episodes	Average Number Chronic Conditions	Average Medicare Episode Payment
CHF*COPD	24.9%	7.1	\$14,717
DIABETES*CHF	13.3%	6.4	\$15,367
CHF*RENAL	5.6%	5.8	\$15,060
Lung Cancer	2.0%	4.7	\$16,649
Osteoporosis	15.0%	5.0	\$11,414
COPD	7.7%	4.2	\$12,322
Rheumatoid Arthritis/Osteoarthritis	11.0%	3.9	\$12,160
Hip/Pelvic Fracture	0.6%	4.2	\$13,488
Heart Failure	2.6%	3.7	\$13,279
Alzheimer's Disease	1.3%	4.6	\$9,672
Alzheimer's Disease and Related Disorders or Senile	1.4%	3.7	\$11,274
Stroke/Transient Ischemic Attack	1.7%	3.3	\$12,419
Colorectal Cancer	0.5%	2.9	\$18,249
Depression	3.1%	2.3	\$11,571
Acute Myocardial Infarction	0.4%	3.3	\$16,264
Ischemic Heart Disease	3.4%	2.5	\$12,978
Atrial Fibrillation	0.3%	2.2	\$11,156
Chronic Kidney Disease	1.1%	1.9	\$15,070
Female Breast Cancer	0.1%	1.8	\$11,999
Prostate Cancer	0.2%	1.8	\$10,509
Endometrial Cancer	0.0%	1.8	\$12,734
Diabetes	0.7%	1.4	\$9,849
Glaucoma	0.2%	1.0	\$9,713
Cataract	0.5%	1.0	\$9,894
None	2.2%	0.0	\$11,698
Total	100.0%	5.1	\$13,411

Source: Dobson | DaVanzo analysis of research-identifiable 5% SAF for all sites of service, 2007-2009, wage index adjusted by setting and geographic region, and standardized to 2009 dollars. All episodes have been extrapolated to reflect the universe of Medicare beneficiaries. Average Medicare Episode Payment includes care from all facility-based and ambulatory care settings and excludes beneficiary co-payments, DME, and Part D.

^a For methodology used to determine primary chronic condition, see Analytic Methods.

As expected, the average number of chronic conditions per episode decreases from CHF*COPD, the highest severity chronic condition, to cataract, the lowest severity chronic condition. Overall, the average pre-acute episode has 5.1 chronic conditions, and Medicare episode payment of \$13,411, prior to the index acute care hospitalization. While CHF*COPD and DIABETES*CHF episodes have the highest number of chronic conditions (7.1 and 6.4, respectively), the average Medicare episode payments for those episode types is only slightly higher than the overall

average (\$14,717 and \$15,367, respectively). However, colorectal cancer and acute myocardial infarction have fewer chronic conditions (2.9 and 3.3, respectively), but have higher average Medicare episode payments (\$18,249 and \$16,264, respectively).

Pathways

Exhibit E.3 shows the average number of sequence stops by primary chronic condition, sorted from highest to lowest community risk score. The highest severity primary chronic conditions are associated with the highest average number of sequence stops. CHF* COPD episodes contain the greatest number of overall sequence stops (3.16), as well as facility-based sequence stops (1.31) and ambulatory-based sequence stops (1.85). As the community-risk decreases, so do the average number of sequence stops.

Exhibit E.3: Average Sequence Stops by Primary Chronic Condition^a for 60-Day Fixed-Length Pre-Acute Care Episodes (2007-2009)

Primary Chronic Condition	Average Sequence Stops	Average Facility-based (including HHA) Sequence Stops	Average Ambulatory-based Sequence Stops
CHF* COPD	3.16	1.31	1.85
DIABETES* CHF	3.00	1.24	1.76
CHF* RENAL	2.93	1.22	1.71
Lung Cancer	2.86	1.21	1.65
Osteoporosis	2.71	1.13	1.58
COPD	2.83	1.16	1.67
Rheumatoid Arthritis/Osteoarthritis	2.65	1.11	1.54
Hip/Pelvic Fracture	2.66	1.12	1.54
Heart Failure	2.68	1.13	1.55
Alzheimer's Disease	2.75	1.12	1.63
Other	2.64	1.11	1.52
Overall Average	2.87	1.19	1.68

Source: Dobson | DaVanzo analysis of research-identifiable 5% SAF for all sites of service, 2007-2009, wage index adjusted by setting and geographic region, and standardized to 2009 dollars. All episodes have been extrapolated to reflect the universe of Medicare beneficiaries. Average Medicare Episode Payment includes care from all facility-based and ambulatory care settings and excludes beneficiary co-payments, DME, and Part D.

^a For methodology used to determine primary chronic condition, see Analytic Methods.

Exhibit E.4 presents the 10 most frequent patient pathways for pre-acute care episodes overall. As a function of the way the episodes are designed, all Episode Type 2 patient pathways end with the index acute care hospitalization. The top 10 patient pathways represent 78.3 percent of all pre-acute care episode patient pathways, and have an average Medicare episode payment of \$12,335, which is only slightly lower than the overall average of \$13,411.

The most frequent patient pathway, represented by 56.5 percent of all episodes, is “C-A,” which means that the patient was only receiving physician or outpatient visits prior to the index acute care hospitalization. The second most frequent patient pathway represents 6.8 percent of all episodes and includes Community care, but also includes an ER visit (“C-E-C-A”). This indicates that the patient may have been slightly unstable prior to the index, as indicated by an ER visit (but not a prior hospital admission). It is important to note that our pre-acute care episodes contain a 15-day clean period free of facility-based care (including home health) prior to the index hospital admission.

Exhibit E.4: Distribution of Episodes and Medicare Episode Payment for Top 10 Most Frequent Patient Pathways for 60-Day Fixed-Length Pre-Acute Care Episodes (2007-2009)

Pathway	Percent of Episodes	Average Medicare Episode Payment
C-A	56.5%	\$11,603
C-E-C-A	6.8%	\$12,488
C-A-C-A	5.8%	\$23,797
E-C-A	2.1%	\$11,195
C-E-A	1.5%	\$12,863
H-C-A	1.5%	\$12,630
A-C-A	2.3%	\$20,801
C-P-C-A	0.9%	\$12,504
C-E-C-E-C-A	0.7%	\$13,216
A	0.3%	\$7,565
Subtotal	78.3%	\$12,335
Other	21.7%	\$19,577
Grand Total	100.0%	\$13,411

Facility-based Sequence Stops:	
A	STACH (Index or Readmission)
H	HHA
I	IRF
L	LTCH
S	SNF
Ambulatory-based Sequence Stops	
C	Community (Physician and Outpatient Visits)
E	ER
P	OP Therapy
T	Hospice
Z	Other IP

Source: Dobson | DaVanzo analysis of research-identifiable 5% SAF for all sites of service, 2007-2009, wage index adjusted by setting and geographic region, and standardized to 2009 dollars. Average Medicare Episode Payment includes care from all facility-based and ambulatory care settings and excludes beneficiary co-payments, DME, and Part D.

Prior Admissions

Exhibit E.5 shows the number and percent of episodes and average Medicare episode payments by the number of prior admissions per episode. Almost 90 percent (89.4 percent) of episodes do not contain an admission prior to the index acute care hospitalization, while 9.1 percent of episodes contain one prior admission. The remaining 1.5 percent of episodes contains two or more prior admissions. As the number of prior admissions per episode increases, the average Medicare episode payment increases as well, from \$11,972 for episodes without any prior admissions, to \$42,872 for episodes containing three or more prior admissions.

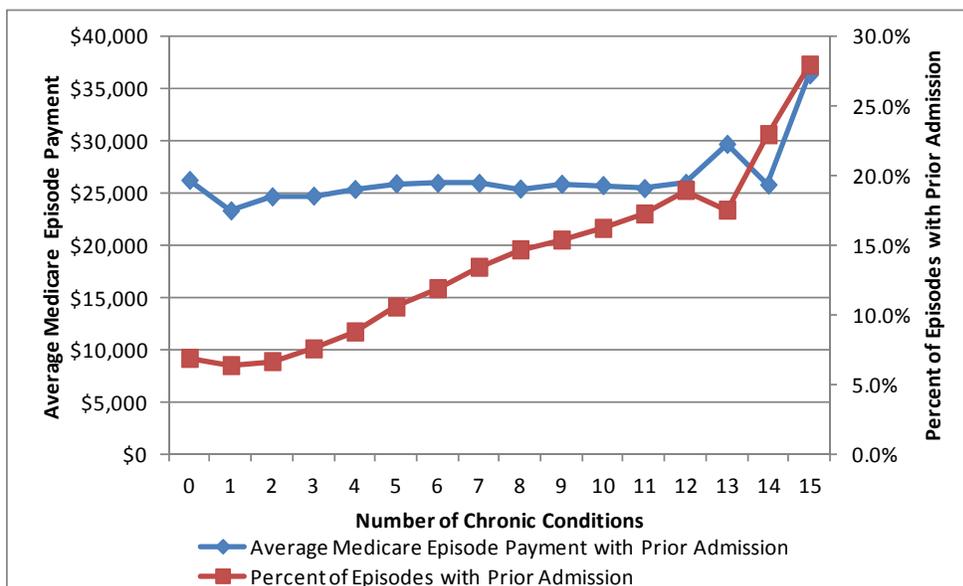
Exhibit E.5: Number of Episodes and Average Medicare Episode Payment by Number of Prior Admissions within an Episode for 60-Day Fixed-Length Pre-Acute Care Episodes (2007-2009)

Number of Prior Admissions	Number of Episodes	Percent of Episodes	Cumulative Percent of Episodes with Prior Admission	Percent of Prior Admission Episodes	Average Medicare Episode Payment	Percent of Total Medicare Episodes Payment
0	22,934,100	89.4%	0.0%	0.0%	\$11,972	79.8%
1	2,322,800	9.1%	9.1%	85.1%	\$23,842	16.1%
2	345,340	1.3%	10.4%	12.6%	\$33,470	3.4%
3+	62,400	0.2%	10.6%	2.3%	\$42,872	0.8%
Overall Average	25,664,640	100.0%	10.6%	100.0%	\$13,411	100.0%

Source: Dobson | DaVanzo analysis of research-identifiable 5% SAF for all sites of service, 2007-2009, wage index adjusted by setting and geographic region, and standardized to 2009 dollars. All episodes have been extrapolated to reflect the universe of Medicare beneficiaries. Average Medicare Episode Payment includes care from all facility-based and ambulatory care settings and excludes beneficiary co-payments, DME, and Part D.

Exhibit E.6 shows the average Medicare episode payment for episodes with a prior admission by the number of chronic conditions per episode. Overall, the percent of episodes containing a prior admission increases with the number of chronic conditions per episode.

Exhibit E.6: Percent of Episodes and Average Medicare Episode Payment for Episodes with Prior Admissions by Number of Chronic Conditions for 60-Day Fixed-Length Pre-Acute Care Episodes (2007-2009)



Source: Dobson | DaVanzo analysis of research-identifiable 5% SAF for all sites of service, 2007-2009, wage index adjusted by setting and geographic region, and standardized to 2009 dollars. Average Medicare Episode Payment includes care from all facility-based and ambulatory care settings and excludes beneficiary co-payments, DME, and Part D.

The increase in the percent of episodes containing a prior admission by number of chronic conditions suggests that prior admissions are partially attributable to the

complexity of patients with multiple chronic conditions. Approximately 6.9 percent of episodes with no chronic conditions contain a prior admission, while 27.9 percent of episodes with 15 chronic conditions contain a hospital admission prior to the index acute care hospitalization (data not shown). It is interesting to note that, as primary chronic conditions increase in severity, the percent of episodes with prior admissions increases faster than the growth in the average Medicare episode payment for episodes.

Nine-month Fixed-Length Non-post-acute Care Community-Based Episodes Medicare Episode Payments by Care Setting and Primary Chronic Condition

During non-post-acute care community-based episodes, or the nine-month episode that begins after discharge from a community-referred admission to home health, Medicare payments are more distributed across care settings than in either the post-acute or pre-acute episodes by care setting. HHAs represent the highest percent of payments (28.9), followed closely by STACHs (28.0) (Exhibit E.7). Physicians and SNFs together represent approximately one-quarter of Medicare episode payments. There is limited use of IRFs, LTCHs, and other ambulatory care settings during non-post-acute care community-based episodes.

Exhibit E.7: Medicare Episode Payment and Percent of Medicare Episode Payment by Care Setting for Nine-Month Fixed-Length Non-Post-Acute Care Community-Based Episodes (2007-2009)

Care Setting	Medicare Episode Payment	Percent Medicare Episode Payment
HHA (Index & Other)	\$24,059,017,460	28.9%
SNF	\$8,786,872,660	10.6%
IRF	\$1,847,902,200	2.2%
LTCH	\$1,707,373,360	2.1%
STACH	\$23,239,389,180	28.0%
Physician	\$13,376,238,620	16.1%
OP	\$5,454,703,860	6.6%
ER	\$945,816,260	1.1%
Hospice	\$2,992,791,680	3.6%
Other IP	\$723,774,880	0.9%
Total	\$83,133,880,180	100.0%

Source: Dobson | DaVanzo analysis of research-identifiable 5% SAF for all sites of service, 2007-2009, wage index adjusted by setting and geographic region, and standardized to 2009 dollars. Average Medicare Episode Payment includes care from all facility-based and ambulatory care settings and excludes beneficiary co-payments, DME, and Part D.

Exhibit E.8 shows the distribution of episodes, average number of chronic conditions, average Medicare episode payments, and average Medicare home health payments per episode by primary chronic condition, sorted from highest to lowest community risk score.

As with Episode Type 2, CHF*COPD is the most prevalent primary chronic condition, representing 23.4 percent of episodes. Osteoporosis and DIABETES*CHF remain the second and third most prevalent primary chronic conditions, representing 18.9 percent and 15.5 percent of all non-post-acute care community-based episodes, respectively. More than 80 percent of all non-post-acute care community-based episodes are contained within the top seven highest ranked primary chronic conditions. This suggests that home health serves chronically-ill patients who have a variety of clinical needs and who are at high community risk without having a hospitalization prior to their receiving home health. Only 1.4 percent of all non-post-acute care community-based episodes have none of the listed

chronic conditions. These patients may be frail and have limited mobility, which leaves them home-bound.

The average non-post-acute care community-based episode has 5.5 chronic conditions, more than the average number of chronic conditions for patients in the pre-acute care episodes (5.1). Non-post-acute care community-based episodes have an average Medicare episode payment of \$24,444, with more than one-quarter (28.2 percent) of the payments attributed to home health care throughout the episode (including the index home health episode). Generally, the total Medicare episode payment and home health proportion of the episode payment decreased as the community risk score of the primary chronic condition decreases. Hip/pelvic fracture, colorectal cancer, female breast cancer, and endometrial cancer are the exception to that trend.

Other than rheumatoid arthritis/osteoarthritis episodes, episodes with one of the top seven most frequent primary conditions have more chronic conditions on average per episode than the overall average across chronic conditions. The average Medicare episode payment for home health services decreases slightly as the community risk of the primary chronic condition (and the average number of chronic conditions) decreases. For example, CHF*COPD episodes receive an average home health payment of \$8,142 compared to \$3,703 for prostate cancer (exceptions to this trend include COPD and stroke/transient ischemic attack). Given that one average home health episode receives a Medicare payment of roughly \$3,000¹, this suggests that patients with higher community risk are receiving two, or as many as three, home health episodes during the whole nine-month episode length. Episodes with lower community risk primary chronic conditions are more likely receiving one home health episode.

¹ Dobson | DaVanzo analysis of research-identifiable 5% SAF for all sites of service, 2007-2009.

Exhibit E.8: Distribution of Episodes and Medicare Episode Paid by Primary Chronic Condition^a for Nine-Month Fixed-Length Non-Post-Acute Care Community-Based Episodes (2007-2009)

Primary Chronic Condition	Percent of Episodes	Average Number Chronic Conditions	Average Medicare Episode Payment	Average Home Health Payment
CHF*COPD	23.4%	7.8	\$35,256	\$8,142
DIABETES*CHF	15.5%	6.8	\$29,913	\$7,795
CHF*RENAL	5.3%	6.6	\$28,088	\$6,355
Lung Cancer	1.3%	5.5	\$26,814	\$4,615
Osteoporosis	18.9%	5.7	\$18,988	\$6,475
COPD	6.2%	5.1	\$21,151	\$7,108
Rheumatoid Arthritis/Osteoarthritis	12.9%	4.5	\$17,316	\$6,735
Hip/Pelvic Fracture	0.5%	4.9	\$25,598	\$5,910
Heart Failure	2.4%	4.1	\$16,519	\$5,407
Alzheimer's Disease	3.0%	4.3	\$16,458	\$5,516
Alzheimer's Disease and Related Disorders or Senile	2.1%	3.4	\$16,898	\$5,643
Stroke/Transient Ischemic Attack	0.9%	3.4	\$18,094	\$6,051
Colorectal Cancer	0.2%	3	\$29,712	\$3,928
Depression	2.1%	2.4	\$16,868	\$5,325
Acute Myocardial Infarction	0.0%	4	\$18,266	\$4,252
Ischemic Heart Disease	1.7%	2.5	\$13,337	\$4,628
Atrial Fibrillation	0.1%	2.3	\$15,415	\$4,682
Chronic Kidney Disease	0.5%	2.1	\$17,634	\$4,425
Female Breast Cancer	0.1%	1.6	\$18,144	\$2,888
Prostate Cancer	0.1%	1.8	\$9,718	\$3,703
Endometrial Cancer	0.0%	2.1	\$17,579	\$4,374
Diabetes	0.8%	1.4	\$8,389	\$4,710
Glaucoma	0.2%	1.4	\$7,293	\$3,994
Cataract	0.3%	1	\$7,969	\$3,845
None	1.4%	0	\$10,210	\$4,616
Overall Average	100.0%	5.5	\$24,444	\$6,899

Source: Dobson | DaVanzo analysis of research-identifiable 5% SAF for all sites of service, 2007-2009, wage index adjusted by setting and geographic region, and standardized to 2009 dollars. All episodes have been extrapolated to reflect the universe of Medicare beneficiaries. Average Medicare Episode Payment includes care from all facility-based and ambulatory care settings and excludes beneficiary co-payments, DME, and Part D.

^a For methodology used to determine primary chronic condition, see Analytic Methods.

Pathways

Exhibit E.9 shows the average number of sequence stops for non-post-acute care community-based episodes by primary chronic condition, sorted from highest to lowest community risk score. Across all chronic conditions, non-post-acute care community-based episodes have an average of 8.62 sequence stops, of which 4.17

are facility-based and 4.45 are ambulatory-based. Since this episode type is triggered by the community admission to home health and is nine-months long, these episodes can include both pre- and post-acute care episodes. Therefore, it is expected that the average number of sequence stops would be considerably higher than the results presented for both the pre- and post-acute care episodes.

As with pre-acute episodes, CHF*COPD has the highest average number of total sequence stops (11.07), facility-based sequence stops (5.63), and ambulatory-based sequence stops (5.44). Osteoporosis and DIABETES*CHF represent an average of 7.69 and 9.54 sequence stops per episode, respectively. As the community-risk decreases, so does the average total number of sequence stops. In the top 10 highest severity conditions, the total number of sequence stops ranges from 11.07 for CHF*COPD episodes to 6.91 for heart failure. CHF*COPD episodes have the highest number both of average facility-based sequence stops (5.63) and ambulatory-based sequence stops (5.44).

Exhibit E.9: Average Medicare Episode Payment and Average Sequence Stops by Primary Chronic Conditions^a for Nine-Month Fixed-Length Non-Post-Acute Care Community-Based Episodes (2007-2009)

Primary Chronic Condition	Average Medicare Episode Payment	Average Sequence Stops	Average Facility-based (including HHA) Sequence Stops	Average Ambulatory-based Sequence Stops
CHF*COPD	\$35,256	11.07	5.63	5.44
DIABETES*CHF	\$29,913	9.54	4.74	4.80
CHF*RENAL	\$28,088	9.15	4.62	4.53
Lung Cancer	\$26,814	7.90	3.68	4.22
Osteoporosis	\$18,988	7.69	3.47	4.22
COPD	\$21,151	8.17	3.82	4.35
Rheumatoid Arthritis/Osteoarthritis	\$17,316	7.40	3.44	3.96
Hip/Pelvic Fracture	\$25,598	7.56	3.75	3.81
Heart Failure	\$16,519	6.91	3.17	3.74
Alzheimer's Disease	\$16,458	6.98	3.13	3.85
Other	\$14,795	6.02	2.78	3.24
Overall Average	\$24,444	8.62	4.17	4.45

Source: Dobson | DaVanzo analysis of research-identifiable 5% SAF for all sites of service, 2007-2009, wage index adjusted by setting and geographic region, and standardized to 2009 dollars. All episodes have been extrapolated to reflect the universe of Medicare beneficiaries. Average Medicare Episode Payment includes care from all facility-based and ambulatory care settings and excludes beneficiary co-payments, DME, and Part D.

^a For methodology used to determine primary chronic condition, see Analytic Methods.

Exhibit E.10 presents the 10 most frequent patient pathways for non-post-acute care community-based episodes. Unlike the post-acute and pre-acute care episodes, the distribution of patient pathways is less concentrated among the most frequent pathways. This is likely a function of the extended episode length, which allows patient pathways to vary more. The top 10 patient pathways represent slightly more

than one-third (34.7 percent) of all episodes. These top frequency patient pathways have a significantly lower average Medicare episode payment than non-post-acute care community-based episodes overall (\$9,096 compared to \$24,444). The most frequent patient pathway, represented by 16.8 percent of all episodes, is “H-C,” which indicates that following the index home health admission, the patient returns to the community and receives care from a physician or outpatient department.

The presence of a community sequence stop in between the home health sequence stops warrants further investigation. Initial analysis indicates that patients with care pathways intertwined between home health and physician care have a higher proportion of high-severity primary chronic conditions than other non-post-acute care community-based episodes. This suggests that home health providers, in coordination with physicians, are often able to keep patients safe at home and out of facility-based care and thus reduce Medicare episode payments.

Exhibit E.10: Distribution of Episodes and Average Medicare Episode Payment for Top 10 Most Frequent Patient Pathways for Nine-Month Fixed-Length Non-Post-Acute Care Community-Based Episodes (2007-2009)

Pathway Pattern	Percent of Episodes	Average Medicare Episode Paid
H-C	16.8%	\$5,273
H-C-H-C	5.1%	\$8,915
H-C-E-C	2.4%	\$6,794
H-C-H-C-H-C	2.4%	\$12,710
H-C-H-C-H-C-H-C-H-C-H-C	1.9%	\$23,792
H-C-H-C-H-C-H-C	1.6%	\$15,930
H-C-H-C-H-C-H-C-H-C	1.4%	\$20,182
H-C-A-C	1.2%	\$15,087
H	1.0%	\$2,192
H-C-A-H-C	0.9%	\$17,030
Subtotal	34.7%	\$9,096
Other	65.3%	\$32,617
Grand Total	100.0%	\$24,444

Facility-based Sequence Stops:	
A	STACH (Index or Readmission)
H	HHA
I	IRF
L	LTCH
S	SNF
Ambulatory-based Sequence Stops	
C	Community (Physician and Outpatient Visits)
E	ER
P	OP Therapy
T	Hospice
Z	Other IP

Source: Dobson | DaVanzo analysis of research-identifiable 5% SAF for all sites of service, 2007-2009, wage index adjusted by setting and geographic region, and standardized to 2009 dollars. All episodes have been extrapolated to reflect the universe of Medicare beneficiaries. Average Medicare Episode Payment includes care from all facility-based and ambulatory care settings and excludes beneficiary co-payments, DME, and Part D.

Hospital Admissions

Exhibit E.11 shows the percent of episodes and average Medicare episode payment by primary chronic condition for episodes that contain a hospital admission compared to episodes that do not. Across all primary chronic conditions, episodes with a hospital admission have an average Medicare episode payment almost four times that of episodes without an admission (\$11,162 compared to \$41,953, ratio of 3.76). This suggests that avoiding hospital admissions within a non-post-acute care

community-based episode through the use of care coordination could produce significant Medicare savings.

As the severity of the primary chronic condition decreases, the relative difference in the average Medicare episode payment for episodes containing, and not containing prior admissions increases. For example, CHF* COPD, DIABETES*CHF, and CHF*RENAL episodes that contain a hospital admission have an average Medicare episode payment more than 3.5 times higher than the average payment for episodes not containing a hospital admission. For those with a primary chronic condition of acute myocardial infarction, episodes with a hospital admission have an average Medicare episode payment over four times greater than the average payment for episodes not containing a hospital admission. The ratio for episodes with no chronic conditions is about five times. This is likely due to the lower payments for ambulatory care provided in episodes without a hospital admission compared to the facility-based care payments for the hospital admission and downstream post-acute care.

Exhibit E.11: Distribution of Episodes and Average Medicare Episode Payments by Hospital Admission Status by Primary Chronic Condition^a for Nine-Month Fixed-Length Non-Post-Acute Care Community-Based Episodes (2007-2009)

Primary Chronic Condition	Percent of Episodes with Admission	Average Medicare Episode Payment			Ratio ^b
		All Episodes	Without Hospital Admission	With Hospital Admission	
CHF* COPD	61.4%	\$35,256	\$13,849	\$48,691	3.52
DIABETES* CHF	49.9%	\$29,913	\$12,897	\$47,031	3.65
CHF* RENAL	59.5%	\$28,088	\$10,711	\$39,914	3.73
Lung Cancer	54.6%	\$26,814	\$14,366	\$37,171	2.59
Osteoporosis	34.4%	\$18,988	\$10,496	\$35,176	3.35
COPD	37.3%	\$21,151	\$11,814	\$36,857	3.12
Rheumatoid Arthritis/Osteoarthritis	29.6%	\$17,316	\$10,347	\$33,856	3.27
Hip/Pelvic Fracture	54.1%	\$25,598	\$9,658	\$39,111	4.05
Heart Failure	34.2%	\$16,519	\$9,505	\$30,033	3.16
Alzheimer's Disease	32.3%	\$16,458	\$9,755	\$30,514	3.13
Alzheimer's Disease and Related	30.9%	\$16,898	\$9,274	\$33,939	3.66
Stroke/Transient Ischemic Attack	34.4%	\$18,094	\$9,495	\$34,518	3.64
Colorectal Cancer	40.3%	\$29,712	\$19,720	\$44,494	2.26
Depression	26.2%	\$16,868	\$9,585	\$37,381	3.90
Acute Myocardial Infarction	52.5%	\$18,266	\$6,888	\$28,544	4.14
Ischemic Heart Disease	20.0%	\$13,337	\$8,671	\$32,011	3.69
Other	16.1%	\$11,607	\$7,845	\$31,262	3.98
None	13.0%	\$10,210	\$6,708	\$33,692	5.02
Overall Average	43.2%	\$24,444	\$11,162	\$41,933	3.76

Source: Dobson | DaVanzo analysis of research-identifiable 5% SAF for all sites of service, 2007-2009, wage index adjusted by setting and geographic region, and standardized to 2009 dollars. All episodes have been extrapolated to reflect the universe of Medicare beneficiaries. Average Medicare Episode Payment includes care from all facility-based and ambulatory care settings and excludes beneficiary co-payments, DME, and Part D.

^a For methodology used to determine primary chronic condition, see Analytic Methods.

^b Average Medicare episode payment for episode with a hospital admission divided by average Medicare episode payment for episode without hospital admission.

Exhibit E.13 shows the number and percent of episodes, and average Medicare episode payment, by the number of hospital admissions per episode. More than one-half (56.8 percent) of episodes do not contain a hospital admission, while about one-quarter (24.6 percent) of episodes contain one hospital admission. An additional 10.5 percent of episodes contain two hospital admissions, while the remaining 8.1 percent of episodes contain three or more hospital admissions. As the number of admissions per episode increases, the average Medicare episode payment increases as well, from \$11,162 for episodes without any admissions, to \$77,203 for episodes containing three or more hospital admissions.

Exhibit E.13: Number of Episodes and Average Medicare Episode Payment by Number of Hospital Admissions within an Episode for Nine-Month Fixed-Length Non-Post-Acute Care Community-Based Episodes (2007-2009)

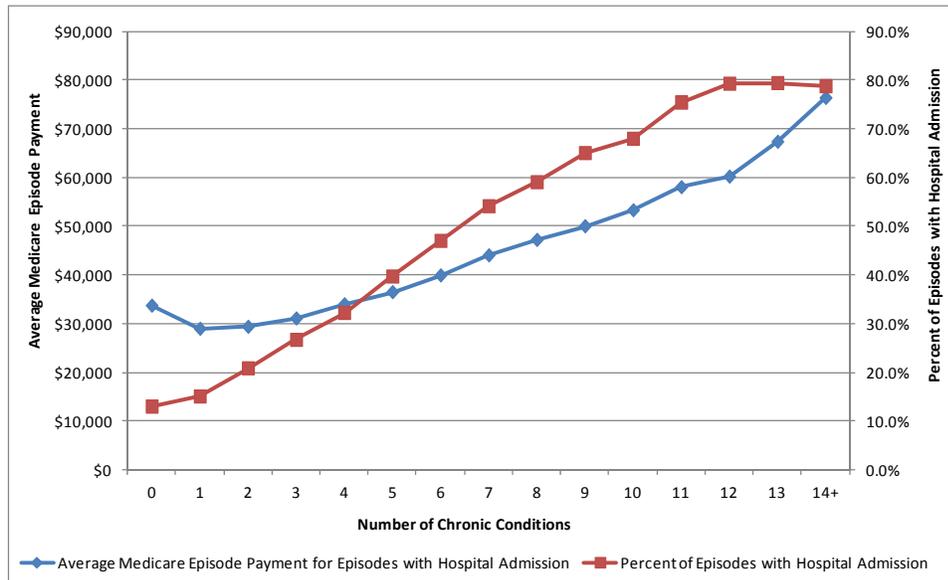
Number of Admissions	Number of Episodes	Percent of Episodes	Cumulative Percent of Episodes with Hospital Admission	Percent of Admitted Episodes	Average Medicare Episode Payment	Percent of Total Medicare Episodes Payment
0	1,699,720	56.8%	0.0%	0.0%	\$11,162	26.0%
1	734,620	24.6%	24.6%	56.9%	\$28,377	28.5%
2	313,500	10.5%	35.0%	24.3%	\$46,394	19.9%
3+	242,700	8.1%	43.2%	18.8%	\$77,203	25.6%
Total	2,990,540	100.0%	43.2%	100.0%	\$24,444	100.0%

Source: Dobson | DaVanzo analysis of research-identifiable 5% SAF for all sites of service, 2007-2009, wage index adjusted by setting and geographic region, and standardized to 2009 dollars. All episodes have been extrapolated to reflect the universe of Medicare beneficiaries. Average Medicare Episode Payment includes care from all facility-based and ambulatory care settings and excludes beneficiary co-payments, DME, and Part D.

Exhibit E.14 shows the average Medicare episode payment for episodes with a hospital admission by the number of chronic conditions. As with pre-acute care episodes, the percent of episodes containing a hospital admission increases with the number of chronic conditions per episode. The increase in the proportion of episodes containing a hospital admission by number of chronic conditions suggests that readmissions are partially attributable to the complexity of patients with multiple chronic conditions.

Approximately 13.0 percent of episodes with no chronic conditions contain a hospital admission while 78.7 percent of episodes with 14 or more chronic conditions contain a hospital admission (data not shown). It is interesting to note that the growth in the proportion of episodes with an admission increases faster than the growth in the average Medicare episode payment for the admitted episodes. This seems reasonable considering that as the percent of episodes containing an admission rises, Medicare episode payments rise disproportionately relative to base Medicare episode payments.

Exhibit E.14: Percent of Episodes and Average Medicare Episode Payment for Episodes with Hospital Admissions by Number of Chronic Conditions for Nine-Month Fixed-Length Non-Post-Acute Care Community-Based Episodes (2007-2009)



Source: Dobson | DaVanzo analysis of research-identifiable 5% SAF for all sites of service, 2007-2009, wage index adjusted by setting and geographic region, and standardized to 2009 dollars. All episodes have been extrapolated to reflect the universe of Medicare beneficiaries. Average Medicare Episode Payment includes care from all facility-based and ambulatory care settings and excludes beneficiary co-payments, DME, and Part D.

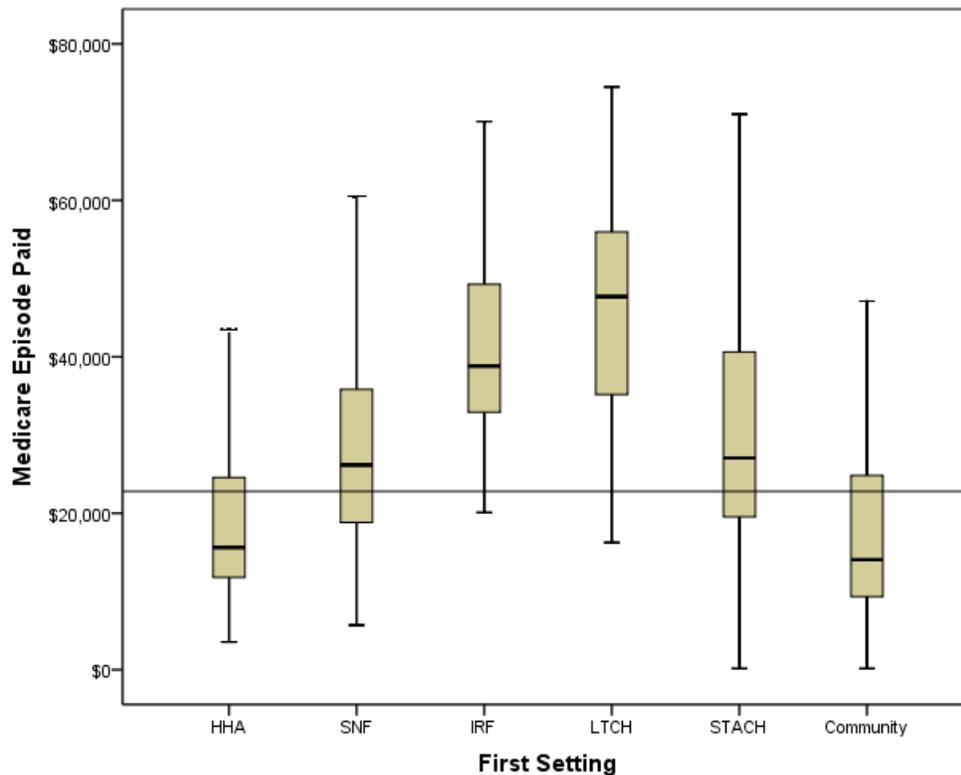
60-Day Fixed-Length Post-Acute Care Episodes for MS-DRG 291 (Heart Failure & Shock w MCC)

Exhibit E.15: Medicare Episode Payment for MS-DRG 291 for 60-Day Fixed-Length Post-Acute Episode by Select First Setting (2007-2009)

First Setting	Number of Episodes	Medicare Episode Payment (in millions)	Average Medicare Episode Payment	Average Overall Payment	Difference
HHA	54,640	\$1,104	\$20,211	\$22,562	\$2,351
SNF	64,200	\$1,833	\$28,551	\$22,562	(\$5,989)
IRF	3,460	\$157	\$45,426	\$22,562	(\$22,864)
LTCH	2,480	\$154	\$62,123	\$22,562	(\$39,561)
STACH	12,840	\$450	\$35,030	\$22,562	(\$12,468)
Community	172,700	\$3,303	\$19,127	\$22,562	\$3,435
Total	310,320	\$7,001	\$22,562	\$22,562	\$0

Source: Dobson | DaVanzo analysis of research-identifiable 5% SAF for all sites of service, 2007-2009, wage index adjusted by setting and geographic region. All episodes have been extrapolated to reflect the universe of Medicare beneficiaries. Average Medicare Episode Payment includes care from all facility-based and ambulatory care settings and excludes beneficiary co-payments, DME, and Part D.

Exhibit E.16: Medicare Episode Payment with Primary Chronic Condition of CHF* COPD^a for MS-DRG 291 by Select First Setting for 60-Day Fixed-Length Post-Acute Care Episodes (2007-2009)



Source: Dobson | DaVanzo analysis of research-identifiable 5% SAF for all sites of service, 2007-2009, wage index adjusted by setting and geographic region. All episodes have been extrapolated to reflect the universe of Medicare beneficiaries. Average Medicare Episode Payment includes care from all facility-based and ambulatory care settings and excludes beneficiary co-payments, DME, and Part D. Data are trimmed at 2.5 standard deviations.

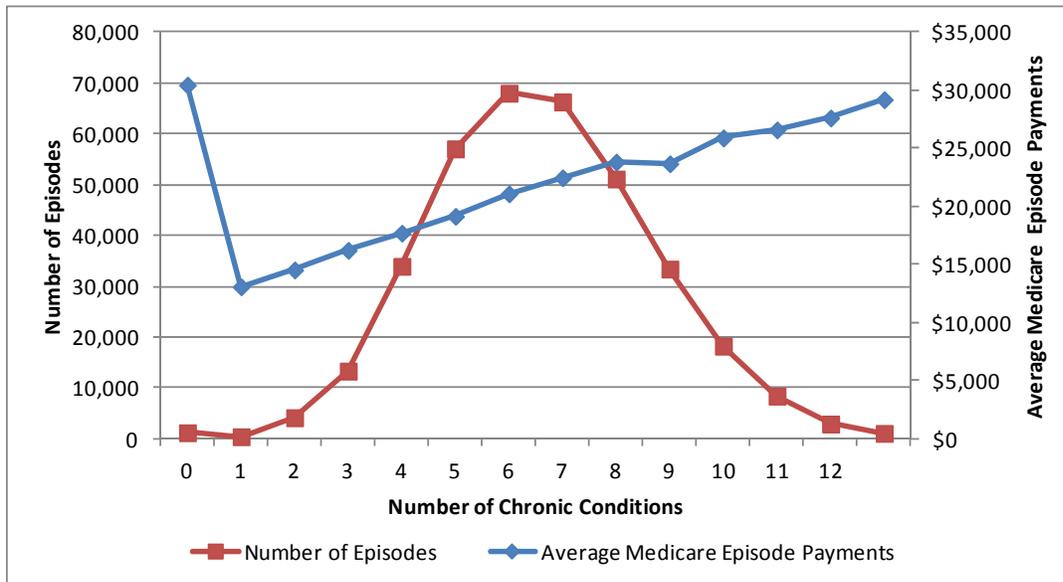
^a For methodology used to determine primary chronic condition, see Analytic Methods.

Exhibit E.17: Distribution of Episodes by Beneficiary Demographic Characteristics for MS-DRG 291 by Select First Setting for 60-Day Fixed-Length Post-Acute Care Episodes (2007-2009)

Demographic Characteristic	HHA	SNF	IRF	LTCH	STACH	Community
Live Alone	40.0%	40.8%	30.1%	21.0%	23.1%	20.5%
Over 85 Years Old	36.6%	51.5%	30.1%	25.8%	20.1%	19.7%
Female	62.3%	68.0%	65.9%	60.5%	47.5%	51.7%
Resides in Rural Area	18.0%	24.9%	23.1%	16.9%	25.5%	24.0%
Race Non-White	17.6%	12.8%	17.3%	29.8%	31.6%	28.6%
Died During Episode	42.8%	58.3%	45.7%	56.5%	48.3%	34.4%
Dual Eligible	22.6%	32.9%	19.7%	37.1%	31.8%	30.3%
Episode Contains Readmission	37.19%	37.69%	45.66%	29.84%	100.0%	34.8%
Overall Average	15.2%	17.8%	1.0%	0.7%	3.6%	48.0%

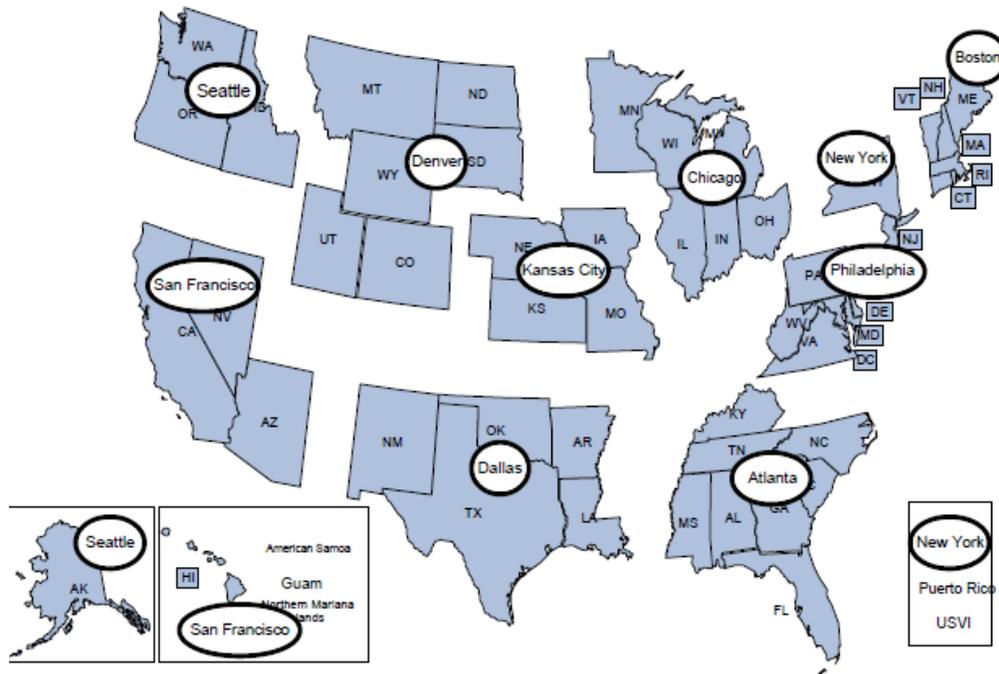
Source: Dobson | DaVanzo analysis of research-identifiable 5% SAF for all sites of service, 2007-2009, wage index adjusted by setting and geographic region.

Exhibit E.18: Number of Episodes and Average Medicare Episode Payment by Number of Chronic Conditions for MS-DRG 291 for 60-Day Fixed-Length Post-Acute Care Episodes (2007-2009)



Source: Dobson | DaVanzo analysis of research-identifiable 5% SAF for all sites of service, 2007-2009, wage index adjusted by setting and geographic region. All episodes have been extrapolated to reflect the universe of Medicare beneficiaries. Average Medicare Episode Payment includes care from all facility-based and ambulatory care settings and excludes beneficiary co-payments, DME, and Part D.

Map of 10 CMS Regions



Source: Centers for Medicare & Medicaid Services

List of States by CMS Regions

Region I

Connecticut
Maine
Massachusetts
New Hampshire
Rhode Island
Vermont

Region II

New Jersey
New York
Puerto Rico
Virgin Islands

Region III

Delaware
District of Columbia
Maryland
Pennsylvania
Virginia
West Virginia

Region IV

Alabama
Florida
Georgia
Kentucky
Mississippi
North Carolina
South Carolina
Tennessee

Region V

Illinois
Indiana
Michigan
Minnesota
Ohio
Wisconsin

Region VI

Arkansas
Louisiana
New Mexico
Oklahoma
Texas

Region VII

Iowa
Kansas
Missouri
Nebraska

Region VIII

Colorado
Montana
North Dakota
South Dakota
Utah
Wyoming

Region IX

Arizona
California
Hawaii
Nevada
American Samoa
Guam

Region X

Alaska
Idaho
Oregon
Washington

**Appendix D:
Evidence Table of Published Literature**

Appendix D

ACUTE CARE HOSPITAL READMISSIONS			
Title	Author, Year	Health Outcome Findings (when applicable)	Cost Findings (when applicable)
1 How changes in Washington University's Medicare Coordinated Care Demonstration Pilot ultimately achieved savings	Peikes D, Peterson G, Brown RS. (2012).	The Washington University School of Medicine was not able to demonstrate any reduction in hospitalizations but after a redesign, switching from phone-based care management to in-person local care managers, hospitalizations were reduced by 12%. The in-person contacts were able to build trusting relationships with patients and providers and improve adherence to care plans. The higher risk group experienced a 17% drop in hospitalizations after the program redesign.	Before the program redesign, the Washington University program increased total Medicare spending by 12%, but after the redesign reduced monthly Medicare spending by \$217 per enrollee, offsetting the program's monthly \$151 care management fee. The greatest cost savings effects are found in the higher risk group (those with two or more hospitalizations two years prior to enrollment), with a monthly spending reduction of 14.8% or \$435.
2 Hospital readmission and the value of a care transitions program for the elderly: a retrospective cohort study	Syed H, Chen C, Crane SJ. (2012).	In this pilot study of care transitions within an integrated primary care group practice, results showed an 11% 30-day readmission rate, compared to a national rate of 19.6%.	The savings from reduced hospital readmissions, as a result of the care transitions pilot, were not quantified in this study.
3 Six features of Medicare Coordinated Care Demonstration Programs that cut hospital admissions of high-risk patients	Brown RS, Peikes D, Peterson G, et al. (2012).	Four of eleven programs that were part of the Medicare Coordinated Care Demonstration reduced hospitalizations by eight to 33% among enrollees who had a high risk of near-term hospitalization. The six features include: (1) supplementing telephone calls to patients with frequent in-person meetings; (2) occasionally meeting in person with providers; (3) acting as a communications hub for providers; (4) delivering evidence-based education to patients; (5) providing strong medication management; (6) and providing timely and comprehensive transitional care after hospitalizations. These features could be incorporated into medical homes, ACOs, and other policy initiatives to reduce hospitalizations and improve patients' lives.	However, the approaches would save money only if care coordination fees were modest and organizations found cost-effective ways to deliver the interventions.

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ACUTE CARE HOSPITAL READMISSIONS			
Title	Author, Year	Health Outcome Findings (when applicable)	Cost Findings (when applicable)
4	An early look at a four-state initiative to reduce avoidable hospital readmissions	Boutwell AE, Johnson MB, Rutherford P. (2011).	The State Action on Avoidable Rehospitalizations initiative (STAAR) aims to reduce rates of avoidable rehospitalization in Massachusetts, Michigan, Ohio, and Washington by mobilizing state-level leadership to improve care transitions. Although there are no publicly available data on whether the project is achieving its primary goal of reducing avoidable rehospitalizations, the effort has so far been successful in aligning numerous complementary initiatives within a state, developing statewide rehospitalization data reports, and mobilizing a sizable number of hospitals to work on reducing rehospitalizations.
5	After hospitalization: a Dartmouth Atlas report on post-acute care for Medicare beneficiaries	Goodman DC, Fisher ES, Chang CH. (2011).	A significant proportion of Medicare patients discharged to home did not see a clinician within 14 days of discharge. Rates of emergency room visits after discharge varied up to two-fold across regions and academic medical centers, suggesting that many health care systems have important opportunities to develop alternatives to emergent care.
6	A new care paradigm slashes hospital use and nursing home stays for the elderly and the physically and mentally disabled	Meyer H. (2011).	Commonwealth Care Alliance, a not for profit health care system in Boston, offers a spectrum of medical/social services for older physically/mentally disabled. In 2009, Commonwealth Care Alliance scored in the 90th percentile or above on HEDIS measures for comprehensive diabetes care, long-term medication monitoring, and access to preventive services.
7	Holsinger: veterans health care program could be model for Medicare	Holsinger JW. (2011).	80% of veterans rate their care as "very good" or "excellent."
8	Impact of VA home based primary care: access, quality, and cost	National Health Policy Forum (Thomas Edes presentation). (2011).	Home based primary care (HBPC) program has achieved a 24% cost reduction for its VA participants. Similarly, Ohio's Medicaid waiver program that screens at-risk patients to determine if they could stay at home instead of entering a nursing home/hospital is cutting Medicaid costs in half for the state.
			The cost of care for veterans before HBPC for 2002 was \$2,488 per patient per year, and during HBPC was \$13,588 per patient per year.

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ACUTE CARE HOSPITAL READMISSIONS			
Title	Author, Year	Health Outcome Findings (when applicable)	Cost Findings (when applicable)
9	Improving care transitions and reducing acute care hospitalizations: New Jersey care transitions project home health experience	Su Y, Miller A, Miller J, et al. (2011).	Thirty-day re-hospitalization rates for the same quarters of 2010 showed a decrease from 30.0% in Q3 2009 to 13.3% in Q3 2010, and from 33.3% in Q4 2009 to 16.7% in Q4 2010 (October – November data). The percent of the HHA Medicare beneficiaries with a claim for home health services within two days of hospital discharge increased from 46.37% to 55.70%.
10	Reducing regional hospital readmissions: the PAVE project	Yurchick PJ. (2011).	The overall goal of PAVE (Preventing Avoidable Episodes Project) is to reduce readmission rates by 10% over the 18-month project period.
11	The care span: fewer hospitalizations result when primary care is highly integrated into a continuing care retirement community	Bynum JP, Andrews A, Sharp S, et al. (2011).	Residents of a CRCC with an embedded primary care team had fewer hospitalizations, emergency visits, and specialty physician visits. They also saw fewer different physicians. Only 5% who died did so at a hospital compared to 27% nationally.
12	The importance of transitional care in achieving health reform	Naylor MD, Aiken LH, Kurtzman ET, et al. (2011).	Out of a systematic review of 21 RCTs of transitional care interventions, 9 interventions demonstrated positive effects on measures related to hospital readmissions. Many of the interventions shared features, such as assigning a nurse as the clinical manager and in-person home visits to discharged patients.
13	The care transitions intervention: translating from efficacy to effectiveness	Voss R, Gardner R, Baier R, et al. (2011).	Reduced 30-day hospital readmission by 30% in a randomized controlled trial in an integrated health system.
14	Could Medicare readmission policy exacerbate health care system inequity?	Bhalla R, Kalkut G. (2010).	19.6% of Medicare beneficiaries were readmitted within 30 days of hospital discharge (Jencks).
15	HealthSouth rehabilitation hospital of Toms River: Interdisciplinary acute care transfer process/review	HealthSouth Rehabilitation Hospital of Toms River.	The use of an Acute Care Discharge Review Form that is reviewed by the Medical Director and shared with all providers involved in a patient's care was used to track "red flags" and diagnoses for the patient's acute care hospitalization prior to admission to the rehab facility. The discharge review process reduced rehospitalization rates by 44% in two months.

Appendix D

ACUTE CARE HOSPITAL READMISSIONS				
Title	Author, Year	Health Outcome Findings (when applicable)	Cost Findings (when applicable)	
16	Hospitalizations and skilled nursing facility admissions before and after the implementation of a home-based primary care program	Wajnberg A, Wang KH, Aniff M, et al. (2010).	Measured hospitalizations and SNF admission before and after enrollment in home-based primary care between October 2004 and August 2006. 61% of patients had 1 or more hospitalizations before enrollment compared to only 38% after. The median hospitalization rate decreased from 1 to 0.	House calls programs (HCPs) can reduce costly hospitalizations and SNF placements.
17	The foundation that health reform lays for improved payment, care coordination, and prevention	Thorpe KE, Ogden LL. (2010).	Likely targets for decreasing readmissions are heart attack, pneumonia, and heart failure, which account for 18% of 30-day readmissions. Randomized trials have shown that transitional care programs for elders can reduce readmission rates by as much as 50%.	From 2013 to 2019, Medicare could save as much as \$188 billion by preventing avoidable 30-day readmissions, with potential annual savings growing from \$21.4 billion in 2013 to \$33 billion in 2019.
18	The impact of health reform on health system spending	Cutler DM, Davis K, Stremikis K, et al. (2010).		Prior to reform, Medicare expenditures were projected to grow by 6.8% annually from 2010 to 2019. Payment and system reform savings estimated by CBO total \$397 billion (when CLASS and non-Medicare provisions are removed), and applying these cost savings reduced the annual growth rate to 5.5%. When additional health system modernizations are accounted for, the annual growth rate is reduced to 4.9% and total 10-year savings reach \$524 billion.
19	Avoiding hospital admission through provision of hospital care at home: a systematic review and meta-analysis of individual patient data	Shepperd S, Doll H, Angus RM, et al. (2009).	There was no significant difference in mortality at 3 months for patients who received hospital care at home, but at 6 months, mortality was significantly lower. However, admissions to the hospital were greater for the "hospital at home" model. Patients were more satisfied with their care at home than at the hospital though.	Hospital care at home was less expensive than an acute care hospital admission when the analysis was restricted to treatment received (and costs of informal care were excluded). For selected patients, avoiding admission through hospital care at home yielded similar health outcomes to inpatient care at a similar, if not lower cost.
20	Effects of care coordination on hospitalization, quality of care, and health care expenditures among Medicare beneficiaries: 15 randomized trials	Peikes D, Chen A, Schore J, Brown R. (2009).	Eligible FFS Medicare patients between April 2002 and June 2005 in 15 care coordination programs (each received a negotiated monthly fee per patient from Medicare) were randomly assigned to treatment or control (usual care) status. Mercy Medical Center focused on heart disease patients and reduced annual hospitalizations by 17% per person per year. Health Quality Partners reduced hospitalizations by approximately 11% compared to control groups and for high-risk patients, there was a 29% reduction in hospitalization.	Mercy had had monthly treatment expenditures that were \$112 (9%) lower than control group. For HQP, there was 11% in expenditures, and 20% reduction in expenditures for the high risk population.

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ACUTE CARE HOSPITAL READMISSIONS			
Title	Author, Year	Health Outcome Findings (when applicable)	Cost Findings (when applicable)
21	Independence at home act: a chronic care coordination program for Medicare that has proven effective in reducing costs and improving quality for highest cost patients	New York Academy of Medicine. (2009). *The Urban Medical Housecall program in Boston, MA - reduced hospital admissions for these patients by 29% and hospital days by 34%. *The Virginia Commonwealth Medical Center house calls program in Richmond, VA - reduced hospital costs by 60% for high costs beneficiaries with multiple chronic diseases. *The Call Doctor Medical Group in San Diego - reduced ER visits by 59% and generated per capita savings of \$1,075. *The Home Physicians program in Chicago, IL - reduction in ER visits and hospitalizations from 35% to as high as 60% over the years. *The House Call program at Montefiore Health System in the Bronx, NY - 42% reduction in hospitalizations and a 33% reduction in total costs. *The Mount Sinai Visiting Doctors program in New York City, NY - reduced hospitalizations for those patients by 66%.	Health outcomes continued... *Geriatric Care of Nevada (now Geriatric Specialty Care) - reduced hospitalizations by 27% and per patient total costs by \$750. *The GRACE house calls program in Indianapolis, IN - reduced ER visits by 50% and hospitalization rates by 43%. *The House Call program at the Washington Hospital Center, in D.C. - 25% reduction in hospital length of stay and a 75% reduction in end of life hospital stays.
22	Long-term effect of home telehealth services on preventable hospitalization use	Huanguang J, Chuang HC, Wu SS, et al. (2009). The VA Care Coordination Home Telehealth (CCHT) program for diabetes mellitus (DM) patients reduced preventable hospitalizations. These are some of the first efforts to examine the extent of home telehealth's long-term effect on preventable hospitalization.	Using communication technology to deliver health services and implementing home telehealth may decrease both direct and indirect medical costs over time.
23	Rehospitalizations among patients in the Medicare fee-for-service program	Jencks SF, Williams MV, Coleman EA. (2009). Almost one fifth (19.6%) of the 11,855,702 Medicare beneficiaries who had been discharged from a hospital were rehospitalized within 30 days, and 34.0% were rehospitalized within 90 days; 67.1% of patients who had been discharged with medical conditions and 51.5% of those who had been discharged after surgical procedures were rehospitalized or died within the first year after discharge. The average stay of rehospitalized patients was 0.6 day longer than that of patients in the same diagnosis-related group whose most recent hospitalization had been at least 6 months previously.	The authors estimate that the cost to Medicare of unplanned rehospitalizations in 2004 was \$17.4 billion.

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ACUTE CARE HOSPITAL READMISSIONS			
Title	Author, Year	Health Outcome Findings (when applicable)	Cost Findings (when applicable)
24	Substitutive hospital at home for older persons: effects on costs	Frick KD, Burton LC, Clark R, et al. (2009).	Costs of the hospital at home intervention were significantly lower than those of usual acute hospital care, \$5,081 versus \$7,480. Total costs were lower when substitutive Hospital at Home care was available for COPD/CHF patients (but not for patients with community-acquired pneumonia or cellulitis).
25	Care coordination/home telehealth: the systematic implementation of health informatics, home telehealth, and disease management to support the care of veteran patients with chronic conditions	Darkins A, Ryan P, Kobb R, et al. (2008).	25% reduction in bed days of care, 19% reduction in hospital in cohort of 17,025 Veterans Health Administration (VHA) Care Coordination/Home Telehealth (CCHT) program. Reduction in utilization monitored: 20.4% for diabetes, 25.9% for CHF, 20.7% for COPD.
26	Guided Care: cost and utilization outcomes in a pilot study	Sylvia ML, Griswold M, Dunbar L, et al. (2008).	High-risk, chronically ill community residents who received guided care experienced lower 6-month expenditures (\$4,586 vs. \$5,964). Guided Care (GC) is an enhancement to primary care that incorporates the operative principles of disease management and chronic care innovations. High-risk, chronically ill community residents who received guided care had lower hospital admissions (0.24 vs. 0.43) than the comparison group.
27	Home versus day rehabilitation: a randomised controlled trial	Crotty M, Giles LC, Halbert J, et al. (2008).	Patients in the day hospital had double the risk of readmission compared to those in home rehabilitation. Despite providing less therapy, the home rehab program achieved similar gains with a lower risk of readmission. This small trial (229) of hospitalized patients referred for ambulatory rehabilitation favored the home as a site for post-hospital rehabilitation.
28	Navigating care transitions in California: two models for change	California HealthCare Foundation. (2008).	The California HealthCare Foundation sponsored implementation of two evidence-based care transitions models: 1) Coleman Care Transitions Intervention, and 2) Naylor Transitional Care Model. Randomized clinical trials show that intervention patients had lower re-hospitalization rates at 30 and 90 days than the control group for Coleman. Naylor's model saved \$5,000 per elder as a result of fewer total re-hospitalizations.
29	Post-acute referral decisions made by multidisciplinary experts compared to hospital clinicians and the patients' 12-week outcomes	Bowles KH, Ratcliffe SJ, Holmes JH, et al. (2008).	Experts reviewed case studies of hospital patients who did not in real life receive referrals from hospital clinicians and recommended PAC for 183 patients. These patients had a rehospitalization rate of 23% and ER use of 14% 12 weeks later.

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ACUTE CARE HOSPITAL READMISSIONS				
Title	Author, Year	Health Outcome Findings (when applicable)	Cost Findings (when applicable)	
30	Perspective: transforming chronic care for older persons	Boult C, Christmas C, Durso SC, et al. (2008).	Currently the need for geriatricians to manage chronic care is a high priority with the aging population. John A. Hartford Foundation (JAHF) and Donald W. Reynolds Foundation (DWRF) have funded medical schools' geriatric programs and fellowships to improve medical education. Geriatrics should be merged into other subspecialties such as internal medicine and family medicine to increase knowledge and the quality of care for seniors.	Medicare beneficiaries with 4 or more chronic conditions account for 80% of Medicare spending, which totaled \$425 billion in 2007. Without transformation in chronic care management, chronic care will become unsustainably expensive.
31	Reducing hospital readmissions	Minott J. (2008).	18% of Medicare patients discharged from the hospital have a readmission within 30 days of discharge. Avoidable hospital readmissions result from poor quality care or from poor transitions between different providers and care settings. Patients can be discharged prematurely or to inappropriate settings.	Hospitalizations account for 31% of total health care expenditures, and inpatient care accounts for 37% of spending. Medicare patients discharged from the hospital with readmission within 30 days account for \$15 billion in spending.
32	Home-based primary care: the care of the veteran at home	Cooper DF, Granadillo OR, Stacey CM. (2007).	The HBPC was established in 1970 as a demo project at 6 teaching VA hospitals. Unlike Medicare's episodic, time-limited and focused skilled care services, HBPC provides comprehensive care of the patient, often for the rest of his/her life. HBPC uses a team approach with a strong focus on support of the patient's residential caregiver in daily care at home. During FY 2006, the HBPC program showed a nationwide 27% reduction in hospital admissions and 69% reduction in inpatient days of care after HBPC program admission.	
33	Hospital at home: feasibility and outcomes of a program to provide hospital-level care at home for acutely ill older patients	Leff B, Burton L, Mader SJ, et al. (2005).		Patients who received "hospital-at-home" care, which included continuous nursing care followed by at least daily visits from a nurse and/or physician, had a lower mean cost than those admitted to hospitals (\$5,081 vs. \$7,480).
34	Preparing patients and caregivers to participate in care delivered across settings: The Care Transition Intervention	Coleman EA, Smith JD, Frank JC, et al. (2004).	Encouraging patients and their caregivers to take an active role during care transitions (through the use of Eric Coleman's Four Pillars) reduced the likelihood of rehospitalization (0.52 odds ratio at 30 days; 0.43 OR at 90 days) as well as increased confidence in self-management, and understanding of warning signs and medications.	

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ACUTE CARE HOSPITAL READMISSIONS				
Title	Author, Year	Health Outcome Findings (when applicable)	Cost Findings (when applicable)	
35	The role of primary care in preventing ambulatory care sensitive conditions	Caminal J, Starfield B, Sanchez E, et al. (2004).	Variability in ACSC lists and in factors associated with hospitalization rates questions whether hospitalizations are actually preventable by primary health care (PHC). This is due to when hospital staff decides hospitalization is necessary and variability in admission criteria within/between hospitals.	A systematic approach would be valuable to identify conditions that are amenable to types of primary health care interventions to reduce hospitalizations and thus are cost-effective.
36	Nurse led transitional care improved health related quality of life and reduced emergency department use for heart failure	Harrison MB, Browne GB, Roberts J, et al. (2002).	Disease specific health-related quality of life improved more for patients in the transitional care group than for those in the usual care group. Patients in the transitional care group had fewer first ED visits and multiple ED visits than those in the usual care group.	Reduced use of the emergency department could lead to possible cost savings if the nurse led transitional care model was applied in a more widespread fashion.
37	Comprehensive discharge planning and home follow-up of hospitalized elders: a randomized clinical trial	Naylor MD, Brooten D, Campbell R, et al. (1999).	By week 24 after the index hospital discharge, control group patients were more likely than intervention group patients to be readmitted at least once (37.1% vs. 20.3%). Fewer intervention group patients had multiple readmissions (6.2% vs. 14.5%) and the intervention group had fewer hospital days per patient (1.53 vs. 4.09 days).	At 24 weeks after discharge, total Medicare reimbursements for health services were about \$1.2 million in the control group versus about \$0.6 million in the intervention group (those who received comprehensive discharge planning and home follow-up visit).
38	Issue brief: the role of home-based services in reducing health care spending	Avalere Health	The VA HBPC was associated with 59% reduction in hospital bed days, 21% reduction in 30-day hospital readmissions, and 89% reduction in nursing home bed days.	The Ohio Preadmission Screening System Providing Options and Resources Today (PASSPORT) HCBS waiver program found that home-based care was associated with considerably lower costs than nursing home care. Annual Medicaid spending for PASSPORT beneficiary was \$23,072 versus nursing home beneficiary spending of \$55,751.

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CLINICALLY APPROPRIATE AND COST EFFECTIVE PLACEMENT			
Title	Author, Year	Health Outcome Findings (when applicable)	Cost Findings (when applicable)
39	Costs for 'Hospital at Home' patients were 19 percent lower, with equal or better outcomes compared to similar inpatients	Cyer L, Shannon SB, Van Amsterdam M, et al. (2012).	Presbyterian Healthcare Services (Albuquerque, NM) adapted the Hospital at Home model to provide acute hospital-level care within patients' homes. Patients show comparable or better clinical outcomes compared with similar inpatients, and better satisfaction levels.
40	Gradual rebalancing of Medicaid long-term services and supports saves money and serves more people, statistical model shows	Kaye, HS. (2012).	This article does not focus on the health outcomes or benefits resulting from Medicaid long-term services and supports. However, it notes that consumers have a strong preference to remain in their homes and communities rather than become institutionalized.
41	Report to Congress: Post Acute Care Payment Reform Demonstration (PAC-PRD)	U.S. Department of Health and Human Services Centers for Medicare & Medicaid Services. (2012).	After controlling for patient acuity measures during the episode, HHA stays have a statistically significant impact on self care and functional ability from admission to discharge. HHA patients had a mean self care change that was 4.02 units higher than that of SNFs. Family involvement and other factors may be associated with admission to home health, which were not included in the model.
42	Acute hospital discharge: why the "right" place is the "best" place	SeniorMetrix. (2011).	Hospitals tend to discharge patients needing post acute care to an incorrect setting at least one-third of the time. SeniorMetrix is a leader in post acute measurement and decision support and performed a study on the outcomes of matched patient populations of patients discharged to a SNF (84 patients) or HHA (126 patients). Their data suggest that those highest functioning patients sent to a SNF would get the same clinical result if they went home and received home health services. Transferring high functioning patients to SNF care actually increased their chances of being readmitted to the hospital within 30 days by 300%.

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CLINICALLY APPROPRIATE AND COST EFFECTIVE PLACEMENT				
Title	Author, Year	Health Outcome Findings (when applicable)	Cost Findings (when applicable)	
43	Effectiveness and cost of a transitional care program for heart failure: a prospective study with concurrent controls	Stauffer BD, Fullerton C, Fleming N, et al. (2011).	The intervention significantly reduced adjusted 30-day readmission rates to Baylor Medical Center Garland (BMCG) by 48% during the post intervention period, which was better than the secular reductions seen at all other facilities in the system.	The intervention had little effect on length of stay or total 60-day direct costs for BMCG. Under the current payment system, the intervention reduced the hospital financial contribution margin on average by \$227 for each Medicare patient with heart failure.
44	Geographic variation in health care: changing policy directions	Bernstein J, Reschovsky JD, White C. (2011).	Analysis shows the need for a policy shift from narrowly targeting specific geographic areas toward a system-wide payment reform to encourage overall efficiency. Sources of variation include the use of clearly ineffective or inappropriate treatments, the rate of injuries /avoidable complications from medical error, and levels of fraud. Health status explained about 30% of the variation and after accounting for price adjustments, about 45%.	Dartmouth Atlas research found that FFS Medicare spending on elderly beneficiaries varies as much as 2.5 times across localities. Policies to reduce Medicare payment or impose costs added costs on beneficiaries in high-cost areas with poor outcomes could threaten patient access, quality of care, and penalize efficient providers. Alternative payment models such as pay for performance or a flat fee to a group of providers would create incentives to coordinate and improve efficiency.
45	Medical care for the elderly living at home: home-based primary care (HBPC) and hospital-at-home programs	The National Health Policy Forum. (2011).	Veterans Affairs (VA) HBPC resulted in a 59% reduction in hospital bed days, 89% reduction in nursing home days, and 21% reduction in 30-day hospital readmission rates. In a study conducted by three Medicare managed care plans and a VA medical center, those treated at the home versus the hospital had fewer clinical complications and experienced higher satisfaction.	Cost savings in non-VA FFS health care needs further study. In hospital-at-home studies, average amounts paid for home-based patients were lower than amounts paid for patients with similar characteristics and conditions who were treated at the hospital.
46	To the hospital and back home again: a nurse practitioner-based transitional care program for hospitalized homebound people	Ornstein K, Smith KL, Foer DH, et al. (2011).	MSVD, a joint program of Mount Sinai's departments of medicine and geriatrics, is the largest academic HBPC program in the U.S. It sought to enhance its HBPC model by implementing a NP-led transitional care program to improve care for hospitalized homebound patients. This program has led to timelier, patient-centered care decision making, but future outcomes for measurement should include changes in medication error, greater patient satisfaction, and less caregiver burden.	The hiring of NPs in this model (1.6 full-time NPs) led to a total annual cost of \$197,000. Given the large amount of unreimbursed costs of this program, more outcome measures must be explored to justify the upfront investment necessary to sustain a transitional care program serving hospitalized homebound people.

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CLINICALLY APPROPRIATE AND COST EFFECTIVE PLACEMENT				
Title	Author, Year	Health Outcome Findings (when applicable)	Cost Findings (when applicable)	
47	Home and community-based Medicaid options for dependent older Floridians	Golden AG, Roos BA, Silverman MA, et al. (2010).	Florida created the Long-Term Care Diversion Program (LTCDP) which is a waiver program where private companies receive a PMPM capitated payment to manage and coordinate the full continuum of LTC needs. However, no studies have determined whether LTCDP enrollees have a lower incidence of ED and hospital admissions.	Total costs to Medicare for LTCDP enrollees have not been analyzed. Because there is much regional variation in costs across the state, it complicates these calculations. Medicare rates per enrollee in Miami are the highest in the nation, and 90% of Medicaid home health costs originate in Miami-Dade county. However, the average monthly Medicaid cost for LTDCP patients from FY 2007/2008 was \$1,624 compared to \$3,839 for Medicaid nursing home patients.
48	Medicare spending and outcomes after postacute care for stroke and hip fracture	Buntin MB, Colla CH, Deb P, et al. (2010).	Relative to discharge home, IRFs improve health outcomes for hip fracture patients. SNFs reduce mortality for hip fracture patients but increase institutionalization for stroke patients.	Both SNFs and IRFs are far more expensive than discharge to home.
49	Post-acute and long-term care: a primer on services, expenditures and payment methods	ASPE, Grabowski DC. (2010).		Total expenditures for nursing facility and post-acute care spending (2008) for SNFs were \$22.9 billion versus \$16.9 billion for HHAs.
50	Geographic correlation between large-firm commercial spending and Medicare spending	Chernew ME, Sabik LM, Chandra A, et al. (2010).	Services such as home care are much less frequent in the commercial population than in Medicare. Common diseases such as heart disease may be treated differently in an over-65 Medicare patient than the under-65 patient in the commercial market due to differences in comorbidities and frailty.	The analysis found a small inverse correlation between measures of commercial and Medicare spending across HRRs. Spending growth was weakly positively correlated across HRRs. The positive correlation in utilization and lack of correlation in spending implies an inverse correlation of prices. Reducing provider market concentration and promoting competitive pricing would cause private markets to work better to reduce cost.
51	McAllen and El Paso revisited: Medicare variations not always reflected in the under-sixty-five population	Franzini L, Mikhail OI, Skinner JS. (2010).	In 2007, Medicare enrollees in McAllen were far more likely to be admitted to the hospital and die in the hospital than those in El Paso. Their care was also more fragmented as evidenced by visits from more than 10 physicians near the end of their lives, signaling a lack of coordinated care.	Medicare spending for the elderly is much higher in McAllen than El Paso, TX. Although spending per Medicare member per year was 86% higher in McAllen than El Paso, total spending per member per year for Blue Cross Blue Shield insured in McAllen was 7% lower than in El Paso. McAllen ranks second only to Miami in terms of overall price-adjusted Medicare spending. The largest difference was for home health: spending in McAllen was 4.63 times the average in El Paso and 7.14 times the national average.

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CLINICALLY APPROPRIATE AND COST EFFECTIVE PLACEMENT				
Title	Author, Year	Health Outcome Findings (when applicable)	Cost Findings (when applicable)	
52	Successful models of comprehensive care for older adults with chronic conditions: evidence for the Institute's of Medicine "Retooling for an aging America" report	Boult C, Green AF, Boult LB, et al. (2009).	An analysis of 15 models of health care supports the finding that interdisciplinary primary care, disease management, preventive home visits, and caregiver support can reduce the use of health services. Interdisciplinary primary care, preventive home visits, and inpatient geriatric evaluation and management (GEM) can increase survival. Preventive home visits, caregiver support, transitional care, and comprehensive inpatient care can also improve patients' QOL and functional autonomy.	Interdisciplinary primary care (for heart failure) and transitional care can reduce health care costs. This provides empirical support for the enthusiasm for the "medical home" concept and care management for patients with complex health care needs.
53	Health care provider evaluation of a substitutive model of hospital at home	Marsteller JA, Burton L, Mader SL, et al. (2009).	Providing acute hospital-level care in the patient's home, as a full substitute for an acute hospital admission for older persons, in Hospital at Home (HaH) has been demonstrated to be clinically feasible, efficacious, and associated with lower rates of important clinical complications, higher patient and family caregiver satisfaction, less caregiver stress, and lower costs.	The health care provider evaluation of substitutive HaH care was positive, providing support for the viability of this innovative model of care. Without provider support, no new model of care will survive, however.
54	Independence at home: community-based care for older adults with severe chronic illness	DeJonge KE, Taler G, Boling PA. (2009).	Expansion of PACE and IAH models is the future for community-based care of persons with chronic illness to effectively manage their clinical and social needs.	Two million elders average per capita costs of over \$50,000 per year. The documented savings from using comprehensive care in a patient's home, ranged from 30% to 50% of total costs.
55	Geographic variation in health care spending	Auerbach D, White C. (2008).	Extensive health and disease status measures (including self-reported) explained about 20% of total variation. However, when people are aggregated into large regional groups, the variation is largely averaged out. Health status (using HCC as a measure) explained 16% of total variation in Medicare spending by state according to a 2003 MedPAC study.	Per capita health care spending varies widely across the U.S. For example, in 2004, per capita spending ranged from \$4,000 in Utah to \$6,700 in Massachusetts. Individuals in high-spending areas receive 60% more in services than those in low-spending areas. Medicare spending would fall by 20% if spending in medium and high-spending regions were the same as low-spending regions.
56	Variations in hospital resource use for Medicare and privately insured populations in California	Baker LC, Fisher ES, Wennberg JE. (2008).	Privately insured PPO or FFS patients in the last two years of life average 2.4 hospital stays at the least-resource-intensive hospital compared to more than 5.0 days at the highest hospital. Physician surveys show that they perceive higher-resource-use systems to be of lower quality as well.	If resource use for chronically ill Medicare patients care at Los Angeles hospitals could match the average for similar patients in Sacramento hospitals, Medicare spending could be reduced by more than \$1 billion a year. This shows how the focus on the local delivery system could lead to greater potential accountability in both quality and cost.

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CLINICALLY APPROPRIATE AND COST EFFECTIVE PLACEMENT				
Title	Author, Year	Health Outcome Findings (when applicable)	Cost Findings (when applicable)	
57	States with more health care spending have better-quality health care: lessons about Medicare	Cooper RA. (2008).	Quality rankings are not only correlated with spending but socio-demographic characters such as income, race, and education. However, more health care spending at the state level <u>as a whole</u> is associated with better-quality health care.	Higher Medicare spending per enrollee correlates with poor-quality health care at the state level leads Dartmouth to conclude that higher Medicare spending is attributed to waste and inefficiency. For instance, high Medicare spending <u>per enrollee</u> in the South is correlated to their poor health quality.
58	Multidimensional preventive home visit programs for community-dwelling older adults: a systematic review and meta-analysis of randomized controlled trials	Huss A, Stuck AE, Rubenstein LZ, et al. (2008).	The meta-analysis revealed that multidimensional geriatric assessment that included a clinical examination and regular follow-up was an important determinant of the program's effects on functional status outcomes. If the assessment is properly performed, functional status decline can be delayed or prevented. The effect of preventive home visits was also more pronounced in younger populations. No effect on nursing home admissions among older adults was found, even in trials with intensive interventions.	
59	A study of stroke post-acute care costs and outcomes: final report	Kramer A, Holthaus D, Goodrich G, et al. (2006).	The report pointed out of some of the main health outcome research findings relating to post-acute care in stroke patients: *Chen et al. found that stroke patients discharged to HH showed more improvement in activity of daily living (ADL) function than those discharged to IRF, SNF, or home without home care at six weeks, six months, and one year post-discharge. *Kane et al. found that stroke patients discharged to HH had lower rehospitalization rates at one year than those discharged to SNFs or IRFs. Kane et al. found that hip fracture patients treated in HH or IRFs had significantly more functional improvement than those treated in SNFs at six weeks, six months, and one year.	Chen et al. also found that costs for patients receiving HH were considerably lower than those receiving care in an institutional setting (SNF or IRF).
60	Comparison of Medicare spending and outcomes for beneficiaries with lower extremity joint replacements	Buntin MB, Deb P, Escarce J, et al. (2005).	Patients who use IRF care are at higher risk of death/long-term institutionalization than those who use no institutional PAC and those who use SNF care are at even higher risk.	Total Medicare PAC payments (for 120 day episodes following acute discharge) for IRF and SNF were \$8,023 and \$3,578, respectively, higher than Medicare payments for those discharged home (reference group).

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CLINICALLY APPROPRIATE AND COST EFFECTIVE PLACEMENT				
Title	Author, Year	Health Outcome Findings (when applicable)	Cost Findings (when applicable)	
61	Comprehensive discharge planning with postdischarge support for older patients with congestive heart failure	Phillips CO, Wright SM, Kern DE. (2004).	Eighteen studies representing data from 8 countries randomized 3,304 older inpatients with CHF to comprehensive discharge planning plus postdischarge support or usual care. Patients with comprehensive discharge planning and post-discharge support had fewer readmissions, lower all-cause mortality, and higher quality-of-life scores than control patients.	Postdischarge support with a home visit could prevent 84,000 readmissions with an estimated reduction in Medicare payments of \$424 million per year, after adjusting for the cost of discharge planning with a home visit. The average cost for administering the intervention in the U.S. was \$80.76 per patient per month.
62	How much is post-acute care use affected by its availability?	Buntin MB, Garten AD, Paddock S, et al. (2004).	Availability of a PAC is a major determinant (more so than clinical characteristics) of whether patients use such care and which type of PAC facility they use.	Further research is needed to evaluate whether a greater supply of PAC leads to either higher use of institutional care and better outcomes-- or the contrary, unwarranted expenditures of resources and delays in returning patients to their homes.
63	Transitional care of older adults hospitalized with heart failure: a randomized, controlled trial	Naylor MD, Brooten DA, Campbell RL, et al. (2004).	At 52 weeks, intervention group patients had fewer readmissions (104 vs. 162).	Intervention patients had lower mean total costs (\$7,636 vs. \$12,481).
64	Geographic variation in Medicare per capita spending: should policy-makers be concerned?	Gold M. (2004).	People in higher spending areas do not receive better care (both in the relationship between use and quality, and spending and appropriateness of care). Positive action/incentives to increase the quality of care could reduce variation, such as disease management and shared performance data.	Studies find that less than one-half the variation in spending across areas is explained by population mix and differences in the price of individual services. Instead, differences in amount and type of care used explain the majority of spending variation.
65	Improving patient outcomes of home health care: findings from two demonstration trials of outcome-based quality improvement	Shaughnessy PW, Hittle DF, Crisler KS, et al. (2002).	Outcome-based Quality Improvement (OBQI) patients had a decline in hospitalization in both the National Demonstration of 27 states (22%) and New York State Demonstration (26%) over the three and four-year demonstration periods. The national OBQI trial was designed to establish and methodology and template to collect uniform (OASIS) data on all adult home health patients to measure and report patient outcomes.	

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CLINICALLY APPROPRIATE AND COST EFFECTIVE PLACEMENT				
Title	Author, Year	Health Outcome Findings (when applicable)	Cost Findings (when applicable)	
66	Home-based intervention (HBI) in congestive heart failure: long term implications on readmission and survival	Stewart S, Horowitz JD. (2002).	Overall, HBI patients accumulated 16% fewer unplanned readmissions (396 vs. 475). The duration of readmission was shorter for HBI (8.2 days) versus usual care (8.8 days).	The usual care group was more likely to be admitted to higher cost hospital care (e.g. intensive care) with a mean cost of \$711 versus HBI of \$595 (Australian). The average cost of applying the HBI was \$600/patient (Australian), when taking into account the home visit costs and additional primary care, cardiology and pharmacy consults.
67	Home visits to prevent nursing home admission and functional decline in elderly people	Stuck AE, Egger M, Hammer A, et al. (2002).	Preventative home visitation programs are effective only if interventions are based on multidimensional geriatric assessment, include multiple follow-up home visits, and target persons at lower risk for death and those who are relatively young. The assessment delays or prevents functional status decline, and the follow-up visits reduce nursing home admissions.	Preventative home visits require an initial assessment of \$433 per person the first year to produce a net savings of \$1,403 per person annually in the third year.
68	Effectiveness of home based support for older people: systematic review and meta-analysis	Elkan R, Kendrick D, Dewey M, et al. (2001).	Home visiting was associated with a significant reduction in mortality (0.72; 0.54 to 0.97). Home visiting was also associated with a significant reduction in admissions to LTC institutional care for the elderly (0.65; 0.46 to 0.91).	
69	Rates of hospitalization for ambulatory care sensitive conditions in the Medicare+Choice population	McCall N, Harlow J, Dayhoff D. (2001).	ACSCs could be used as sentinel events for potentially vulnerable populations because the oldest and disabled have higher rates of ACSC admission than younger Medicare beneficiaries. If treated with timely primary care and properly managed outpatient care, medical practitioners agree that most ACSCs (e.g. bacterial pneumonia, diabetes) should not require hospitalization. Over 70% of all ACSC admissions were for CHF, pneumonia, and asthma/COPD.	By targeting commonly defined ACSCs (because lack of primary care for ACSCs does lead to hospitalizations), the rate of preventable admissions could increase access and quality while decreasing unnecessary costs for the oldest M+C beneficiaries.
70	Home or hospital for stroke rehabilitation? Results of a randomized controlled trial: II: cost minimization analysis at 6 months	Anderson C, Mhurchu CN, Rubenach S, et al. (2000).	The economic results indicate that an established scheme could play an important role in the release of hospital beds and be a cost-effective approach to the rehabilitation of patients with stroke.	The mean cost per patient was lower for patients randomized to the early hospital discharge and home-based rehabilitation Australian (\$8,040) compared with those who received conventional care (\$10,054).

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CLINICALLY APPROPRIATE AND COST EFFECTIVE PLACEMENT			
Title	Author, Year	Health Outcome Findings (when applicable)	Cost Findings (when applicable)
71	The cost effectiveness of post-acute care for elderly Medicare beneficiaries	Chen Q, Kane RL, Finch MD. (2000).	Home health care is more cost effective than PAC in SNFs or IRFs. These results provide a basis for a more efficient Medicare reimbursement system for PAC.
72	The optimal outcomes of post-hospital care under Medicare	Kane RL, Chen Q, Finch M, et al. (2000).	Patients discharged to nursing homes fared worst and those sent home with home health care or to rehabilitation did best. Because the cost of rehabilitation is high, greater use of home care could result in improved outcomes at modest or no additional cost.
73	Effects of a multidisciplinary, home-based intervention on planned readmissions and survival among patients with chronic congestive heart failure: a randomised controlled study	Stewart S, Marley JE, Horowitz JD. (1999).	There were fewer unplanned readmissions (68 vs. 118) and associated days in hospitals (460 vs. 1173) for those in the home-based intervention versus the "usual" hospital based intervention for chronic CHF patients discharged after an acute care stay. Australian hospital-based costs were \$490,300 for the intervention home-based care and \$922,600 for the usual hospital-based care.
74	Evidence suggesting that a chronic disease self-management program can improve health status while reducing hospitalization	Lorig KR, Sobel DS, Stewart AL, et al. (1999).	A chronic disease self-management program was designed for patients with physician-confirmed heart disease, lung disease, stroke, or arthritis. Patients enrolled in the program had reduced rates of hospitalization and fewer nights in the hospital. Six-month healthcare costs \$820 less than control groups.
75	Effects of a home-based intervention among patients with congestive heart failure discharged from acute hospital care	Stewart S, Pearson S, Horowitz JD. (1998).	Examines the effect of a home-based intervention (HBI) on readmission and death among "high risk" patients with congestive heart failure discharged home from acute hospital care. Patients in the HBI group had fewer unplanned readmissions (36 vs. 63) and fewer out of hospital deaths (1 vs. 5). Due to reduced frequency of unplanned readmissions within 6 months of hospital discharge, Medicare would save money on acute hospital stays through more home-based interventions for high risk Medicare beneficiaries. The mean cost of hospital based care was \$3,200 versus \$5,400 on the usual care group.

Appendix D

NEW CARE DELIVERY AND PAYMENT MODELS				
Title	Author, Year	Health Outcome Findings (when applicable) or Program Design	Cost Findings (when applicable) or Implications	
76	Lessons from Medicare's demonstration projects on disease management and care coordination	Nelson L. (2012).	On average, the 34 programs had no effect on hospital admissions or regular Medicare expenditures (that is, expenditures before accounting for the programs' fees). There was considerable variation in the estimated effects among programs, however. Programs in which care managers had substantial direct interaction with physicians and significant in-person interaction with patients were more likely to reduce hospital admissions than programs without those features.	After accounting for the fees that Medicare paid to the programs, Medicare spending was either unchanged or increased in nearly all of the programs.
77	Medicare's readmissions-reduction program – a positive alternative	Berenson RA, Paulus RA, Kalman NS. (2012).	Reductions of as much as 10% in admissions from any cause could result if hospitals aggressively tried to reduce readmissions, given the success of programs offering limited financial incentives. The authors propose a “warranty” approach to reducing readmissions, so Medicare could eliminate or reduce payments (perhaps to the variable cost for the admission) for many or perhaps all readmissions within a designated interval after discharge. This proposal would remove entirely the incentives associated with payments for avoidable readmissions.	Although these effects are desirable outcomes for patients and payers, they detrimentally affect hospitals' finances. Unless they are at maximum capacity, hospitals face two major economic disincentives to reducing readmissions for the specified diagnoses: the direct costs of the program itself and decreased revenues resulting from successful interventions. Interventions to create and sustain reductions in readmissions typically average \$100 to \$200 per discharge and often have spillover effects, decreasing hospitalizations for nontargeted diagnoses and reducing readmissions from any cause even outside the 30-day window and across payers.
78	“Bundling” payment for episodes of hospital care: issues and recommendations for the new pilot program in Medicare	Komisar HL, Feder J, Ginsburg PB. (2011).	First, a key criterion in selecting conditions is to choose diagnoses for which medical interventions are well-established and supported by evidence. A second criterion in choosing diagnoses for the pilot is volume. Third, it is desirable to focus initially on conditions for which there is substantial variation in treatment patterns and expenditures, even after controlling for patients' characteristics—as long as there are practice guidelines to inform practitioners.	The bundled payment amount would vary based on the condition being treated and be adjusted for additional health conditions of the patient that affect care needs for the episode—adjusted for the patient's severity and complexity. The provider entity receiving the payment would in turn need to figure out a method of sharing payment and risk among the participating providers. Financial rewards or penalties could be computed by comparing actual Medicare spending for a set of covered episodes with a benchmark based on what would have been paid using a single bundled payment for this set of episodes.

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79	Large variations in Medicare payments for surgery highlight savings potential from bundled payment programs	Miller DC, Gust C, Dimick JB, et al. (2011).	Bundled payment may have mixed effects on providers. Incentives need to be stronger for providers to focus on continued improvements in care coordination and efficiency.	Current Medicare episode payments for certain inpatient procedures varied by 49-130% across hospitals. Hospitals have considerable room to improve cost efficiency for inpatient surgery and should look for patterns of excess utilization (in surgical specialties and types of postdischarge care). The average total episode payment for Medicare beneficiaries undergoing elective hip replacement, coronary artery bypass grafting, back surgery, or colectomy was \$20,807, \$42,194, \$26,540, and \$26,491.
80	Medicare's bundling pilot: Including post-acute care services	Dummit LA. (2011).	The ability to assess the value of the services is particularly important under a bundled arrangement to protect the welfare of the patient. Measures that have been used to assess the effectiveness of post-acute care include return to the community; ADLs; IADLs; function related to walking, self-reported health, and satisfaction; rehospitalizations; and mortality. Some of these measures are objective and could be adjusted to account for differences across patient types. Others, however, are at least somewhat subjective and reflect social supports as well as the adequacy of rehabilitation or recovery.	The payment amount for the bundle of services needs to be set appropriately to reward entities that deliver an episode of care efficiently and provide incentives for improvement. If the payment is too low, participation may be limited and any entity that does participate will have stronger incentives to stint on services or avoid potentially high-cost patients. If the payment is too high, Medicare and the beneficiaries will be paying too much and the entity will not need to implement the desired efficiencies.
81	Medicare's bundled payment pilot for acute and postacute care: analysis and recommendations on where to begin	Sood N, Huckfeldt PJ, Escarce JJ, et al. (2011).	Bundling could mitigate some of the negative incentives of the current system—which result in a lack of care coordination, movement of patients among care sites for the purposes of maximizing reimbursement, and other effects that raise costs and probably produce worse outcomes for patients. However, bundling may also have unintended adverse consequences, such as restricting patients' choice of postacute care providers and stinting on care.	Applying an outlier system of payments to a substantial number of patients, or even to all patients, could also reduce skimping, as well as providers' financial risk and limitations on patients' choice of postacute care providers. The general idea would be to have some additional payment above the payment bundle, to be paid in the event of a particularly high-cost case. Finally, contracts that allow for gain and loss sharing could balance the need to achieve savings with the amount of risk placed on providers.

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82 Opportunities and challenges for episode-based payment	Mechanic RE. (2011).	Episode-based payments can be developed around clinical guidelines and used to engage clinicians in quality improvement. Geisinger Health System's experience creating evidence-based care processes in conjunction with episode-based payment for cardiac surgery is a notable prototype. Episode-based payment creates incentives to improve clinical integration for specialty service lines, in contrast with the emphasis on primary care typical of capitation or shared-savings programs.	Episode-based payment is much more complex to administer than fee-for-service or capitation and thus faces substantial implementation challenges. Episode payment systems must also designate which services count toward particular episodes for patients with multiple health conditions. Financial incentives for quality would ensure that providers do not skimp on necessary services within episodes.
83 Reforming payments to healthcare providers: the key to slowing healthcare cost growth while improving quality?	McClellan M. (2011).	While bundled payments using quality measures may achieve higher quality and lower costs within the bundle, the effect on overall healthcare costs and health outcomes may be harder to determine. Defining an "episode" requires making some challenging judgments about where care for the condition ends and where care for everything else begins.	The bundled payments offer a direct incentive to reduce costs across the services in the bundle, while the linkages to quality measures try to assure that the cost reduction occur through steps that improve overall quality—or at least do not hinder it.
84 Acute and postacute payment: from a culture of compliance to a culture of innovation and best practice	DeJong G. (2010).	Quality and outcome metrics chosen must have adequate validity and reliability, offer precision, and be feasible to collect. Bundling could "squeeze out" unnecessary utilization and reduce the need for certain kinds of services within a given episode.	To work effectively, the payment system must adjust for patient case-mix and include a P4P component to avoid stinting. A P4P component would also encourage upstream acute providers to work with downstream postacute providers. Financial gain sharing is necessary as well as an outlier payment policy for patients with unique needs. Bundling has the potential to restore provider "autonomy" and align incentives to achieve real value.
85 Episode-based payments: charting a course for health care payment reform	Pham HH, Ginsburg PB, Lake TK, et al. (2010).	Adjustment of payments for performance on quality measures is critical for any episode-based payment program that seeks to substantially improve the quality of care and hold providers accountable for outcomes under any incentives that might prompt providers to withhold needed care.	Payment rates for episodes should be based on external cost benchmarks; guideline-based standards; and be revised and updated based on cost trends over time. Policymakers cannot assume that appropriate adjustments will occur without adequate resources and oversight.

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86 Medicare payments for common inpatient procedures: implications for episode-based payment bundling	Birkmeyer JD, Gust C, Baser O, et al. (2010).	Hospitals should implement better systems for monitoring, benchmarking, and improving their quality and cost-efficiency with inpatient surgery. Physicians, the primary drivers of utilization, should redouble their efforts to eliminate clinical waste. Hospitals and physicians will need to collaborate on strategies for enhancing care coordination as surgical patients leave the hospital.	Fully bundled payments for inpatient surgical episodes would need to be dispersed among many different types of providers. Hospital payments—both overall and for specific services—vary considerably and might be reduced by incentives for hospitals and physicians to improve quality and efficiency.
87 Piloting bundled Medicare payments for hospital and post-hospital care: a study of two conditions raises key policy design considerations	Avalere Health. (2010).	This analysis shows that a 30-day bundle length would capture nearly all of the care for joint replacement and COPD patients during an initial hospital stay, first PAC and a rehospitalization. Using this episode of care, providers could improve care transitions, form value-based partnerships and reduce hospitalizations. However, a 30-day bundle may not be adequate for those with longer episode times.	Post-acute bundling could have enormous implications, affecting the way Medicare reimburses for over \$200 billion of hospital and post-hospital care and transforming the delivery for the chronically ill and disabled.
88 Building a bridge from fragmentation to accountability —the Prometheus payment model	de Brantes F, Rosenthal MB, Painter M. (2009).	Bundled payment aims to foster outcomes-based collaboration and offer a bridge from a fragmented system to a more integrated, accountable one. It encourages reduction in avoidable complications of care.	Currently PAC accounts for 22% of all private sector health care expenditures in the US, and as much as 80% of all dollars for conditions such as CHF that require significant management and have significant regional variation. If potentially avoidable costs were reduced by 10-15% in the Medicare population, the country's health bill would be reduced by \$700 billion over 10 years.
89 Clinician feedback on using episode groupers with Medicare claims data	Thomas F, Caplan C, Levy JM, et al. (2009).	This article reported clinicians' reaction to seven episode grouper design issues. The authors noted that home health care is part of the continuum of care, therefore, should be included in the same episode as the inpatient hospital stay when measuring physician resource use. Some concerns about the design include validating the grouper logic, risk adjustment, homogeneity of episode costs, adequate sample size, and quality performance.	Any system measuring physician efficiency must also include measures of quality, since lower expenditures may result from an unacceptable level of quality.

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90	Effects of payment changes on trends in post-acute care	Buntin MB, Colla CH, Escarce JJ. (2009).	Although the effects of the payment systems on the use of postacute care varied, most reduced the use of the site of care they directly affected and boosted the use of alternative sites of care. Payment system changes do not appear to have differentially affected the severely ill. This is an important finding as an unintended consequence of prospective payment may be selection (i.e., discrimination) against the sickest patients within a diagnosis group.	Payment system incentives play a significant role in determining where Medicare beneficiaries receive their post-acute care. Changing these incentives results in shifting of patients between post-acute sites.
91	Episode-based performance measurement and payment: making it a reality	Hussey PS, Sorbero ME, Mehrotra A, et al. (2009).	When quality of care is measured, the focus is on discrete services within separate settings rather than the overall quality of the care. Medicare beneficiaries receive care from a median of 7 physicians. Episode-based approach strengthens incentives for better coordination across providers.	Pilots can be used for a "building block" approach, such as Medicare ACE or Physician Hospital Collaboration, to include more conditions and settings. Episode payment is also being tested in Geisinger's cardiac care episodes and PROMETHEUS Payment for several acute and chronic conditions.
92	Payment reform options: episode payment is a good place to start	Mechanic R, Altman S. (2009).	Although payers with market power can reduce spending by cutting FFS payments, doing so in a fragmented system will create serious quality problems. Payment reform must also be accompanied by new investments in quality measurement, comparative and cost-effectiveness research, IT, and techniques for managing complex chronic illnesses. Payers will encounter less resistance if they develop episode payments within a quality improvement framework.	Four payment reform options include: recalibrating FFS; instituting pay-for-performance (P4P); creating episode payments that combine hospital and physician reimbursement; and adopting global payment approaches such as capitation.

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93	Using Medicare payment policy to transform the health system: A framework for improving performance	Guterman S, Davis K, Schoenbaum S, et al. (2009).	(1) Global fee for primary care - Avoiding preventable hospitalizations with good primary care, ED overuse, overprescribing, and unnecessary specialist referrals would generate reduced overall patient care costs relative to what would be anticipated under the traditional system, as well as improving care. (2) Global DRG case rate - would give hospitals greater control of the resources they use to treat their patients, reimbursement that covers a continuum of care over 30 days after admission, and the opportunity to benefit from savings resulting from reduced complications and readmissions. (3) Per enrollee payment for IDss - care could be managed by these organizations in away to yield both higher quality and more prudent use of resources.	New payment approaches include (1) a global fee for primary care; (2) a global DRG case rate for each hospitalization, including postacute care, subsequent hospital admissions, and ED care for thirty days after the initial discharge; and (3) per enrollee payment for IDss.
94	Collective accountability for medical care – toward bundled Medicare payments	Hackbarth G, Reischauer R, Mutti A. (2008).	The FFS payment system does not provide incentives to ensure care throughout an episode is coordinated. Bundling payments creates incentives for providers to contain their own costs and improve collective efficiency with other providers.	Under a bundled payment system, Medicare would pay a single provider entity a fixed amount to cover the cost of providing a full range of Medicare-covered services during the episode, such as a hospital stay plus 30 days post discharge. To encourage joint accountability, payment for physician services as well as hospital and PAC services must be included in the bundle.
95	Paying for care episodes and care coordination	Davis K. (2007).	Given the fragmented health care system and lack of continuity in the patient-physician relationship, new payment methods are warranted.	FFS is viewed as an obstacle to achieving effective, coordinated, and efficient care. Pay for performance is one strategy to transition to fundamental payment reform. Payments to hospitals and physicians for care episodes could be based on the performance of all medical staff affiliated with a specific hospital.
96	Bundled Medicare payment for acute and post-acute care	Welch PW. (1998).		The bundling of payment for acute and postacute care services offers the opportunity of budgetary control over at least one-half of the services provided to Medicare beneficiaries through SNFS, IRFs and HHAs, and bundling would not increase the risk to the typical hospital.